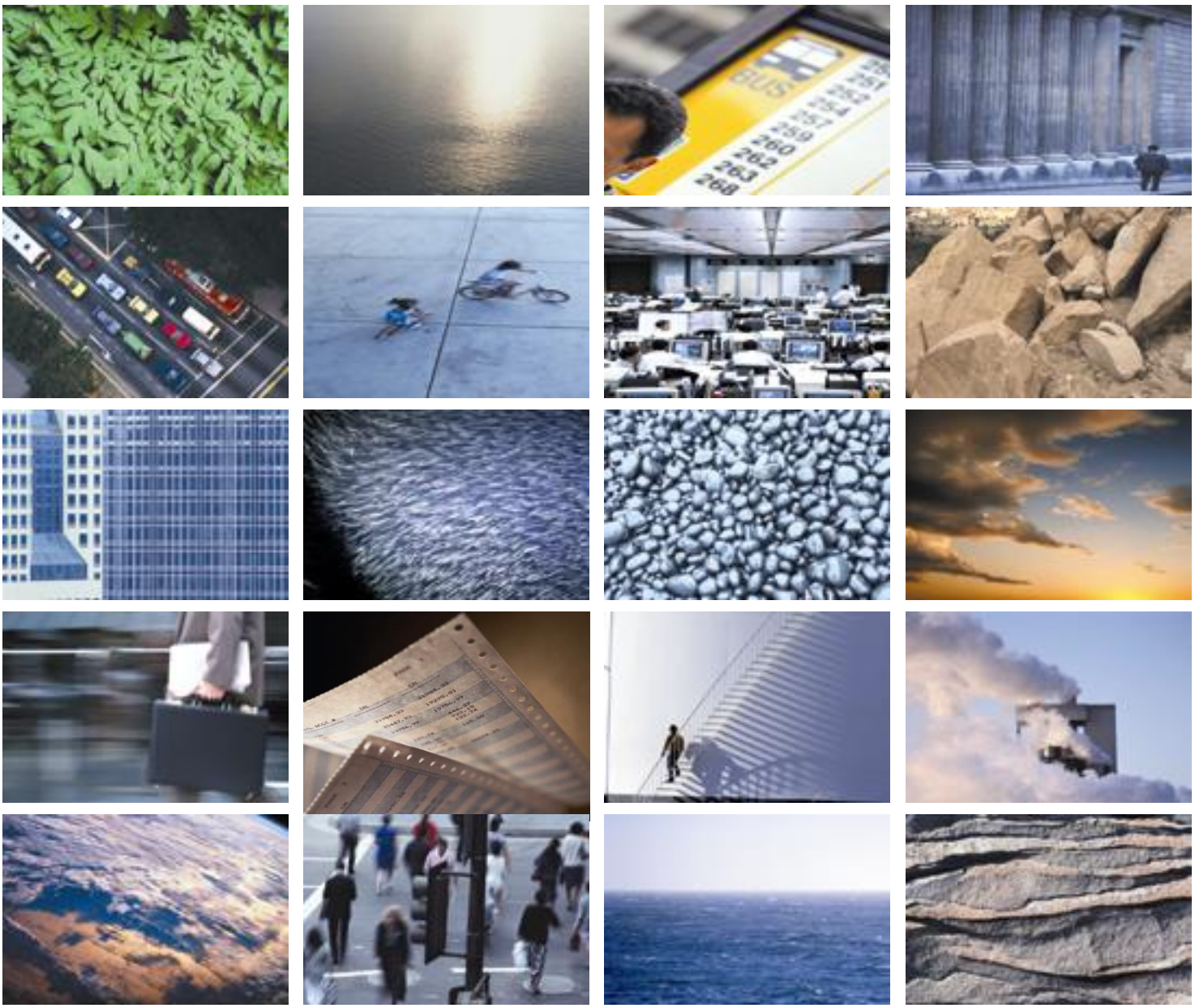

Initial Environmental Examination (IEE) of 3D Offshore Seismic Survey in Myanmar Offshore Block MD-4

Eni Myanmar B.V.

Main Report

May 2017

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FINAL REPORT

Eni Myanmar B.V.

Initial Environmental Examination (IEE) of 3D Offshore Seismic Survey in Myanmar Offshore Block MD-4

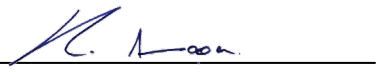
May 2017

0325189

Prepared by: ERM-Siam Co Ltd

For and on behalf of ERM-Siam Co Ltd

Approved by: Kamonthip Ma-oon

Signed: 

Position: Partner

Date: 12 May 2017

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION AND PROJECT BACKGROUND

Eni Myanmar B.V. (Eni) is planning to conduct a 3D Offshore Seismic Survey in Myanmar Offshore Block MD-4, for which Eni signed a Production Sharing Contract (PSC) in March 2015 (the activity will be referred from now on as "the Project"). The survey is tentatively planned in Q4 of 2017, depending on the timeline for receiving the appropriate approvals, which will be discussed further in ***Chapter 3***.

Block MD-4 is located in the Moattama-South Andaman Basin, approximately 240 km West of Myeik and 450 km South of Yangon. The Block covers an area of 5,900 km^2, and water depths range from 1,500 to 2,200 m. The Project is expected to take 100 days from start to finish, as will be detailed further in ***Chapter 4***.

In Myanmar, as per Annex 1 of the EIA (Environmental Impact Assessment) Procedure dated 29th December 2015, an IEE study is required to be undertaken for Offshore Seismic Acquisition Projects that have the potential to cause environmental, social and health impacts in order to receive approval from the Myanmar authorities. The Ministry of Natural Resources and Environmental Conservation (MONREC) is responsible for environmental assessment in Myanmar. The Project has made reference to the final *EIA Procedure*[1] as well as the *Draft Administrative Instruction* provided by MONREC in July 2015.

1.2 DESCRIPTION OF PROJECT

This section provides a summary of the general description of the physical features and activities associated with the 3D marine seismic survey in the Concession Block MD-4, Offshore Myanmar, which includes:

- Project Location;
- Description of Project Activities; and
- Project Schedule.

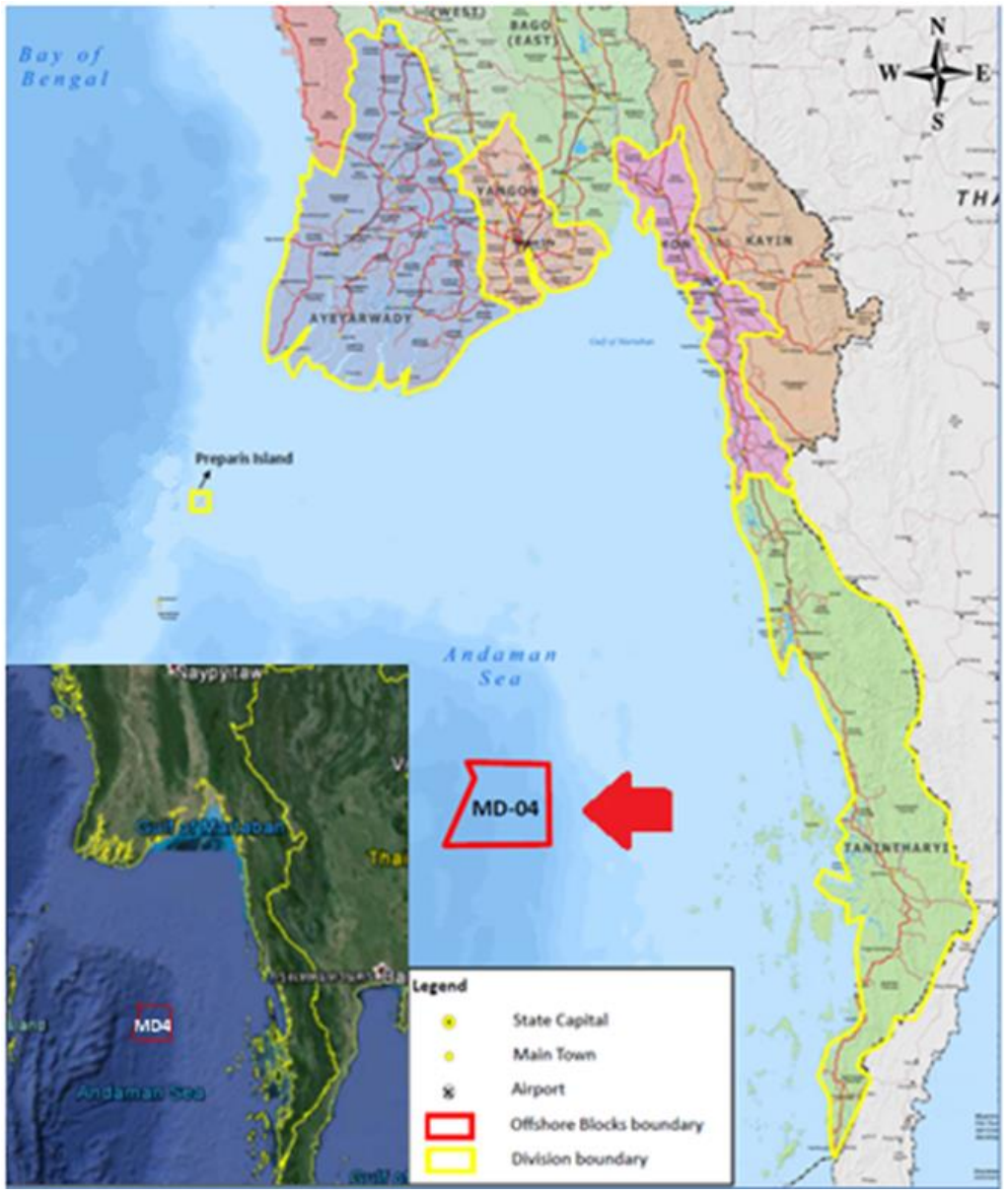
A full description of the Project and Alternatives is presented in ***Chapter 4*** of this IEE Report.

[1] Pursuant to Section 7 of the Environmental Conservation Law (2012) and Articles 52 and 53 of the Environmental Conservation Rules (2014) of the Republic of the Union of Myanmar

1.2.1 Project Location

The Petroleum Concession Block MD-4 is located in the Moattama-South Andaman Basin, approximately 240 km West of Myeik and 450 km South of Yangon. The Block covers an area of 5,900 km², and water depths range from 1,500 to 2,200 m (***Figure 1.1***).

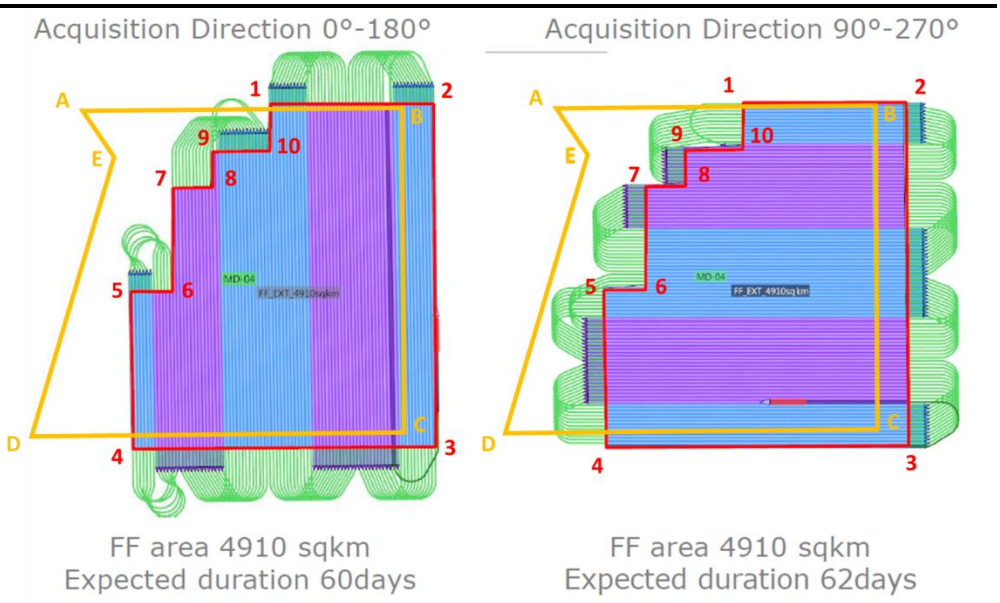
Figure 1.1 Location of Offshore Block MD-4



Note: Not to scale
Source: Eni, 2016

The 3D seismic survey will have a Shooting Direction of E-W with 16 streamers configuration. The project will cover maximum area of 4,910 km². The survey area is shown in ***Figure 1.2***

Figure 1.2 ***Preliminary Fullfold Survey Area***



Note: Not to Scale
Source: Eni, 2016

1.2.2 *Preparation Phase*

1.2.2.1 *Notification of Project Activities to Relevant Authorities and Stakeholders*

Before beginning seismic operations, Eni will coordinate with relevant government authorities and stakeholders via a "Notice to Mariners", sent to the Myanma Oil and Gas Enterprise (MOGE), at least four weeks prior to the survey. This is to inform stakeholders of the schedule of the Project in order to allow time for them to remove their fishing gears from the survey area.

1.2.2.2 *Site Survey and Site Preparation*

Major obstacles, such as fish traps and other static fish gear on the seabed of the survey areas may need to be moved before the survey to avoid damaging the seismic equipment and to prevent accidents. It will be necessary therefore to conduct a preliminary reconnaissance survey of the area at least one week before data acquisition to locate these potential obstacles. A detailed site survey will be conducted at least one week prior to the seismic survey to scout the survey lines to identify and log the location of any obstacles (including debris).

1.2.3 *Seismic Survey Phase*

1.2.3.1 *Seismic Data Acquisition*

During a marine seismic survey, a slow moving survey vessel tows an impulse-emitting sound source (array of airguns). High energy low frequency sounds (termed shots; created by the controlled release of compressed air) are produced by the airguns and directed downwards at the seabed and underlying sub-seabed geology. These sound waves bounce off the sub-

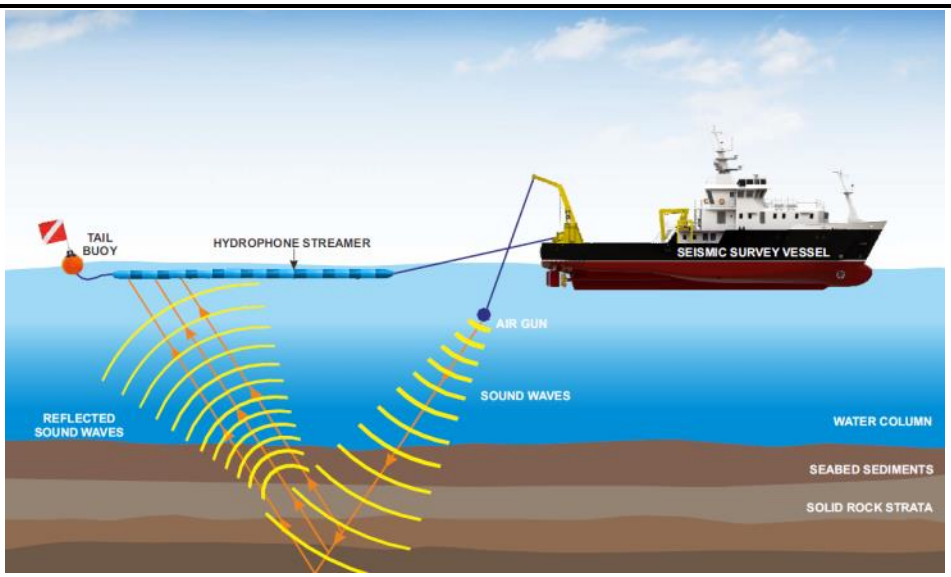
surface rock formations and return to the surface where the seismic energy is collected by an array of receivers (hydrophones). The acquired data are then recorded by onboard computers for subsequent data processing and interpretation. An illustration of the principle of a typical marine seismic survey operation is shown in ***Figure 1.3***, and an example of the layout of streamers and vessel is shown in ***Figure 1.4***.

For this Project, it is proposed to use a broadband seismic technique. The receivers (hydrophones) will be encased in streamers (at least 16), with an active length of 8,000 m behind the seismic vessel, at a depth of 12 or 18 m below the sea surface. Streamers will be separated by 100 m. The source depth can be varied from 6 m to 8 m.

The seismic survey will be performed using vessels of varying nature and function. In particular the fleet will comprise one seismic vessel (towing vessel), one support vessel and two chase vessels. Vessels will be operated 24h/7d for the entire duration of the survey and approximately 70 personnel will be involved in the survey. The seismic vessel will move at a speed of about 4.3 knots, and will follow a pre-planned set of survey lines. The vessel will utilize GPS to track the exact location of the seismic gear being towed.

Chase vessels will accompany the survey vessel during 3D seismic survey activities. One vessel, the 'mother chase vessel' hired by the seismic survey contractor, will sail approximately 500 m in front of the survey vessel. At least two chase vessels, typically local fishing boats, will sail on each side and at the back of the survey vessel at a distance of 500 m.

Figure 1.3 Schematic of Marine Seismic Survey



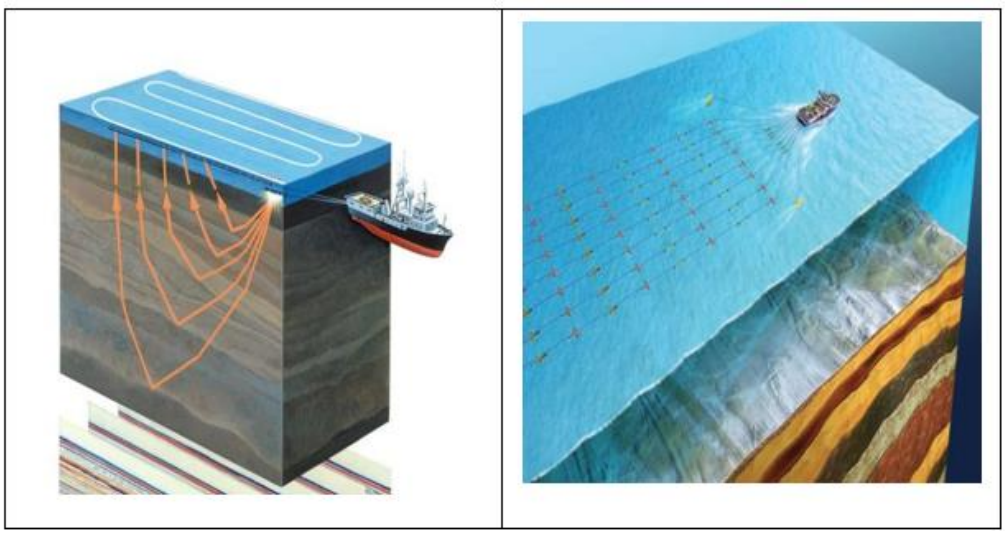
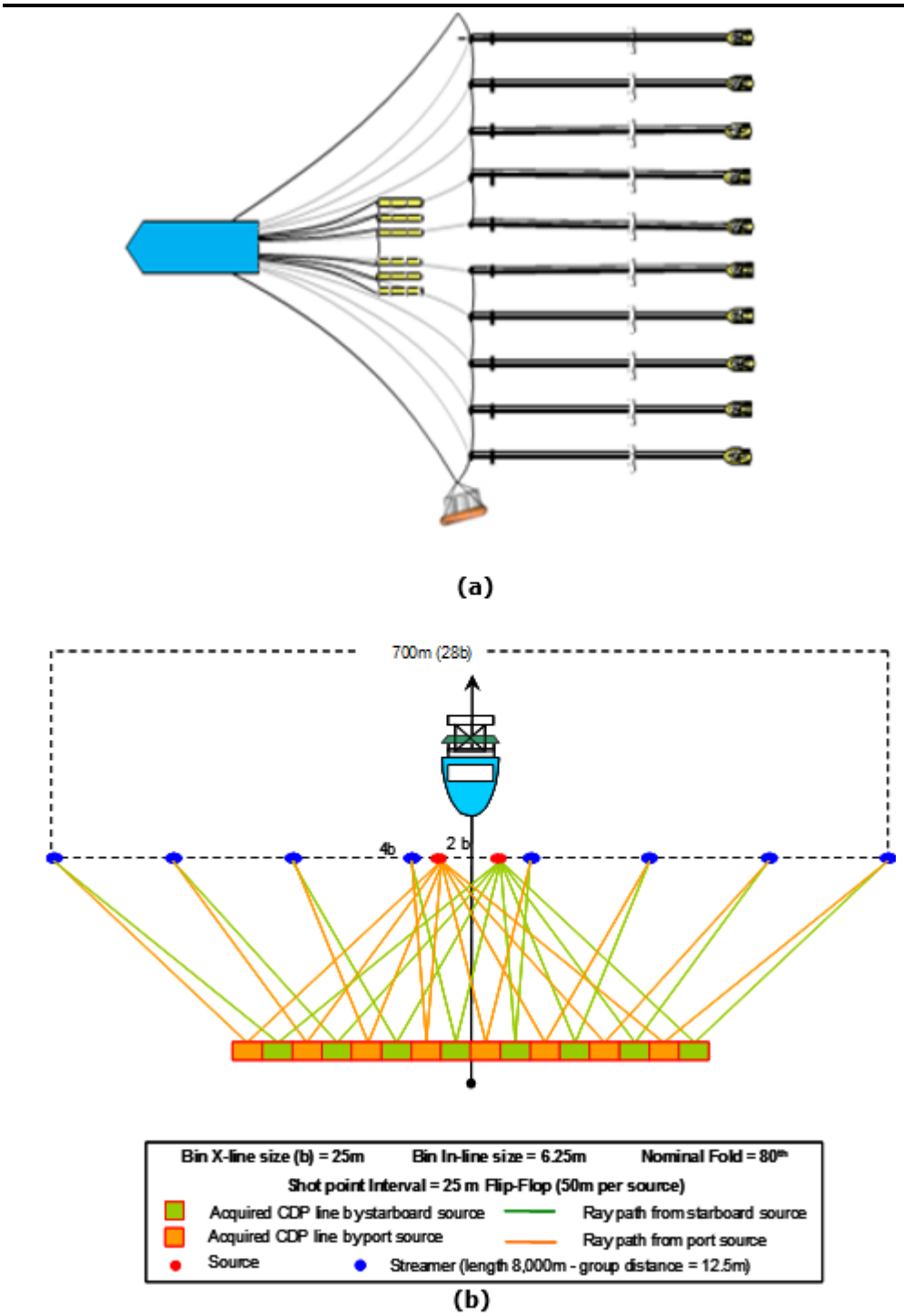


Figure 1.4 3D Seismic Survey Vessel



1.2.3.2 *Demobilization*

Upon completion of 3D seismic surveys, all seismic equipment, buoys and markers will be demobilized from the survey areas and all contracted vessels will be signed off and released. Shipping and fishing activities in the seismic area are expected to resume to normal.

1.2.3.3 *Seismic Data Processing and Interpretation*

Seismic data recorded on board will be transferred to a specialized processing center onshore, where data will be processed using specific software, which will aid future determination of the locations of exploration wells.

1.3 *PROJECT SCHEDULE*

A tentative project schedule for the 3D seismic survey is presented in ***Table 1.1***.

Table 1.1 Tentative Project Schedule for 3D Seismic Survey in Block MD-4

Project Activity	Schedule
Notification of Project	One month before site survey
Vessel in port	Kick Off Meeting & HSE audits of the seismic and supply vessels
Site survey and site preparation • Conduct a survey of obstructions e.g. fish traps, etc in the survey area, and remove all obstructions as required.	At least one week before commencement of seismic survey activity
3D Seismic data acquisition in Block MD-4	Starting date: Q4 2017. The seismic survey is approximately 100 days
Demobilization	Q4 2017

1.4 *SUMMARY OF RELEVANT LEGISLATION*

The *Final EIA Procedure* for Myanmar were promulgated on 29th December 2015. The procedures were prepared by the Ministry of Natural Recourses and Environmental Conservation (MONREC), formerly called the Ministry of Environmental Conservation and Forestry (MOECAF), along with the support of an EIA Review Team Committee comprising the members of relevant union ministries, union attorney general's office, three city development committees and Non-governmental Organisations (NGOs) and technical support by experts from the Asian Development Bank Greater Mekong Region – Environment Operations Centre (ADB GMS-EOC).

Under the *final EIA Procedure* (refer to the *EIA Procedure* thereafter), there is a requirement for the undertaking of an IEE or an EIA in order to obtain an ECC for certain development projects (1). This process is elaborated further in ***Chapter 3*** of this IEE, along with a complete list of laws related to environmental and social issues and hence relevant to the IEE Study for the proposed seismic surveys.

(1) Under Section 7 of the Environmental Conservation Law (2012) and Articles 52, 53 and 55 of the Environmental Conservation Rules (2014) of the Republic of the Union of Myanmar.

1.5 SUMMARY OF SURROUNDING ENVIRONMENT

Due to the relatively remote offshore location of the Project works, the biological nature of the seismic survey area in Block MD-4 is considered to be of relatively low ecological value compared to more productive near shore areas. The deep waters are not expected to support communities of high ecological importance, however, it is noted that marine mammals, marine turtles and seabirds may occasionally pass through these waters.

In terms of social environment, the most important aspect is relevant to the fisheries. Block MD-4 is located within the Tanintharyi Fishing Area. In addition to offshore fisheries, there are likely fishing activities on the islands closest to Block MD-4 (Coco Islands and Preparis Island), but little documented information is available. According to discussion with local regional offices, only fishery groups from Tanintharyi Region are likely to be located within Block MD-4. Full details on the physical, biological, and social environment in the Project area are presented in ***Chapter 5*** of this IEE.

1.6 HIGHLIGHTS OF KEY IMPACTS AND MITIGATION MEASURES

A summary of key impacts from the Project, as well as the results of impact assessment, and key mitigation measures, are listed in ***Table 1.2***. This is only a brief summary of the most important impacts and mitigation measures. Full details on all potential impacts from each activity are presented in ***Chapter 6***, and a list of mitigation measures for each impact is presented in ***Chapter 7***.

The mitigation measures are put in place to reduce the likelihood of the impacts identified, and/or to limit the extent or severity of impact if one does occur. The purpose of the proposed mitigation measures is to manage identified impacts, comply with regulations and ensure that standards of international industry practice are adopted during the execution of all Project activities.

It should be noted that all identified potential impacts can be appropriately managed with the implementation of these mitigation measures, and there are no major residual impacts from Project activities.

Table 1.2 Highlights of Key Potential Impacts and Mitigation Measures

Potential Impacts	Mitigation Measures	Significance of Residual Impact
Impact on marine life forms, especially marine mammals due to noise generated by airgun	• Ensure that survey contractor follows codes of good practices for seismic survey, especially measures to minimise impact on marine mammals. • Implement the 'Pre Start-up Visual Observation Procedures' (also known as "Pre-shooting search) as per JNCC Seismic Guidelines[1] – make a visual check from a suitable high observation platform to see if there are any marine mammals within a 500 m radius at least 30 minutes prior the commencement of seismic acquisition. In deep waters (>200m) the pre-shooting search should extend to 60 minutes as deep diving species (e.g. sperm whale and beaked whale) are known to dive for longer than 30 minutes. • If mammals are observed during the pre-shooting search, delay the start of the seismic sources until the marine mammals have moved out of the 500 m radius, or 20 minutes after the last sighting within 500 m. • Implement "Soft Start Procedures" as per JNCC Seismic Guidelines. Power should be built up slowly from a low energy start-up (e.g. starting with the smallest airgun in the array and gradually adding in others) over at least 20 minutes to give adequate time for marine mammals to leave the area. This build up of power should occur in uniform stages to provide a constant increase in output. • Implement passive acoustic monitoring (PAM), whereby sea mammal vocalization is monitored to determine whether there may be any mammals near the survey vessel, especially during night time or low visibility operations when mammals may not be able to be visually observed. • Maintain visual observation continuously during soft starts and operations to determine the presence of marine mammals. • After detecting marine mammals, a record shall be made that includes observation detail and marine mammal description, such as the seismic vessel coordinates and distance between the vessel and the marine mammal, and if possible, species & number of the marine mammal, frequency and duration of marine mammal in the observation area. Recorded information shall be collected in Observation Report for future reference. • Utilize chase vessels to monitor the survey area at least 24 hours prior to commencement of airgun array operations. • Where possible and data is available, maintain awareness and observation of the periods of migration of the most present species in the Project area, in order to stop the activities during those periods.	Minor

[1] JNCC guidelines for minimising the risk of injury and disturbance to marine mammals from seismic surveys August 2010

Potential Impacts	Mitigation Measures	Significance of Residual Impact
Fishermen may temporarily be unable to carry out fishing activities in some areas during survey	• At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy). • At least two/three weeks prior to survey Eni will engage fisheries liaison officers: one to stay on each Support Vessel, one to stay on the Chase Boat, and one to stay on the seismic vessel. Such fishery representatives will be fully qualified, and have offshore safety certificates, and preferably have experience with of offshore seismic operations. They will be responsible for and are in charge to take care of coordination activities for a proper "Fishing Activity Disruption". • Patrol the seismic survey area for at least one (1) week before commencing seismic survey activity, and remove all obstructions in the survey area. Record location and details of removed fishing gear. • Fishing vessels operating over the proposed survey lines for a marine seismic survey, or those in danger of passing over the deployed streamer will be warned off by the chase boats. • Chase vessels will be available to warn vessels to keep clear of the seismic survey vessel and associated trailing equipment, and to escort any unauthorised vessels out of the Project Area. In addition, stationary fishing equipment (eg fishing gears) identified by the chase vessels on the survey route will be removed in advance of operations. • Chase vessel with MOGE Representative will be employed to ensure navigational safety and appropriate management of fishing interactions. • Mobile exclusion zone, limiting the duration and extent of disruption to the fishing activity in any area. • Upon completion of the survey, all equipment will be immediately removed from the Project Area, i.e. demobilization. • Organize a complaint, problem, and suggestion receiving point for the entire project duration. Findings from complaints and suggestions shall be reported to MOGE.	Minor
Survey equipment, including airgun arrays and steamers, could be a temporary obstruction to navigation in the area Increased marine traffic could increase the risk of accident or collisions in the survey area	• At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy). • Use support vessels to warn off traffic. • Provide adequate lighting and signal blinker on the seismic vessel, and chase vessel to prevent the collision hazard with fishing or cargo vessels. • Vessels will be equipped with radar, navigation equipment, and communication equipment to identify obstructions and to provide sufficient warning of approaching surface vessels that may pose a danger to the operations. • Stop the survey in case of poor visibility or extreme weather conditions (such as cyclone), and record the event. • Warning device (ie. Bell or Light) will be provided on the streamer tail buoy for night-time operations. • Upon completion of the survey, all equipment will be immediately removed from the Project Area, i.e. demobilization.	Negligible

1.7 MONITORING MEASURES

As detailed in Myanmar's National Environmental Quality Guidelines, *"projects shall engage in continuous, proactive and comprehensive self-monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC."*

Monitoring will be required in order to demonstrate compliance with legal limits (i.e. Myanmar's National Environmental Quality Guidelines), and Eni's Project requirements, and will also provide verification of the overall design and effectiveness of the implemented mitigation/control measures.

Main environmental, social and health aspects to be monitored for the full project duration are below listed, but all the project sensitivities will be taken under strict control:

- Offshore water discharges;
- Marine Mammals;
- Fishery and Navigation;
- Hazardous and Non-Hazardous Waste; and
- Accidental Spills and Leaks.

Full details of the environmental monitoring program are presented in ***Chapter 7*** of this IEE Report.

1.8 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan (EMP) has been prepared for the Project, which consists of procedures, plans and policies relevant to the Project activities to check and monitor compliance and effectiveness of the mitigation measures to which Eni is committed (as listed above). In addition, this EMP is aimed to ensure compliance with statutory requirements and corporate safety and environmental policies. The complete EMP for the Project is presented in ***Chapter 7*** of this IEE Report. This is a "live document" which will be constantly updated considering the increasing level of available project data and information.

1.9 PUBLIC CONSULTATION AND DISCLOSURE

Public consultation is an important aspect of the impact assessment process. As part of the impact assessment study, Eni has engaged with a number of stakeholders at the state/region, township and village level during consultations as per Myanmar's *EIA Procedure*.

Eni initially engaged with MOGE to verify the most appropriate region to conduct public consultations for the MD-4 Block activities. Based on this, the Tanintharyi Region was the most relevant administrative location in terms of

potential impacts from the Project (in particular fisheries, since most of the fisherman in Block MD-4 are likely to be from Tanintharyi Region).

Prior to any public meeting consultation, Eni Myanmar requested and organized a courtesy visit with the Regional Minister of Electricity and Energy of Tanintharyi Region on 28th March, 2017, to introduce the project activities and to request the permit to engage the local authorities, NGOs and villagers within the boundaries of the Tanintharyi Region. The locations engaged for the public consultations were Dawei (in Dawei Township), and Myeik (in Myeik Township).

Public consultation activities were conducted from April 7 - 8, 2017, via public meetings held in Dawei and Myeik Townships, with an additional follow up meeting held in Myeik on April 27th, 2017. Key stakeholders that were consulted consisted of fisherman that have the potential to fish in and around Block MD-4. Comments and recommendations of stakeholders obtained from the public consultation meetings are summarized in ***Chapter 8*** of this IEE Report.

The main issue raised was that there were not enough stakeholders that attended the 1st meeting in Myeik on April 8th (due to short notification time). As a result of this, Eni conducted an additional public meeting in Myeik on April 27th, which had additional attendees.

There were some questions and concerns raised at the public meetings regarding exclusion zones and impacts to fisheries, transparency of information disclosure, impacts to marine fauna, grievance mechanism, and CSR activities. All of the issues were responded to appropriately by Eni and ERM at the public meetings.

The implementation of the public consultation program achieved its goals in providing an opportunity for stakeholders to give opinions and recommendations on the Project. Opinions and recommendations obtained through public consultation have been used in the IEE study to help develop mitigation measures and monitoring programs on environmental and social impacts, as discussed in ***Chapter 8*** of this IEE report.

Eni also conducted a number of disclosure activities. Notification of the IEE Report was issued in local newspapers. Eni will also disclose the Myanmar language Executive Summary of this IEE Report at the township General Administrative Department (GAD) and Department of Fisheries (DoF) offices in Dawei and Myeik. Eni will further disclose the full IEE Report (in English) and Executive Summary (in Myanmar) on its website at https://www.eni.com/enipedia/en_IT/international-presence/asia-oceania/enis-activities-in-myanmar.page.

1.10 STATEMENT OF COMMITMENTS

Eni shall at all times comply fully with the commitments, mitigation measures, and plans that have been presented in this IEE Report.

Eni shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, including the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (2015), as well as the EMP, Project commitments and conditions.

Eni and ERM hereby confirm that:

(1) The IEE Report is accurate, consolidated and complete;
(2) The IEE has been conducted in accordance with relevant laws, including the EIA Procedure (2015).
(3) The Project will fully follow the commitments, mitigation measures and plans set out in this IEE Report.

In addition, as requested and in compliance to articles 62, 76 and 100 – 105 of the new EIA procedure, Eni Myanmar B.V. endorses and confirms to Ministry of Natural Resource and Environmental Conservation the following:

- the accuracy and completeness of the IEE and relevant EMP;
- that the IEE and the EMP have been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures;
- that eni Myanmar and its Seismic Contractor during the execution of the Project will at all times comply fully with the commitments, mitigation measures and plans set out in the IEE and the associated EMP;
- that Eni Myanmar and its Seismic Contractor confirm full commitment in complying with all laws and regulations as detailed in the IEE determined to be relevant to the planned seismic program;
- that Eni Myanmar is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.
- that Eni Myanmar shall incorporate all relevant environmental commitments and requirements set forth in the IEE Report, for the Construction Phase EMP and/or Operational Phase EMP as the case may, including applicable Emission Limit Values and Environmental Quality Standards, into detailed designs, construction contract specifications, and contracts on Project operations related to any part of the Project;
- that Eni Myanmar shall bear full legal and financial responsibility for:
  - all actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Company acting

for or on behalf of the Company, in carrying out work on the Project; and

- Person Affected by the Project (PAP) until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.

- that Eni Myanmar shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC (or letter of Approval Letter equivalent of ECC), applicable Laws, the Rules, the EIA Procedure and standards.

1.11 CONCLUSIONS AND RECOMMENDATIONS

This IEE Study for the proposed seismic survey in Block MD-4 was conducted to comply with the requirements of the MONREC EIA Procedures. The IEE demonstrates that Eni understands the environment, health safety and social setting in which they are operating and has properly assessed the key potential environmental and social impacts associated with the proposed Project. A project-specific, dedicated EMP has been developed and presented as a tool to manage impacts associated with the Project and ensure legislative compliance and standards of good practice during the execution of the Project. Provided that the recommended mitigation measures are properly implemented, it is expected that the environmental, health safety and social impacts of the proposed Project would be managed by Eni in a professional and acceptable manner. As such, the IEE concludes that no Major impacts on the environment and people are anticipated from this Project and all impacts have been properly mitigated to be as low as reasonably practical.

The IEE Report disclosure process will include disclosure of the executive summary of the IEE study in Myanmar language in the locations where public consultation took place: Dawei and Myeik Townships in Tanintharyi Region. The IEE Report disclosure will be advertised in national and local newspapers. Engagement activities thus far have been undertaken as part of the IEE process. However, stakeholder engagement is understood to be a continuous process to be undertaken throughout the life of the Project, in this case during the duration of the seismic survey. Eni will implement and manage this ongoing consultation, address concerns if new stakeholders emerge, and monitor stakeholder feedback.

1 အကျဉ်းချုပ်အစီရင်ခံစာ

1.1 နိဒါန်း နှင့် စီမံကိန်း၏ နောက်ခံအကြောင်းအရာ

Eni Myanmar B.V. (Eni) သည် မြန်မာ့ကမ်းလွန် လုပ်ကွက်အမှတ် MD-4 တွင် 3D ကမ်းလွန် ဆိုက်စမစ်တိုင်းတာမှု ကို ဆောင်ရွက်ရန် စီစဉ်လျက်ရှိပြီး၊ ၎င်းအတွက် Eni မှ ၂၀၁၅ ခုနှစ် မတ်လ တွင် ထုတ်လုပ်မှုအပေါ်ခွဲဝေခံစား ရေးစာချုပ် (PSC) ချုပ်ဆိုခဲ့ပါသည် (ဤလုပ်ငန်းကို နောက်ပိုင်း တွင် 'စီမံကိန်း' ဟု ရည်ညွှန်းသွားပါမည်)။ သင့်လျော်သောခွင့်ပြုချက်လက်ခံရရှိမှု အပေါ်မူတည်၍ တိုင်းတာမှုကို ၂၀၁၇ ခုနှစ် နောက်ဆုံးသုံးလပတ်အတွင်း ဆောင်ရွက်ရန် စီစဉ်ထားပါသည်။ ၎င်းကို ***အခန်း ၃*** တွင် အကျယ် ဆွေးနွေးတင်ပြထားပါသည်။

လုပ်ကွက်အမှတ် MD-4 သည် မုတ္တမတောင်ဘက် ကပွလီပင်လယ်ချိုင့်ဝှမ်းတွင် တည်ရှိပြီး၊ မြေတ်မြို့မှ အနောက်ဘက်သို့ ၂၄၀ ကီလိုမီတာခန့် နှင့် ရန်ကုန်မှ တောင်ဘက်သို့ ၄၅၀ ကီလိုမီတာခန့် ကွာဝေး ပါသည်။ လုပ်ကွက်သည် ဇရိယာ ၅,၉၀၀ စတုရန်းကီလိုမီတာရှိပြီး၊ ရေအနက်မှာ ၁,၅၀၀ မီတာ မှ ၂,၂၀၀ မီတာ အတွင်း ရှိပါသည်။ စီမံကိန်းကို အစ မှ အဆုံးထိ ရက်ပေါင်း ၁၀၀ ခန့် ကြာမြင့်မည်ဟု တွက်ချက်ထားပြီး၊ ၎င်းကို ***အခန်း ၄*** တွင် အသေးစိတ် တင်ပြထားပါသည်။

မြန်မာနိုင်ငံတွင်၊ ၂၀၁၅ ခုနှစ် ဒီဇင်ဘာလ ၂၉ ရက်နေ့တွင်ထုတ်ပြန်သည့် ပတ်ဝန်းကျင်ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) ဆိုင်ရာလုပ်ထုံးလုပ်နည်း၏ နောက်ဆက်တွဲ ၁ အရ၊ ပတ်ဝန်းကျင်၊ လူမှုရေး နှင့် ကျန်းမာရေးထိခိုက်မှုများအလားအလာရှိသည့် ကမ်းလွန်ဆိုက်စမစ်ပြုလုပ်ဆောင်ရွက်ခြင်း စီမံကိန်း အတွက် မြန်မာ့သက်ဆိုင်ရာအစိုးရအဖွဲ့များထံမှ ခွင့်ပြုချက်ရရှိရန်အတွက် ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း (IEE) ကို ဆောင်ရွက်ရန် လိုအပ်ပါသည်။ မြန်မာနိုင်ငံတွင် ပတ်ဝန်းကျင်ဆိုင်ရာ ဆန်းစစ်ခြင်းအတွက် သယံဇာတ နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေးဝန်ကြီးဌာန (MONREC) က တာဝန်ရှိပါသည်။ စီမံကိန်းသည် ၂၀၁၅ ခုနှစ် ဇူလိုင်လတွင် သယံဇာတ နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်း ရေးဝန်ကြီးဌာန (MONREC) က ထုတ်ပြန်ထားသည့် အပြီးသတ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း *(EIA) ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း*[1] နှင့် *အုပ်ချုပ်မှုဆိုင်ရာညွှန်ကြားချက် မူကြမ်း* တို့ကို ကိုးကား ဆောင်ရွက်ခဲ့ပြီး ဖြစ်ပါသည်။

1.2 စီမံကိန်းအကြောင်းအရာဖော်ပြချက်

ဤအပိုင်းတွင် မြန်မာကမ်းလွန် လုပ်ကွက်အမှတ် MD-4 တွင် 3D အဏ္ဏဝါဆိုက်စမစ်တိုင်းတာမှု နှင့် စပ်လျဉ်း၍ ရုပဆိုင်ရာအနေအထားများ နှင့် လုပ်ငန်းများ၏ ယေဘုယျဖော်ပြချက် အကျဉ်းချုပ် ဖြစ်သည့် အောက်ပါတို့ကို တင်ပြမည် ဖြစ်ပါသည်။

- စီမံကိန်းတည်နေရာ
- စီမံကိန်းလုပ်ငန်းများဖော်ပြချက်၊ နှင့်

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[1] ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ ပုဒ်မ ၇ နှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်းဥပဒေ ပုဒ်မ ၅၂ နှင့် ၅၃ အရ ဖြစ်ပါသည်။

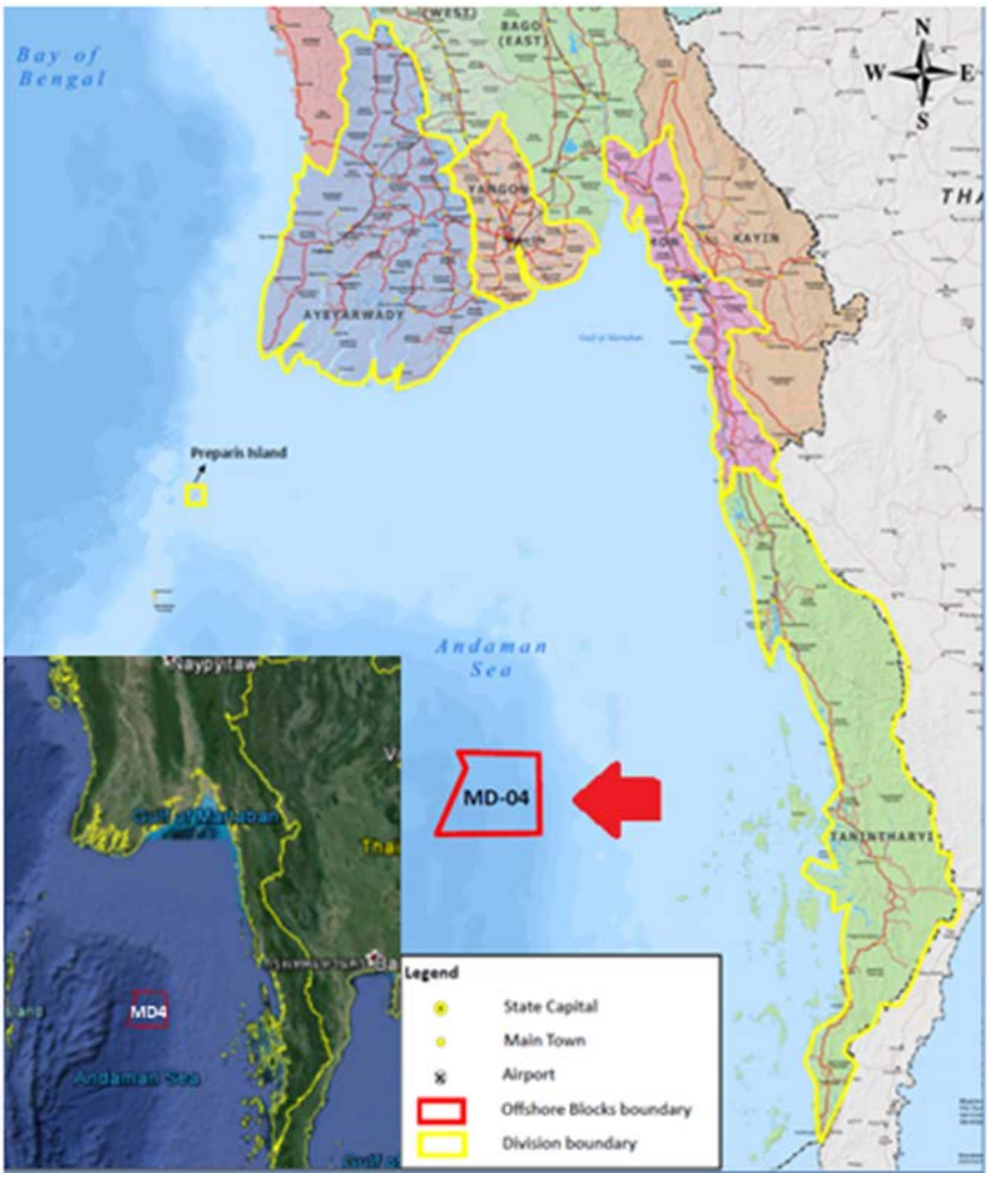
- စီမံကိန်းအချိန်ဇယား။

စီမံကိန်းအကြောင်းအရာအပြည့်ဖော်ပြချက်နှင့် အခြားဆောင်ရွက်နိုင်သောနည်းလမ်းများ အပြည့်အစုံကို ဤ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင် ခံစာ ၏ ***အခန်း ၄*** တွင် တင်ပြထားပါသည်။

1.2.1 စီမံကိန်းတည်နေရာ

ရေနံကမ်းလွန်လုပ်ကွက်အမှတ် MD-4 သည် မုတ္တမတောင်ဘက် ကပွလီပင်လယ်ချိုင့်ဝှမ်းတွင် တည်ရှိပြီး၊ မြေတ်မြို့မှ အနောက်ဘက်သို့ ၂၄၀ ကီလိုမီတာခန့် နှင့် ရန်ကုန်မှ တောင်ဘက်သို့ ၄၅၀ ကီလိုမီတာခန့် ကွာဝေး ပါသည်။ လုပ်ကွက်သည် ဇရိယာ ၅,၉၀၀ စတုရန်းကီလိုမီတာရှိပြီး၊ ရေအနက်မှာ ၁,၅၀၀ မီတာ မှ ၂,၂၀၀ မီတာ အတွင်း ရှိပါသည်။ (***ပုံ ၁.၁***)။

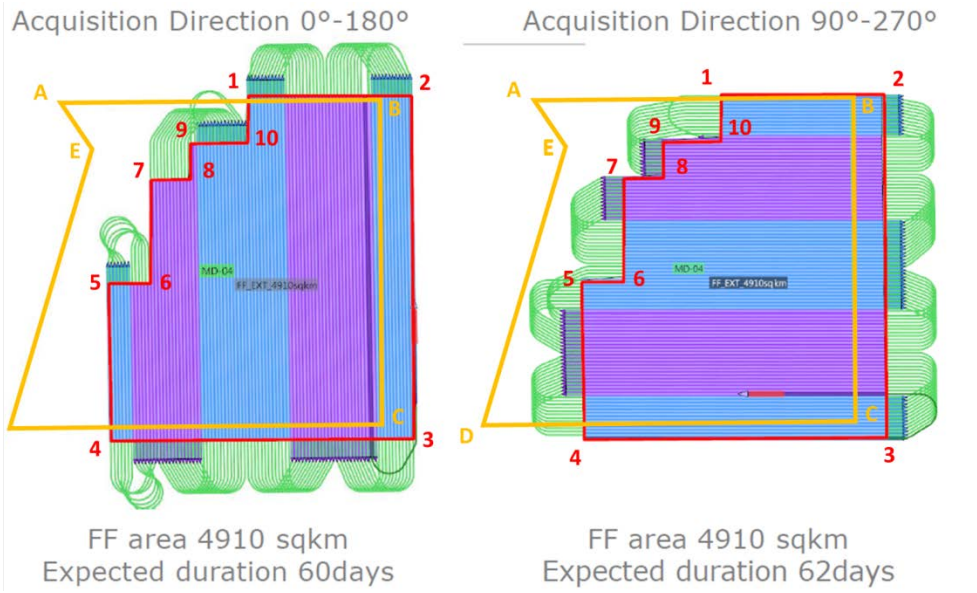
ပုံ ၁.၁ လုပ်ကွက်အမှတ် MD-2 ၏ တည်နေရာပြမြေပုံ



မှတ်ချက် - စကေးဖြင့် ဖော်ပြထားခြင်းမဟုတ်ပါ
ပင်ရင်း - Eni (၂၀၁၆)

3D ဆိုက်စမစ်တိုင်းတာမှုတွင် ကြိုးကြိုး ၁၆ ကြိုးပါ အစီအစဉ်တပ်ဆင်မှုစနစ်နှင့် အရှေ့မှအနောက် (E-W) ဦးတည်ရာလမ်းကြောင်းဖြင့် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ စီမံကိန်းတွင် အများဆုံး ဇရိယာ ၄,၉၁၀ စတုရန်းကီလိုမီတာခန့် ပါဝင်မည် ဖြစ်ပါသည်။ တိုင်းတာမှုဇရိယာကို ***ပုံ ၁.၂ တွင် ဖော်ပြထားပါသည်။***

ပုံ ၁.၂ အကြိုတိုင်းတာမှုဇရိယာ



မှတ်ချက် - စကေးဖြင့် ဖော်ပြထားခြင်းမဟုတ်ပါ
ပင်ရင်း - Eni (၂၀၁၆)

1.2.2 ကြိုတင်ပြင်ဆင်ခြင်းအဆင့်

1.2.2.1 စီမံကိန်းလုပ်ငန်းများကို သက်ဆိုင်ရာအစိုးရအဖွဲ့အစည်းများနှင့် သက်ဆိုင်သူများထံသို့ ထုတ်ပြန်ကြေညာခြင်း

ဆိုက်စမစ်လုပ်ငန်းများမစတင်မီ၊ Eni သည် သက်ဆိုင်ရာအစိုးရအဖွဲ့များနှင့် အကျိုးသက်ဆိုင်သူများအား "ရေကြောင်းသတိပေးချက်" ဖြင့် မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေ့လုပ်ငန်း (MOGE) သို့ အနည်းဆုံး ရက်သတ္တပတ်လေးပတ် ကြိုတင်၍ ပေးပို့ကာ ညှိနှိုင်းဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ထို့သို့ လုပ်ဆောင်ခြင်းမှာ စီမံကိန်းအချိန်ဇယားအား သက်ဆိုင်သူများတွက် ၎င်းတို့၏ငါးဖမ်းပိုက်များကို တိုင်းတာရေး ဇရိယာမှ ရွှေ့လျားပေးနိုင်ရန် အချိန်ရရှိအောင် အသိပေးကြေငြာခြင်းဖြစ်ပါသည်။

1.2.2.2 လုပ်ငန်းခွင်ကြိုတင်လေ့လာခြင်း နှင့် လုပ်ငန်းခွင်ကြိုတင်ပြင်ဆင်ခြင်း

တိုင်းတာရေးဇရိယာများ အတွင်းရှိ အဓိက အတားအဆီးများဖြစ်သော ရေအောက်ကြမ်းပြင်မှ ငါးဖမ်းထောင်ချောက်များ နှင့် အခြားရွှေ့ပြောင်းရန် မလွယ်ကူသော ငါးဖမ်းပိုက်များသည် ဆိုက်စမစ်ကိရိယာများကို ထိခိုက်နိုင်မှုများမှ ရှောင်တိမ်းနိုင်ရန် နှင့် မတော်တဆမှုများကို ကြိုတင်ကာကွယ်နိုင်ရန် အတွက် တိုင်းတာရေးမလုပ်မီ ပြောင်းရွှေ့ထားရန် လိုအပ်ပါသည်။ ထို့ကြောင့်၊ ဖြစ်ပေါ်လာနိုင်သော ဤကဲ့သို့အတားအဆီးများရှိနိုင်သည့် နေရာများကို သိရှိထားရန် တိုင်းတာမှု မစတင်မီ အနည်းဆုံး တစ်ပတ်ကြိုတင်၍ အကြိုတိုင်းတာရေးဇရိယာ ကင်းထောက် ခြင်းကို ဆောင်ရွက်ထားရန် လိုအပ်ပါသည်။ အတားအဆီးများရှိနိုင်သည့် နေရာများကို သတ်မှတ်ခြင်းနှင့်

မှတ်တမ်းရေးသွင်းခြင်းများ ပြုလုပ်ပြီး၊ တိုင်းတာရေးလမ်းကြောင်းများကို ကင်းထောက်နိုင်ရန် ဆိုက်စမစ် တိုင်းတာရေး မတိုင်မီ အနည်းဆုံးတစ်ပါတ်ကြိုတင်၍ အသေးစိတ်လုပ်ငန်းခွင် တိုင်းတာမှုကို ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

1.2.3 ဆိုက်စမစ်တိုင်းတာရေးအဆင့်

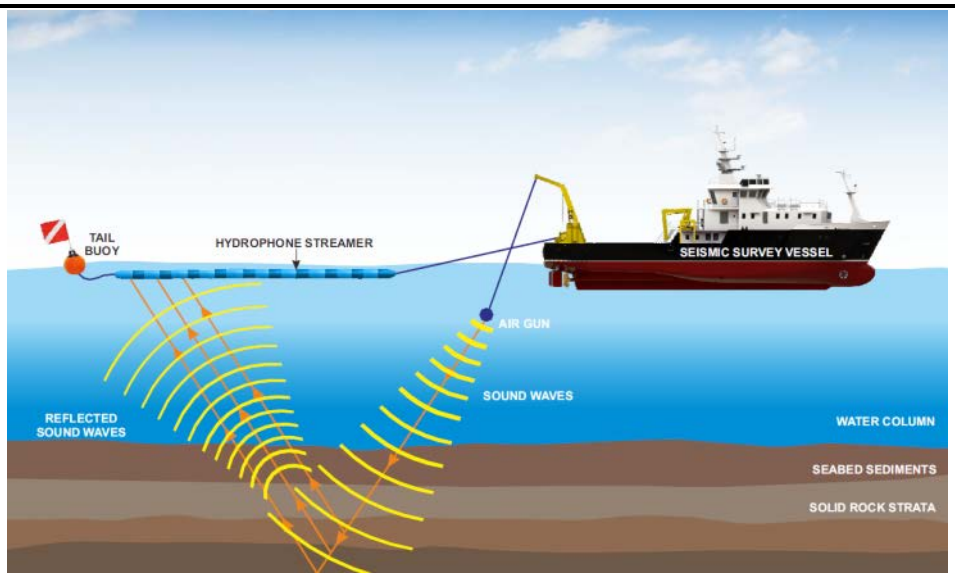
1.2.3.1 ဆိုက်စမစ်အချက်အလက်များရယူခြင်း

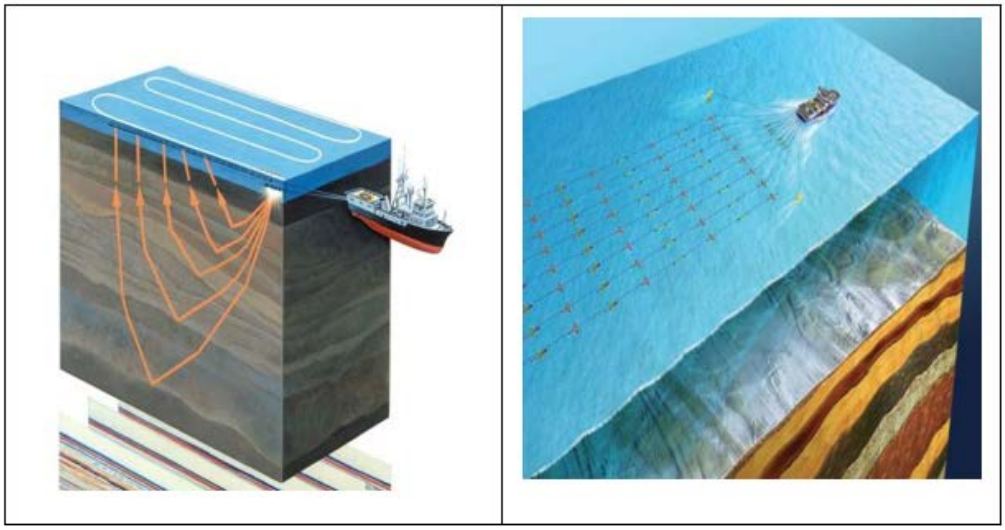
အဏ္ဏဝါဆိုက်စမစ် တိုင်းတာရေး ကာလအတွင်း၊ ဖြေးဖြေးချင်းခုတ်မောင်းနေသော တိုင်းတာရေး ရေယာဉ်၏ နောက်ဘက်တွင် အသံထုတ်လွှတ်သည့်ကြိုးများ တပ်ဆင်ထားမည် ဖြစ်ပါသည်။ အားမြင့်ပြီးကြိမ်နှုန်းနိမ့်သည့် အသံဖြင့် (လေဖိအားကိုအသုံးပြုပြီး ထိန်းချုပ်ထုတ်လွှတ်လိုက်သည့်လေ) ကို လေသေနတ်များမှထုတ်လွှတ်ပြီး၊ ၎င်းလေသည် ရေအောက်ကြမ်းပြင်နှင့် မြေပြင်အောက်သို့ ဦးတည်ရိုက်ခတ်မည် ဖြစ်ပါသည်။ ၎င်းအသံလှိုင်း များသည် မြေပြင်အောက်ရှိ ကျောက်ဖွဲ့စည်းပုံများကို ရိုက်ခတ်ပြီး၊ အသံပြန်လှိုင်းများအဖြစ် မျက်နှာပြင်ပေါ် ပြန်ထွက်လာသည့် လှိုင်းများကို ဖမ်းယူသည့်ကိရိယာများ (ဟိုက်ဒရိုဖုန်းများ) မှ စုဆောင်း ရယူမည် ဖြစ်ပါသည်။ လက်ခံစုဆောင်းရရှိထားသည့် အချက်အလက်များကို ရေယာဉ်ပေါ်ရှိ ကွန်ပျူတာများမှ အချက်အလက်များကိုခွဲခြမ်း စစ်ဖြာခြင်းနှင့်ကောက်ချက်ချမှတ်နိုင်ရန်အတွက် မှတ်တမ်းပြုထားမည် ဖြစ်ပါ သည်။ အဏ္ဏဝါဆိုက်စမစ်လုပ်ငန်းပုံစံကို ***ပုံ ၁.၃*** နှင့် ကြိုးကြိမ်များနှင့် ရေယာဉ်၏ ခင်းကျင်းမှုပုံစံကို ***ပုံ ၁.၄*** တွင် ဖော်ပြထားပါသည်။

ဤ စီမံကိန်း အတွက် စွမ်းရည်မြင့်မားသည့်ချိတ်ဆက်မှုဆိုင်ရာဆိုက်စမစ်နည်းပညာ (broadband seismic technique) ကို အသုံးပြုရန် အဆိုပြုပါသည်။ ဖမ်းယူသည့်ကိရိယာများ (ဟိုက်ဒရိုဖုန်းများ) ကြိုးကြိမ်များ (အနည်းဆုံး ၁၆ ခု) ဖြင့် ဖုန်းအုပ်ထားပြီး၊ ဆိုက်စမစ်ရေယာဉ်နောက်တွက် ၈,၀၀၀ မီတာ အရှည်ခန့်ရှိမည်ဖြစ်ပြီး ပင်လယ်ရေမျက်နှာပြင်အောက်ဖက်အနက် ၁၂ သို့မဟုတ် ၁၈ မီတာ ခန့်တွင် ထားရှိမည် ဖြစ်ပါသည်။ ကြိုးကြိမ်များကို ၁၀၀ မီတာအကျယ် ခြားထားမည် ဖြစ်ပြီး၊ ရေအောက်တွင် ရှိမည့် အနက်မှာ ၆ မီတာ မှ ၈ မီတာ ခန့် တွင် ရှိမည် ဖြစ်ပါသည်။

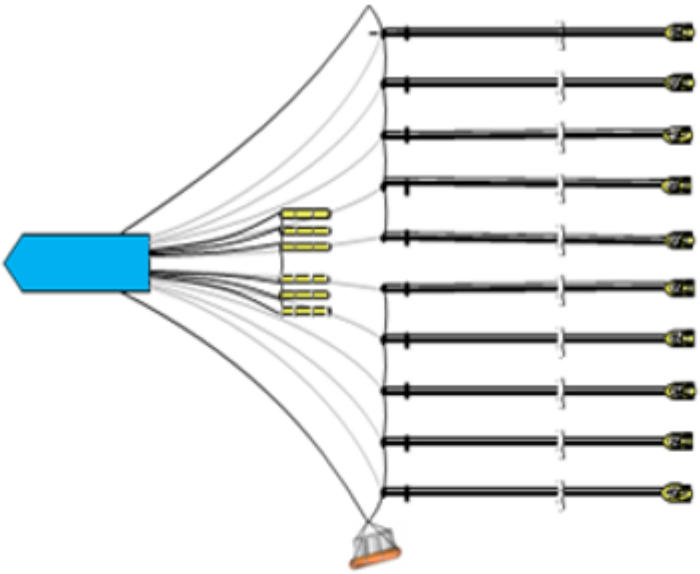
ဆိုက်စမစ်တိုင်းတာမှုကို အမျိုးအစားနှင့် တာဝန်များမတူညီသည့် ရေယာဉ်များအသုံးပြုလျှက် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ ရေယာဉ် များတွင် ပင်မဆိုက်စမစ်ရေယာဉ် တစ်စီး၊ ထောက်ပံ့ရေးရေယာဉ်တစ်စီး နှင့် ကင်းထောက် ရေယာဉ် နှစ်စီး တို့ပါဝင်မည် ဖြစ်ပါသည်။ ရေယာဉ်များကို တစ်ရက်လျှင် ၂၄ နာရီ၊ တစ်ပတ်လျှင် ၇ ရက် အချိန်ပြည့် လည်ပတ် ဆောင်ရွက်သွားမည် ဖြစ်ပြီး၊ တိုင်းတာမှုတွင် ဝန်ထမ်း ၇၀ ဦးခန့် ပါဝင် မည် ဖြစ်ပါသည်။ ဆိုက်စမစ်ရေယာဉ်သည် အမြန်နှုန်း ရေမိုင် ၄.၃ မိုင်ခန့်ဖြင့် ခုတ်မောင်းသွားနေမည် ဖြစ်ပြီး၊ ကြိုတင်စီစဉ်သတ်မှတ်ထားသည့် တိုင်းတာရေးလမ်းကြောင်းများဖြင့် ဆောင်ရွက်မည် ဖြစ်ပါသည်။ ရေယာဉ်သည် ဆိုက်စမစ်ကိရိယာဆွဲယူသွားသည့် တည်နေရာအတိအကျကို ခြေရာခံရန် GPS ကို အသုံးပြုသွားမည် ဖြစ်ပါသည်။

3D ဆိုက်စမစ်လုပ်ငန်းစဉ်များကာလအတွင်း တိုင်းတာရေးရေယာဉ်သည် ကင်းထောက်ရေယာဉ်များနှင့် အတူရှိ နေမည် ဖြစ်ပါသည်။ ဆိုက်စမစ်တိုင်းတာရေး ကန်ထရိုက်တာမှ ငှားရမ်းထားသော အဓိက ကင်းထောက်ရေယာဉ် တစ်စီးသည် ဆိုက်စမစ်တိုင်းတာရေးယာဉ်၏ ရှေ့ဘက် ခန့်မှန်းခြေ မီတာ ၅၀၀ ခန့်တွင် ခုတ်မောင်းသွားနေ မည် ဖြစ်ပါသည်။ အနည်းဆုံး ကင်းထောက်ရေယာဉ်နှစ်စီး (ဒေသခံငါးဖမ်းစက်လှေများလည်း ဖြစ်နိုင်ပါသည်) သည် မီတာ ၅၀၀ အကွာတွင် တိုင်းတာရေးရေယာဉ်၏ ဘေးတစ်ဖက်တစ်ချက်နှင့် နောက်ဘက်တို့တွင် ခုတ်မောင်းသွားနေမည် ဖြစ်ပါသည်။

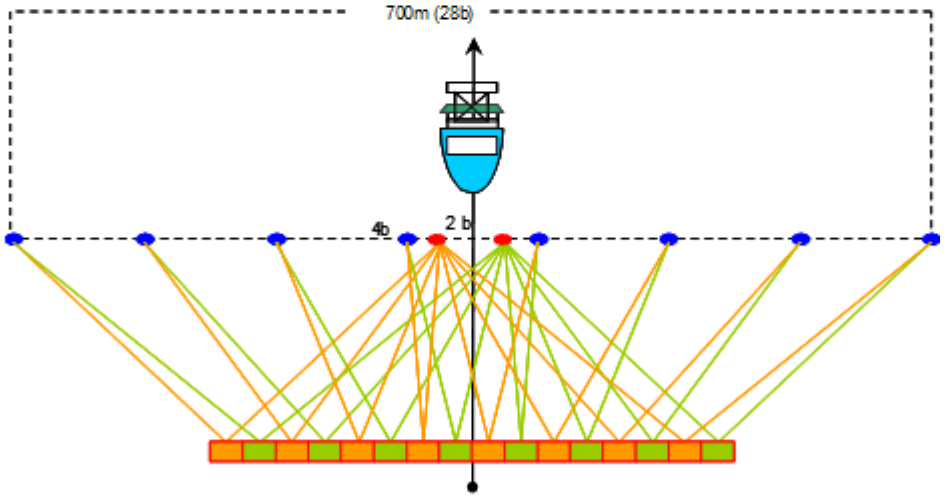

TAIL BUOY
HYDROPHONE STREAMER
SEISMIC SURVEY VESSEL
AIR GUN
SOUND WAVES
REFLECTED SOUND WAVES
WATER COLUMN
SEABED SEDIMENTS
SOLID ROCK STRATA



ပုံ ၁.၄ *3D ဆိုက်စမစ်တိုင်းတာရေးပြရုပ်ပုံ*



(a)



(b)

1.2.3.2 *ပြန်လည်ရှုပ်သိမ်းခြင်း*

3D ဆိုက်စမစ်တိုင်းတာရေးပြီးမြောက်သွားသောအခါ၊ ဆိုက်စမစ်ကိရိယာအားလုံး၊ ရေကြောင်းပြဇော်ယာများ နှင့် အမှတ်အသားများ အားလုံးကို တိုင်းတာရေးဇရိယာများမှ ပြန်လည်ရုပ်သိမ်းမည် ဖြစ်ပြီး၊ စာချုပ် ချုပ်ဆို ထားသည့် ရေယာဉ်များအားလုံးလုပ်ငန်းပြီးမြောက် အဆုံးသတ်ပြီး စာချုပ်ပြီးဆုံးကာ မိမိနေရာများသို့ ပြန်သွားကြမည် ဖြစ်ပါသည်။ ဆိုက်စမစ်ဇရိယာအတွင်း သဘော်သယ်ယူပို့ဆောင်ရေးများ နှင့် ငါးဖမ်းလုပ်ငန်းများသည်လည်း နဂိုပုံမှန် အတိုင်း ပြည်လည် ဆောင်ရွက်နိုင်မည်ဖြစ်ပါသည်။

1.2.3.3 *ဆိုက်စမစ်အချက်အလက်များတွက်ချက်သုံးသပ်ခြင်း*

ရေယာဉ်ပေါ်တွင်မှတ်တမ်းတင်ထားသည့်ဆိုက်စမစ်အချက်အလက်များကို ကုန်းပေါ်ရှိ အထူးပြုပြင်ရေးစင်တာ သို့ လွှဲပြောင်းပေးမည် ဖြစ်ပါသည်။ ၎င်းစင်တာတွင် တိကျသော ဆော့ဖ်ဝဲများ အသုံးပြုပြီး၊ အချက်အလက်များကို ဆက်လက် ခွဲခြမ်းစိတ်ဖြာမည် ဖြစ်ပါသည်။ ယင်းမှတစ်ဆင့် ရှာဖွေရေးတွင်းနေရာများကို ဆုံးဖြတ်ရာတွင် အထောက်အကူပြုစေမည် ဖြစ်ပါသည်။

1.3 *စီမံကိန်းအချိန်းဇယား*

3D ဆိုက်စမစ်တိုင်းတာမှု အတွက် စီမံကိန်း အချိန်ဇယားကို ***ဇယား ၁.၁*** တွင် တင်ပြထားပါသည်။

ဇယား ၁.၁ လုပ်ကွက်အမှတ် MD-2 တွင် ဆောင်ရွက်မည့် 3D ဆိုက်စမစ်တိုင်းတာမှု အတွက် စီမံကိန်း အချိန်ဇယား

စီမံကိန်းလုပ်ငန်းများ	အချိန်ဇယား
စီမံကိန်းထုတ်ပြန်ကြေညာချက်	လုပ်ငန်းခွင်တိုင်းတာရေး မတိုင်မီ တစ်လ ကြိုတင် ဆောင်ရွက်ခြင်း
ဆိပ်ကမ်းသို့ရေယာဉ်ရောက်ရှိခြင်း	အစည်းအဝေးများစတင်ပြုလုပ်ခြင်း & ဆိုက်စမစ် နှင့် ထောက်ပံ့ရေး ရေယာဉ်များ၏ HSE စစ်ဆေးခြင်း
လုပ်ငန်းခွင်တိုင်းတာရေးနှင့် လုပ်ငန်းခွင်ကြိုတင်ပြင်ဆင်မှု • တိုင်းတာရေးဇရိယာအတွင်း၊ ဥပမာ - ငါးဖမ်းထောင်ချောက်၊ စသည့် တိုင်းတာရေး ဆိုင်ရာ အတား အဆီးများနှင့်သက်ဆိုင်သည်များ ဆောင်ရွက်ခြင်း။ အတားအဆီးများကို လိုအပ်လျှင် ရွှေ့ပြောင်းခြင်း။	ဆိုက်စမစ်တိုင်းတာရေးလုပ်ငန်းများ မစတင်မီ အနည်းဆုံး တစ်ပတ် ကြိုတင်ဆောင်ရွက်ခြင်း
လုပ်ကွက်အမှတ် MD-2 တွင်3D ဆိုက်စမစ်အချက်အလက် ကောက်ယူမှုပြုလုပ်ခြင်း	စတင်မည့်နေ့ရက် - ၂၀၁၇ ခုနှစ် နောက်ဆုံးသုံးလအတွင်း။ ဆိုက်စမစ်တိုင်းတာရေးလုပ်ငန်းကာလမှာ ရက်ပေါင်း ၁၀၀ ခန့် ကြာမည်ဖြစ်ပါသည်။
ပြန်ရုပ်သိမ်းခြင်း	၂၀၁၇ ခုနှစ် နောက်ဆုံးသုံးလအတွင်း

1.4 *သက်ဆိုင်ရာ ဥပဒေများအကျဉ်းချုပ်*

မြန်မာနိုင်ငံအတွက် အပြီးသတ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း ကို ၂၀၁၅ ခုနှစ် ဒီဇင်ဘာလ ၂၉ ရက်နေ့တွင် ထုတ်ပြန်ခဲ့ပါသည်။ ၎င်းလုပ်ထုံးလုပ်နည်းကို သယံဇာတ နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဝန်ကြီးဌာန (MONREC) (ယခင် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနှင့် သစ်တောရေးရာဝန်ကြီးဌာန - MOECAF ဟုခေါ်ပါသည်) သည် သက်ဆိုင်ရာပြည်ထောင်စုဝန်ကြီး အဖွဲ့ဝင်များ၊ ပြည်ထောင်စု ရှေ့နေချုပ်ရုံး၊ မြို့နယ်စည်ပင်သာယာရေးကော်မတီသုံးခု နှင့် အစိုးရ မဟုတ်သောအဖွဲ့အစည်းများ (NGOs) နှင့်Asian Development Bank Greater Mekong Region – Environment Operations Centre (ADB GMS-EOC) မှ ပညာရှင်များ၏ နည်းပညာဆိုင်ရာ အထောက်အပံ့များ ဖြင့် ဖွဲ့စည်းထားသော ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း ဆိုင်ရာ စိစစ် သုံးသပ်ရေးအဖွဲ့ကော်မတီ၏ အကူအညီဖြင့် ပြင်ဆင်ရေးသားခဲ့ပါသည်။

အပြီးသတ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (နောက်ပိုင်းတွင် ပတ်ဝန်း ကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်းဟု ရည်ညွှန်းခေါ်ဝေါ်သွားပါမည်) အရ၊ ဖွံ့ဖြိုးရေး စီမံကိန်းများ ဆောင်ရွက်ရန်အတွက် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု

သက်သေခံလက်မှတ် (ECC) ကို ရရှိရန် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) သို့မဟုတ် ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (EIA) ကို ဆောင်ရွက်ရန်အတွက် သတ်မှတ်ချက်တစ်ခု ပါဝင်ပါသည် [1]။ ဤ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) ၏ ***အခန်း ၃*** တွင် ပတ်ဝန်းကျင်နှင့် လူမှုရေးအကြောင်းအရာများ နှင့် စပ်လျဉ်းသည့် ဥပဒေစာရင်းအပြည့်အစုံ နှင့် အဆိုပြု ဆိုက်စမစ် တိုင်းတာရေးများ အတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) လေ့လာမှု ဆိုင်ရာ ဥပဒေများ အပါအဝင် ဤလုပ်ငန်းစဉ်ကို နောက်ထပ်ဖော်ပြထားပါသည်။

1.5 အနီးပတ်ဝန်းကျင်အကြောင်းအရာအကျဉ်းချုပ်

ကမ်းလွန်စီမံကိန်းလုပ်ငန်းတည်နေရာမှာ ကမ်းခြေမှကွာဝေးသောကြောင့် လုပ်ကွက်အမှတ် MD-4 ရှိ ဆိုက်စမစ် တိုင်းတာရေး ဇရိယာ၏ ဇီဝဆိုင်ရာသဘာဝအခြေအနေသည် ပိုမိုကောင်းမွန်သော ကမ်းနီး ဇရိယာများနှင့် နှိုင်းယှဉ်လျှင် ဂေဟစနစ် တန်းဖိုးအရ နည်းပါးသည်ဟု သတ်မှတ်ပါသည်။ ရေနက်ပိုင်းစီမံကိန်းများသည် ပင်လယ်ကမ်းခြေရှိကျေးရွာများသို့ ကြီးမားသည့်ဂေဟဆိုင်ရာ အရေး ပါမှုထောက်ပံ့နေသည်ဟု မမျှော်လင့်ရပါ။ သို့ရာတွင်၊ အဏ္ဏဝါနို့တိုက်သတ္တဝါ များ၊ ပင်လယ်လိပ်များ နှင့် ပင်လယ်ပျော်ငှက်များသည် ဤရေပြင်များတွင် အခါအားလျော်စွာ ဖြတ်သန်း သွားလာလျက် ရှိသည်ကို မှတ်သားရပါသည်။

လူမှုပတ်ဝန်းကျင်အရကြည့်လျှင်၊ အရေးအပါဆုံးကဏ္ဍမှာ ရေလုပ်ငန်းများနှင့် သက်ဆိုင်ပါသည်။ လုပ်ကွက် အမှတ် MD-4 သည် တနင်္သာရီ ရေလုပ်ငန်းများဇရိယာများအတွင်း တည်ရှိနေပါသည်။ ကမ်းဝေး ရေလုပ်ငန်းများအပြင်၊ လုပ်ကွက်အမှတ် MD-4 (ကိုးကိုးကျွန်းများ နှင့် ပရက်ပရီ (Preparis) ကျွန်း)နှင့်အနီးစပ်ဆုံးနေရာတို့တွင်လည်း ရေလုပ်ငန်းများရှိနေနိုင်သော်လည်း မှတ်တမ်း ဆိုင်ရာ သတင်းအချက်အလက်အနည်းငယ်သာ ရရှိပါသည်။ ဒေသခံတိုင်းဒေသကြီးရုံးအရာရှိများ နှင့် ဆွေး နွေးချက်များအရ၊ လုပ်ကွက်အမှတ် MD-4 အတွင်းတွင် တနင်္သာရီတိုင်းဒေသကြီးမှ ရေလုပ် သားများ သာ ရေလုပ်ငန်းများ လုပ်ကိုင်လျှက် ရှိနေနိုင်ပါသည်။ စီမံကိန်းဇရိယာရှိ ရှုပ၊ ဇီဝနှင့် လူမှုရေးရာ ပတ်ဝန်းကျင် အသေး စိတ် အကြောင်းအရာကို ဤ ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း ၏ ***အခန်း ၅*** တွင် တင်ပြထားပါသည်။

1.6 အဓိကသက်ရောက်မှုများ နှင့် လျော့ချရေးအစီအမံများတင်ပြခြင်း

သက်ရောက်မှုဆန်းစစ်ခြင်း၏ ရလဒ် နှင့် အဓိကလျော့ကျစေရေးလုပ်ငန်းများ အပါအဝင် စီမံကိန်း ကြောင့် အဓိကသက်ရောက်မှု အကျဉ်းချုပ် ကို ***ဇယား ၁.၂*** တွင် စာရင်းပြုစုထားပါသည်။ ဤသည် မှာ အရေးအပါဆုံး သက်ရောက်မှုများနှင့် လျော့ချရေးလုပ်ငန်းများ၏ အကျဉ်းချုပ်သာ ဖြစ်ပါ သည်။ လုပ်ငန်းရပ်တစ်ခုချင်းစီ ကြောင့် ဖစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှုအားလုံးအသေးစိတ် အပြည့် အစုံကို ***အခန်း ၆*** တွင် တင်ပြထားပြီး၊ သက်ရောက်မှုတစ်ခုချင်းစီအတွက်လျော့ချရေး လုပ်ငန်းများ စာရင်းကို ***အခန်း ၇*** တွင် တင်ပြထားပါသည်။

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(1) ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်၏ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂) ပုဒ်မ ၇ နှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေး နည်းဥပဒေ (၂၀၁၄) ပုဒ်မ ၅၂၊ ၅၃ နှင့် ၅၅ အရ ဖြစ်ပါသည်။

ဖော်ထုတ်ထားသောဖြစ်လာဖွယ်ရှိသည့် သက်ရောက်မှုကို လျော့ချရန် နှင့်/သို့မဟုတ် ကြီးမားသည့် သက်ရောက်မှု တစ်ခုခု ဖြစ်လျှင်၊ ၎င်း၏ ပမာဏနှင့် ပြင်းထန်မှုကို ကန့်သတ်နိုင်ရန် အတွက် လျော့ကျ စေရေး လုပ်ငန်းများကို ဆောက်ရွက်မည် ဖြစ်ပါသည်။ အဆိုပြုလျော့ချရေးလုပ်ငန်းများ၏ ရည်ရွယ်ချက်မှာ စီမံကိန်း လုပ်ငန်းများပြုလုပ်နေစဉ်အတောအတွင်း၊ ဖော်ထုတ်ထားသည့် သက်ရောက်မှုများကို စီမံခန့်ခွဲရန်၊ စည်းမျဉ်း စည်းကမ်းများနှင့်အညီဖြစ်စေရန် နှင့် လက်ခံထားသည့် နိုင်ငံတကာလုပ်ငန်းများအလေ့အထ စံနှုန်းများ ကို လည်း သေချာစေရန် ဖြစ်ပါသည်။

ဖော်ထုတ်ထားသော ဖြစ်လာနိုင်သည့် သက်ရောက်မှုများအားလုံးသည် ဤလျော့ချရေးလုပ်ငန်းများ အကောင်အထည်ဖော်ခြင်းဖြင့် နည်းလမ်းမှန်စွာစီမံခန့်ခွဲနိုင်မည်ဖြစ်ပြီး၊စီမံကိန်းလုပ်ငန်းများကြောင့် ကြွင်းကျန် သက်ရောက်မှုများမရှိနိုင်ကြောင်း တင်ပြအပ်ပါသည်။

ဇယား ၁.၂ အဓိကဖြစ်ပေါ်လာနိုင်သော သက်ရောက်မှုများနှင့် လျော့ချရေးအစီအမံများ တင်ပြခြင်း

ဖြစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှု	လျော့ကျစေရေးလုပ်ငန်းများ	ကြွင်းကျန်သက်ရောက်မှု၏ အရေးပါမှု
လေသေနတ်မှထွက်ပေါ်လာသည့် အသံကြောင့် အကျော်ဝါသက်ရှိများ အထူးသဖြင့် ပင်လယ်နို့တိုက်သတ္တဝါများ အပေါ် သက်ရောက်မ	• တိုင်းတာရေး ကန်ထရိုက်တာသည် ဆိုက်စမစ်တိုင်းတာရေးအတွက် လုပ်ငန်းဆိုင်ရာစံသတ်မှတ်ချက်ကောင်းများ၊ အထူးသဖြင့် အကျော်ဝါနို့တိုက်သတ္တဝါများအပေါ် သက်ရောက်မှုလျော့ချရန် လုပ်ငန်းများ ကို လိုက်နာရန် ဆေသချာစေခြင်း။ • JNCC ဆိုက်စမစ်လမ်းညွှန်ချက်များ[1] အရ၊ 'မစတင်မီ မြင်ကွင်းကို ကြိုတင်စောင့်ကြည့်လေ့လာခြင်းလုပ်ထုံးလုပ်နည်း' ('Pre Start-up Visual Observation Procedures') (လုပ်ငန်းမစတင်မီအကြိုစောင့်ကြည့်ခြင်း- pre-shooting search ဟုလည်းခေါ်ပါသည်) ကို အကောင်အထည်ဖော်ခြင်း - ဆိုက်စမစ်လုပ်ငန်းမစတင်မီ အနည်းဆုံး ၃၀ မိနစ်ခန့် ကြိုတင်၍ ၅၀၀ မီတာ အချင်းဝက်အတွင်း ပင်လယ်နို့တိုက်သတ္တဝါများရှိ/မရှိကို သင့်လျော်သောအမြင့်ရှိသည့် စောင့်ကြည့်လေ့လာရေးနေရာမှ မြင်ကွင်းများကို ကြည့်ရှုခြင်း။ ရေအနက်၄၀ မျိုးစိတ်များ (ဥပမာ- ဝေလငါးများ - sperm whale and beaked whale) သည် ၃၀ မိနစ်ထက်ပိုကြာအောင် ငုပ်နိုင်သောကြောင့်၊ ရေနက်ပိုင်း () လုပ်ငန်းမစတင်မီ အကြိုစောင့်ကြည့်ခြင်းကို ၆၀ မိနစ်ကြာထိ စောင့်ကြည့်ခြင်း။ • နို့တိုက်သတ္တဝါများကို တွေ့မြင်ရလျှင်၊ 500 မီတာအချင်းဝက် အပြင်ဘက်ရောက်သွားသည်အထိ သို့မဟုတ် နောက်ဆုံး တွေ့မြင်သည့် အချိန်မှ နောက်ထပ် ၂၀ မိနစ်ထိ ဆိုက်စမစ်အသံထုတ်လွှတ်စတင်မှုကို စောင့်ဆိုင်းထားခြင်း။ • JNCC ဆိုက်စမစ်လမ်းညွှန်ချက်များ အရ၊ "ဖြေးညင်းစွာစတင်ခြင်းလုပ်ထုံးလုပ်နည်း" "Soft Start Procedures" ကို ပြုလုပ်ဆောင်ရွက်ခြင်း။ ပါဝါကို စွမ်းအင်အနိမ့်မှ တဖြည်းဖြည်း စတင်၍ (ဥပမာ - အသေးငယ်ဆုံး လေသေနတ်ဖြင့်စတင်၍ တဖြည်းဖြည်းဖြင့် အခြားလေသေနတ်များကို လည်ပတ်စေခြင်း) ပင်လယ်နို့တိုက်သတ္တဝါများ လုပ်ငန်းဇရိယာမှ ထွက်ခွါသွားနိုင်ရန် အနည်းဆုံး အချိန် ၂၀ မိနစ်ခန့်ကြာ ဆောင်ရွက်ခြင်း။ ပါဝါစတင်ခြင်းသည် အဆက်မပြတ်ထွက်ရှိမှုကြီးမားလာစေရန် ပုံမှန်အဆင့်များဖြင့် ဆောင်ရွက်ခြင်း။ • ပင်လယ်နို့တိုက်သတ္တဝါများနှင့် အသံများကိုစောင့်ကြပ်ကြည့်ရှုလေ့လာခြင်းစနစ် (passive acoustic monitoring-PAM) ကို အကောင်အထည်ဖော် ဆောင်ရွက်ခြင်း - ပင်လယ်နို့တိုက်သတ္တဝါများကိုမြင်နိုင်ရန်ခက်ခဲသည့် ညအချိန်များ သို့မဟုတ် မြင်ကွင်းမရှင်းလင်းသည့်လည်ပတ်ရေးကာလများတွင် ရေယာဉ်အနီးအနားတွင် ပင်လယ်နို့တိုက်သတ္တဝါများရှိ မရှိကို ဆုံးဖြတ်နိုင်ရန် ပင်လယ်နို့တိုက်သတ္တဝါအသံများကို စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်း။ • ဖြေးညင်းစွာစတင်နေချိန် နှင့် လုပ်ငန်းများလည်ပတ်ဆောင်ရွက်နေစဉ်အတွင်း ပင်လယ်နို့တိုက်သတ္တဝါများ ရှိ/မရှိကိုဆုံးဖြတ်နိုင်ရန် မြင်ကွင်းစောင့်ကြည့် လေ့လာခြင်း ကို ဆက်လက်လုပ်ဆောင်ခြင်း။ • ပင်လယ်နို့တိုက်သတ္တဝါများကိုရှာဖွေလေ့လာပြီးနောက်၊ စောင့်ကြည့်လေ့လာခြင်းအသေးစိတ် နှင့် ပင်လယ်နို့တိုက်သတ္တဝါ ဖော်ပြချက်များ ပါဝင်သည့်မှတ်တမ်းကို ပြုစုခြင်း။ ဥပမာ - ဆိုက်စမစ်ရေယာဉ်မြေပုံအညွှန်းများ နှင့် ရေယာဉ်နှင့် ပင်လယ်နို့တိုက်သတ္တဝါအကြား အကွာအဝေးနှင့် ဖြစ်နိုင်လျှင် ပင်လယ်နို့တိုက်သတ္တဝါ၏ မျိုးစိတ် နှင့် အရေအတွက်၊ လေ့လာစောင့်ကြည့်သည့် ဇရိယာအတွင်း ရောက်ရှိသည့်	အရေးမပါသော

[1] ဆိုက်စမစ်တိုင်းတာမှုများမှ ပင်လယ်နို့တိုက်သတ္တဝါများအပေါ် အနာတရဖြစ်စေမှု နှင့် အနှောင့်အယှက်ဖြစ်စေမှုဆိုင်ရာ အန္တရာယ်များကို လျော့ချနိုင်ရန်အတွက် JNCC လမ်းညွှန်ချက်များ၊ ၂၀၁၀ ခုနှစ် ဩဂုတ်လ။

ဖြစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှု	လျော့ကျစေရေးလုပ်ငန်းများ	ကြွင်းကျန်သက်ရောက်မှု၏ အရေးပါမှု
	အကြိမ်အရေအတွက် နှင့် အချိန်ကာလ တို့ကို မှတ်တမ်းတင်ခြင်း။ မှတ်တမ်းတင်ထားပြီးသော သတင်းအချက်အလက်များကို ရည်ညွှန်းအသုံးပြုနိုင်ရန်အတွက် လေ့လာစောင့်ကြည့်ရေး အစီရင်ခံစာတွင် ထည့်သွင်းပြုစုခြင်း။ • လေသေနတ်ပစ်လွှတ်ခြင်း လုပ်ငန်းမစတင်မီ အနည်းဆုံး ၂၄ နာရီ ကြိုတင်၍ တိုင်းတာရေးဇရိယာကို စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရန် အထောက်အကူပြုရေး ရေယာဉ်ကို အသုံးပြုခြင်း။ • ဖြစ်နိုင်သောအခြေအနေနှင့် အချက်အလက်များရရှိလျှင်၊ စီမံကိန်းဇရိယာတွင် အဓိကရှိနေသည် မျိုးစိတ်များ၏ ရွှေ့ပြောင်းသွားလာတတ်သည့် ကာလများအတွင်း လုပ်ငန်းများကို ဆိုင်းငံ့နိုင်ရန်အတွက် မျိုးစိတ်များရွှေ့ပြောင်းသွားလာတတ်သည့် ကာလကို ဆက်လက် စောင့်ကြည့် လေ့လာမှုများ ပြုလုပ်ခြင်း။	
အချို့နေရာများတွင် တိုင်းတာရေးများ ပြုလုပ်နေစဉ် အတွင်း ရေလုပ်သားများက ရေလုပ်ငန်းကို ယာယီ မဆောင်ရွက် နိုင်ခြင်း	• တိုင်းတာရေးမစတင်မီ အနည်းဆုံး ရက်ပေါင်း ၃၀ ခန့်ကြိုတင်၍ မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေ့လုပ်ငန်းနှင့် ညှိနှိုင်းဆောင်ရွက်ခြင်း။ မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေ့လုပ်ငန်းမှ မှတစ်ဆင့် စီမံကိန်းနှင့် ပတ်သက်သော သင့်လျော်သည့်အဖွဲ့များ (ဥပမာ - ရေလုပ်ငန်း ဦးစီးဌာန၊ မွေးမြူရေးနှင့် ရေလုပ်ငန်းဝန်ကြီးဌာန နှင့် ရေတပ်) သို့ "ရေကြောင်းသတိပေးချက်" ထုတ်ပြန်ရာတွင် ညှိနှိုင်းဆောင်ရွက် ပေးခြင်း။ • Eni သည် တိုင်းတာရေးအတွက် အနည်းဆုံး နှစ်ပတ်/သုံးပတ် ကြိုတင်၍ ရေလုပ်ငန်းဆက်သွယ်ရေးဝန်ထမ်းများကို ချိတ်ဆက်သွားမည် ဖြစ်ပါသည်။ ထောက်ပံ့ရေး ရေယာဉ်တစ်စီချင်းစီတွင် တစ်ဦး၊ ကင်းထောက် ရေယာဉ်တွင် တစ်ဦး၊ နှင့် ဆိုက်စမစ်ရေယာဉ်တွင် တစ်ဦး အသီးသီး ထားရှိမည် ဖြစ်ပါသည်။ ယင်းကဲ့သို့ရေလုပ်ငန်းကိုယ်စားပြုသူများသည် အရည်အချင်းပြည့်ဝပြီး၊ ကမ်းလွန်ဘေးအန္တရာယ်ကင်းရှင်း ရေးဆိုင်ရာ လက်မှတ်ရရှိထားသူများ၊ ကမ်းလွန်ဆိုက်စမစ်လုပ်ငန်းများနှင့် အတွေ့အကြုံရှိသူများ ဖြစ်ပါမည်။ သူတို့သည် ရေလုပ်ငန်းဆိုင်ရာ အနှောင့် အယှက်မဖြစ်ပေါ်ရန် စနစ်ကျသော ညှိနှိုင်းရေးလုပ်ငန်းများကို တာဝန်ယူဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။ • ဆိုက်စမစ်တိုင်းတာရေးလုပ်ငန်း မစတင်မီ အနည်းဆုံးတစ်ပတ်ကြိုတင်၍ ဆိုက်စမစ်တိုင်းတာမည့်ဇရိယာကို ကင်းလှည့်ခြင်း နှင့် တိုင်းတာရေး ဇရိယာအတွင်းရှိ အတားအဆီးများကို ဖယ်ရှားခြင်း။ ဖယ်ရှားခဲ့သည့် ငါးဖမ်းကိရိယာအသေးစိတ် နှင့် တည်နေရာများကို မှတ်တမ်းပြုခြင်း။ • အဏ္ဏဝါဆိုက်စမစ်တိုင်းတာရေးအတွက် အဆိုပြုလမ်းကြောင်းများပေါ် ဆောင်ရွက်နေသည့်ငါးဖမ်းရေယာဉ်များ သို့မဟုတ် ကြိုးကြီးများ အပေါ် ဖြတ်မောင်းခြင်းမှ အန္တရာယ်ကျရောက်နိုင်သည့် စက်လေ့များကို အထောက်အကူပြုရေး ရေယာဉ်များမှ သတိပေး ဖယ်ရှားစေခြင်း။ • အထောက်အကူပြုရေး ရေယာဉ်ကို ဆိုက်စမစ်တိုင်းတာရေးရေယာဉ်လမ်း နှင့် နောက်ဘက်ချိတ်ဆက်ထားသောကိရိယာများမှ ကင်းရှင်းရန် အခြားရေယာဉ်များကို သတိပေးခြင်း နှင့် စီမံကိန်းဇရိယာအပြင်ဖက် ခွင့်ပြုချက်မရှိသောရေယာဉ်များ ကင်းလှည့်ရန် အသုံးပြုခြင်း။ ထို့အပြင်၊ တိုင်းတာရေးလမ်းကြောင်းပေါ်တွင် အထောက်အကူပြုရေးရေယာဉ်များမှ သတ်မှတ်တွေ့ရှိရသော ငါးဖမ်းကိရိယာကို လုပ်ငန်းများမဆောင်ရွက်မီ ကြိုတင်၍ ပြောင်းရွှေ့မှု ပြုလုပ်ခြင်း။ • မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေ့လုပ်ငန်း ကိုယ်စားလှယ်ကိုခန့်အပ်ထားသည့် အထောက်အကူပြုရေးရေယာဉ်သည် ရေကြောင်းပြ အန္တရာယ်ကင်းရှင်းရေး နှင့် ရေလုပ်ငန်းဆိုင်ရာ ထိတွေ့မှုများ၏ သင့်လျော်သောစီမံခန့်ခွဲမှုကို ဆောင်ရွက်စေခြင်း။ • မည်သည့်ဇရိယာတွင်မဆို ရေလုပ်ငန်းကို နှောင့်ယှက်မှုဖြစ်စေနိုင်သည့်ပမာဏနှင့်ကာလကို ကန့်သတ်နိုင်ရန် ရွှေ့လျားအန္တရာယ် ကင်းရှင်းရေးဇုန် ထားရှိခြင်း။ • တိုင်းတာရေးပြီးမြောက်သည်နှင့်တစ်ပြိုင်နက်၊ ကိရိယာအားလုံးကို စီမံကိန်းဇရိယာမှ ချက်ချင်းရွှေ့ပြောင်းခြင်း (ဥပမာ - ပြန်ရုပ်သိမ်းခြင်း)။	အရေးမပါသော

ဖြစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှု	လျော့ကျစေရေးလုပ်ငန်းများ	ကြွင်းကျန်သက်ရောက်မှု၏ အရေးပါမှု
	• စီမံကိန်းကာလတစ်လျှောက်လုံးအတွက် တိုင်ကြားချက်၊ ပြဿနာ နှင့် အကြံဉာဏ်များကို ရယူနိုင်သော နေရာတစ်ခုကို သတ်မှတ် ထားခြင်း။ တိုင်ကြားချက်များ နှင့် အကြံဉာဏ်များမှ တွေ့ရှိချက်များကို မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေလုပ်ငန်း သို့အစီရင်ခံ တင်ပြခြင်း။	
လေသေနတ်များ နှင့် ကြိုးကြိမ်များအပါအဝင် တိုင်းတာရေးကိရိယာများသည် တိုင်းတာရေး ဇရိယာအတွင်း မောင်းနှင်သွားလာခြင်းကို ယာယီ အတားအဆီးဖြစ်စေခြင်း တိုင်းတာရေးဇရိယာအတွင်း တိုင်းတာရေး ရေယာဉ်သွားလာခြင်း ကြောင့် မတော်တဆမှုများ သို့မဟုတ် တိုက်မိခြင်း အန္တရာယ်များ ရှိလာနိုင်ခြင်း	• တိုင်းတာရေးမစတင်မီ အနည်းဆုံး ရက်ပေါင်း ၃၀ ခန့်ကြိုတင်၍ မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေလုပ်ငန်းနှင့် ညှိနှိုင်းဆောင်ရွက်ခြင်း။ မြန်မာ့ရေနံနှင့်သဘာဝဓါတ်ငွေလုပ်ငန်း မှတစ်ဆင့် စီမံကိန်းနှင့် ပတ်သက်သော သင့်လျော်သည့်အဖွဲ့များ (ဥပမာ - ရေလုပ်ငန်းဦးစီးဌာန၊ မွေးမြူရေးနှင့် ရေလုပ်ငန်းဝန်ကြီးဌာန နှင့် ရေတပ်) သို့ "ရေကြောင်းသတိပေးချက်" ထုတ်ပြန်ပေးခြင်း။ • ရေကြောင်းသွားလာမှုများကို အသိပေးရန် အထောက်အကူပြုရေးရေယာဉ်များ အသုံးပြုခြင်း။ • ဆိုက်စမစ်ရေယာဉ်တွင် အချက်ပြမီးများ လုံလောက်စွာထားရှိခြင်းနှင့် ငါးဖမ်းရေယာဉ်သို့မဟုတ် ပစ္စည်းတင်ရေယာဉ်များနှင့် တိုက်မိခြင်း အန္တရာယ်များကို ကြိုတင်ကာကွယ်နိုင်ရန် အထောက်အကူပြုရေးရေယာဉ်များ အသုံးပြုခြင်း။ • အတားအဆီးများကို ဖော်ထုတ်သတ်မှတ်နိုင်ရန် နှင့် လုပ်ငန်းကိုအန္တရာယ်ဖြစ်စေမည့် ရေပြင်ရေယာဉ်များချဉ်းကပ်လာမှုကို လုံလောက်သော သတိပေးမှု ဆောင်ရွက်နိုင်ရန် ရေယာဉ်များကို ရေဒါ၊ ရေကြောင်းပြကိရိယာ နှင့် ဆက်သွယ်ရေးကိရိယာများ ဖြင့် တပ်ဆင်ထားခြင်း။ • အကြောင်းအမျိုးမျိုးကြောင့် သို့မဟုတ် ရာသီဥတုဆိုးဝါးမှု (ဥပမာ - ဆိုင်ကလုန်း) ကြောင့်၊ မြင်ကွင်းမြင်နိုင်မှု အားနည်းလျှင် တိုင်းတာရေးလုပ်ငန်းကို ရပ်နားခြင်း နှင့် အဖြစ်အပျက်ကို မှတ်တမ်းတင်ထားခြင်း။ • ညဘက်ပိုင်းအချိန်လုပ်ငန်းများအတွက် သတိပေးကိရိယာများ (ဥပမာ - ခေါင်းလောင်း သို့မဟုတ် အလင်းရောင်) ကို ကြိုးကြိမ်များ၏ အမြီးဇော်ယာတွင် တပ်ဆင် ထားခြင်း။ • တိုင်းတာရေးပြီးမြောက်သည်နှင့်တစ်ပြိုင်နက်၊ ကိရိယာအားလုံးကို စီမံကိန်းဇရိယာမှ ချက်ချင်းရွှေ့ပြောင်းခြင်း (ဥပမာ - ပြန်ရုပ်သိမ်းခြင်း)။	မပြောပလောက်သော

1.7 *စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေးအစီအမံများ*

မြန်မာ့ အမျိုးသားပတ်ဝန်းကျင်ဆိုင်ရာအရည်အသွေး (ထုတ်လွတ်မှု) လမ်းညွှန်ချက်များတွင် ဖော်ပြထား သည်မှာ *"လုပ်ငန်း စီမံကိန်းများသည် ဆက်လက်၍စဉ်ဆက်မပြတ် တက်ကြွစွာ ဘက်စုံထောင့်စုံ မှ ကိုယ်တိုင် စောင့်ကြပ် ကြည့်ရှု စစ်ဆေးပြီး လမ်းညွှန်ချက်များနှင့် စံချိန် စံညွှန်းများကို လိုက်နာဆောင်ရွက်ရမည်။ ဤ လမ်းညွှန်ချက်များ၏ ရည်ရွယ်ချက်များကို ဖြည့်ဆည်းနိုင်ရန် အတွက် လုပ်ငန်းစီမံကိန်း၏ ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်နှင့် ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံ လက်မှတ်ပါ သတ်မှတ်ချက်များအတိုင်း အထွေထွေ လမ်းညွှန်ချက်နှင့် လုပ်ငန်းကဏ္ဍအလိုက် လမ်းညွှန်ချက်များကို လိုက်နာ ဆောင်ရွက်မှု အပေါ် လုပ်ငန်းစီမံကိန်းများက ကိုယ်တိုင်စောင့်ကြပ်ကြည့်ရှု စစ်ဆေးရန် တာဝန်ရှိသည်"* ဟူ၍ ဖြစ်ပါသည်။

စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးခြင်းကို ဥပဒေသတ်မှတ်ချက်များ (ဥပမာ - မြန်မာ့ အမျိုးသား ပတ်ဝန်းကျင် ဆိုင်ရာ အရည်အသွေး (ထုတ်လွတ်မှု) လမ်းညွှန်ချက်များ)နှင့်ကိုက်ညီမှုရှိခြင်း နှင့် Eni ၏ စီမံကိန်းသတ်မှတ် ချက်များကို ထင်ရှားစေရန် အပြင်၊ အကောင်အထည်ဖော် ဆောင်ရွက်သည့် လျော့ကျစေရေး/ထိန်းချုပ်ရေး လုပ်ငန်းများ၏ ခြုံငုံသုံးသပ်သည့် ဒီဇိုင်း နှင့် ထိရောက်မှုများ၏ အတည်ပြုခြင်းကို သတ်မှတ်ပေးရန် အတွက် လိုအပ်ပါသည်။

စီမံကိန်းသက်တမ်းကာလအတွင်း အဓိက ပတ်ဝန်းကျင်၊ လူမှုရေး နှင့် ကျန်းမာရေး ကဏ္ဍများကို အောက်တွင် ဖော်ပြထားပြီး၊ စီမံကိန်းဆိုင်ရာထိခိုက်လွယ်မှုများအားလုံးကို တင်းကျပ်စွာ ထိန်းချုပ်သွားမည် ဖြစ်ပါသည် -

- ကမ်းလွန်ရေစွန့်ထုတ်မှုများ၊
- ပင်လယ်နို့တိုက်သတ္တဝါများ၊
- ရေလုပ်ငန်းနှင့် ပင်လယ်ရေကြောင်းပြများ၊
- အန္တရာယ်ရှိသော စွန့်ပစ်ပစ္စည်း နှင့် အန္တရာယ်မရှိသော စွန့်ပစ်ပစ္စည်း၊
- ကမ်းလွန် ရေစွန့်ထုန်မှုများ၊
- အလုပ်သမားများ လုပ်ငန်းခွင်ဆိုင်ရာ ကျန်းမာရေး နှင့် ဘေးအန္တရာယ်ကင်းရှင်းရေး နှင့်
- မတော်မဆယိုဖိတ်မှု နှင့် ယိုစိမ့်မှု။

ပတ်ဝန်းကျင်ဆိုင်ရာ စောင့်ကြပ်ကြည့်ရှုစစ်ဆေးရေးအစီအစဉ်အပြည့်အစုံကို ဤ ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း-EE အစီရင်ခံစာ၏ ***အခန်း ၇*** တွင် တင်ပြထားပါသည်။

1.8 *ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်*

Eni မှ (အထက်တွင်တင်ပြထားသည့်အတိုင်း) ကတိကဝတ်ပြုထားသည့် လျော့ချရေးလုပ်ငန်းများ နှင့် အညီ ဆောင်ရွက်မှုနှင့် ထိရောက်မှု များကို စစ်ဆေးရန်နှင့် စောင့်ကြပ်ကြည့်ရှုရန် စီမံကိန်း လုပ်ငန်းများတွင် အသုံးပြုမည့်လုပ်ထုံးလုပ်နည်းများ၊ အစီအစဉ် နှင့် မူဝါဒများပါဝင်သည့် စီမံကိန်း အတွက် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် (EMP) ကို ပြင်ဆင်ခဲ့ပြီးဖြစ် ပါသည်။ ထို့အပြင်၊ EMP ကို ပြဋ္ဌာန်းဥပဒေ သတ်မှတ် ချက်များ လေးစားလိုက်နာခြင်း၊ ဘေးအန္တရာယ် ကင်းရှင်းရေးနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာမူဝါဒများကို သေချာစေရန် အသုံးပြုရန် ရည်ရွယ်ပါသည်။ စီမံကိန်းအတွက် EMP အပြည့်အစုံကို ဤ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင်ခံစာ၏ ***အခန်း ၇*** တွင် တင်ပြ ထားပါသည်။ ဤသည်မှာ "စာရွက်စာတမ်းအရှင်" (live document) ဖြစ်ပြီး၊ ၎င်းကို စီမံကိန်း

အချက်အလက်များ နှင့် သတင်းအချက်အလက်များရရှိလာသည့် အဆင့်အခြေအနေပေါ်မူတည်၍ အဆက်မပြတ် အသစ်ပြုပြင်နေမည် ဖြစ်ပါသည်။

1.9 *အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း နှင့် အများပြည်သူသို့ ထုတ်ဖော်တင်ပြခြင်း*

အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းသည် ထိခိုက်မှုဆန်းစစ်ခြင်းလုပ်ငန်းစဉ်၏ အရေးကြီးသော ကဏ္ဍတစ်ရပ် ဖြစ်ပါသည်။ ထိခိုက်မှုဆန်းစစ်ခြင်းလေ့လာမှု၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့်၊ Eni သည် မြန်မာ့ *EIA လုပ်ထုံးလုပ်နည်း* အရ တိုင်ပင်ဆွေးနွေးမှုများအတွင်း ပြည်နယ်/တိုင်းဒေသကြီး အဆင့်၊ မြို့နယ်အဆင့် နှင့် ကျေးရွာအဆင့်တို့တွင် သက်ဆိုင်သူများနှင့် ထိတွေ့ဆက်ဆံတိုင်ပင်ခဲ့ပြီး ဖြစ်ပါသည်။

Eni သည် လုပ်ကွက်အမှတ် MD-4 လုပ်ငန်းများအတွက် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးမှုများ ပြုလုပ်ရန် အသင့်လျော်ဆုံးဒေသများကို အတည်ပြုနိုင်ရန်အတွက် မြန်မာ့ရေနံနှင့်သဘာဝဓာတ်ငွေ့ လုပ်ငန်း (MOGE) နှင့် ဦးစွာ ဆက်သွယ်တိုင်ပင်ဆွေးနွေးခဲ့ပါသည်။ ၎င်းတိုင်ပင်ဆွေးနွေးမှုကို အခြေပြုလျှက်၊ စီမံကိန်းမှ ဖြစ်ပေါ်လာနိုင်သည့်သက်ရောက်မှုများအရ အသင့်လျော်ဆုံး အုပ်ချုပ်ရေးတည်နေရာဒေသမှာ တနင်္သာရီတိုင်းဒေသကြီး ဖြစ်ပါသည် (အထူးသဖြင့် ရေလုပ်ငန်း ဖြစ်ပါသည်၊ လုပ်ကွက်အမှတ် MD-4 ရှိ ရေလုပ်သားအများဆုံးမှာ တနင်္သာရီတိုင်းဒေသကြီးမှ ဖြစ်ပါသည်)။

အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုများမစတင်မီ၊ Eni Myanmar သည် ၂၀၁၇ ခုနှစ် မတ်လ ၂၈ ရက်နေ့တွင် တနင်္သာရီတိုင်းဒေသကြီး လျှပ်စစ် နှင့် စွမ်းအင် ဝန်ကြီးနှင့် တွေ့ဆုံ၍ စီမံကိန်း လုပ်ငန်းများတင်ပြခြင်းနှင့် တနင်္သာရီတိုင်းဒေသကြီး နယ်နိမိတ် အတွင်းရှိ ဒေသခံအစိုးရအဖွဲ့များ၊ အစိုးရမဟုတ်သောအဖွဲ့အစည်းများ နှင့် ကျေးရွာသူ/သားများနှင့် တွေ့ဆုံနိုင်ရန် ခွင့်ပြုချက်များ တောင်းခံခဲ့ပါသည်။ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခဲ့သည့် နေရာ များမှာ ထားဝယ် (ထားဝယ်မြို့နယ်) နှင့် မြိတ်မြို့ (မြိတ်မြို့နယ်) တို့ပါဝင် ပါသည်။

အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းလုပ်ငန်းများကို ၂၀၁၇ ခုနှစ် ဖေဖြေလ ၇ မှ ၈ ရက်နေ့ထိ ထားဝယ် နှင့် မြိတ် မြို့နယ်တို့တွင် ဆောင်ရွက်ခဲ့ပြီး၊ ၂၀၁၇ ခုနှစ် ဖေဖြေလ ၂၇ ရက်နေ့တွင် မြိတ်မြို့၌ နောက် ဆက်တွဲ အစည်းဝေးတစ်ရပ်ကို ပြုလုပ်ခဲ့ပါသည်။ တိုင်ပင် ဆွေးနွေးခဲ့သော အဓိက သက်ဆိုင်သူ များတွင် လုပ်ကွက်အမှတ် MD-4 အတွင်းနှင့် အနီးတစ်ဝိုက် တွင် ရေလုပ်ငန်း လုပ်ကိုင်နိုင်သည့် ရေလုပ်သားများပါဝင် ပါသည်။ အများပြည်သူနှင့်တိုင်ပင် ဆွေးနွေးမှု အစည်းအဝေးများမှရရှိခဲ့သည့် သက်ဆိုင်သူများထံမှ မှတ်ချက်များ နှင့် အကြံပြုချက်များ ကို ဤ ကနဦး ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း အစီရင်ခံစာ၏ ***အခန်း ၈*** တွင် အကျဉ်းချုပ်တင်ပြထား ပါသည်။

အဓိကအကြောင်းအရာမှာ မြိတ် မြို့တွင် ဖေဖြေလ ၈ ရက်နေ့က ပြုလုပ်သည့် ပထမအကြိမ်အစည်းဝေး တွင် (အစည်းဝေးအကြောင်းအသိပေးနောက်ကျသောကြောင့်) သက်ဆိုင်သူများအလုံအလောက် တက်မရောက်လာနိုင်ခြင်းဖြစ်ပါသည်။ ထို့ကြောင့်၊ Eni သည် မြိတ်မြို့၌ ဖေဖြေလ ၂၇ ရက်နေ့တွင် နောက်ထပ်တက်ရောက်လာသူများနှင့် နောက်ဆက်တွဲအစည်းအဝေးကို ဆောင်ရွက်ခဲ့ပါသည်။

အချို့ မေးခွန်းများဖြစ်သည့် ဘေးအန္တရာယ်ကင်းရှင်းရေးဇုန်၊ ရေလုပ်ငန်းများအပေါ် သက်ရောက်နိုင်မှု၊ သတင်းအချက်အလက်များထုတ်ဖော်တင်ပြခြင်းဆိုင်ရာ ပွင့်လင်းမြင်သာမှု၊ ပင်လယ်ရေနေသတ္တဝါများအပေါ် သက်ရောက်နိုင်မှု၊ မကျေနပ်ချက်များတိုင်ကြားခြင်းဆိုင်ရာလုပ်ထုံးစနစ် နှင့် CSR

လုပ်ငန်းများနှင့် သက်ဆိုင်သည့် မေးခွန်းအချို့ နှင့် စိုးရိမ်မှုများကို မေးမြန်းခဲ့ကြပြီး၊ မေးခွန်းများ အားလုံးကို အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးမှုအစည်းအဝေးများတွင် Eni နှင့် ERM မှ သင့်လျော်သလို ဖြေကြားခဲ့ပါသည်။

အများပြည်သူနှင့်တိုင်ပင်ဆွေးနွေးခြင်းကို အကောင်အထည်ဖော်ရာတွင် စီမံကိန်းနှင့် စပ်လျဉ်း၍ အမြင်များ နှင့် အကြံပြုချက်များ ပေးနိုင်ရန် သက်ဆိုင်သူများအတွက် အခွင့်အလမ်းပေးရာတွင် အောင်မြင်ခဲ့ပါသည်။ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်းမှရရှိသော အမြင်များနှင့် အကြံပြုချက်များကို ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE လေ့လာရေးတွင် ခွဲခြမ်းစိတ်ဖြာအသုံးပြုခဲ့ပြီး၊ ဤ IEE အစီရင်ခံစာ၏ ***အခန်း ၈*** တွင် တင်ပြထား သည့်အတိုင်း ပတ်ဝန်းကျင်နှင့် လူမှုရေးသက်ရောက်မှုများ လျော့ချရေးလုပ်ငန်းများ နှင့် စောင့်ကြပ် ကြည့်ရှု စစ်ဆေးခြင်းအစီအစဉ်များ ကို ပြင်ဆင်ရန် အထောက်အကူ ပြုခဲ့ပါသည်။

Eni သည် ထုတ်ဖော်တင်ပြခြင်းလုပ်ငန်းများကိုလည်း ဆောင်ရွက်ခဲ့ပါသည်။ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာ၏ ထုတ်ပြန်ချက်ကို သတင်းစာများတွင် ထုတ်ပြန်ခဲ့ပါသည်။ Eni သည် ထားဝယ် နှင့် မြစ်မြို့တို့ ရှိ အထွေထွေအုပ်ချုပ်ရေးဦးစီးဌာန (GAD) နှင့် ရေလုပ်ငန်းဦးစီးဌာန (DoF) ရုံးများတွင်လည်း ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းအစီရင်ခံစာ၏ အစီရင်ခံစာအကျဉ်းချုပ်ကို မြန်မာဘာသာ ဖြင့် ထုတ်ပြန်ထားရှိမည် ဖြစ်ပါသည်။ ထို့အပြင်၊ Eni သည် ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း အစီရင်ခံစာ (အင်္ဂလိပ်ဘာသာ) အပြည့်အစုံ နှင့် အစီရင်ခံစာ အကျဉ်းချုပ် (မြန်မာဘာသာ) တို့ကို ၎င်း၏ဝက်ဆိုက်ဖြစ်သည့် https://www.eni.com/enipedia/en_IT/international-presence/asia-oceania/enis-activities-in-myanmar.page တွင် ဝင်ရောက်ဖတ်ရှုလေ့လာနိုင်မည် ဖြစ်ပါသည်။

1.10 ကတိကဝတ်များ တင်ပြချက်

Eni သည် ဤ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင်ခံစာတွင် တင်ပြထားသည့် ကတိကဝတ်များ၊ လျော့ချရေး အစီအမံများ နှင့် အစီအစဉ်များကို အစဉ်တစိုက် အပြည့်အဝ လိုက်နာသွားမည် ဖြစ်ပါသည်။

Eni သည် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်-EMP၊ စီမံကိန်းကတိကဝတ်များအားလုံး နှင့် စည်းကမ်းချက်များကို အပြည့်အဝ အကောင် အထည်ဖော် ဆောင်ရွက်မည်ဖြစ်ပြီး၊ စီမံကိန်း၏ ကန်ထရိုက်တာများ နှင့် ဆပ်ကန်ထ ရိုက်တာများအားလုံးမှ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်-EMP၊ စီမံကိန်းကတိကဝတ်များ နှင့် စည်းကမ်းချက်များ အပြင်၊ ပတ်ဝန်း ကျင်ထိန်းသိမ်းရေးဥပဒေ (၂၀၁၂)၊ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးနည်းဥပဒေ နှင့် ပတ်ဝန်းကျင် ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅) တို့ အပါအဝင် သက်ဆိုင်ရာဥပဒေများ အားလုံးကို အပြည့်အဝလိုက်နာ ဆောင်ရွက်စေရန် တာဝန် ရှိပါသည်။

Eni နှင့် ERM မှ အောက်ပါတို့ကို အတည်ပြုပါသည် -

(1) ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင်ခံစာသည် တိကျ၊ ခိုင်မာပြီး ပြည့်စုံမှု ရှိပါသည်။

(2) ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE ကို ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း-EIA ဆိုင်ရာ လုပ်ထုံးလုပ်နည်း (၂၀၁၅) အပါအဝင်၊ သက်ဆိုင်ရာဥပဒေများ နှင့် အညီ ဆောင်ရွက်ခဲ့ပါသည်။

(3) စီမံကိန်းသည် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင်ခံစာပါ ကတိကဝတ်များ၊ လျော့ချရေးအစီအမံများကို နှင့် အစီအစဉ်များကို အပြည့်အဝ လိုက်နာဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။

ထို့အပြင်၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာလုပ်ထုံးလုပ်နည်း ၏ ပုဒ်မ ၆၂ယ ၇၆ နှင့် ၁၀၀-၁၀၅ တို့ နှင့်အညီ၊ Eni Myanmar သည် သယံဇာတနှင့် သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး ဝန်ကြီးဌာန သို့ အောက်ပါတို့ကို ထောက်ခံအတည်ပြု ပါသည် -

- ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း နှင့် သက်ဆိုင်ရာ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ၏ တိကျမှု နှင့် ပြည့်စုံမှုရှိပါသည်။
- ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း နှင့် သက်ဆိုင်ရာ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ကို သက်ဆိုင်ရာ ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဥပဒေ၊ နည်းဥပဒေများ နှင့် လုပ်ထုံးလုပ်နည်းများ နှင့် အညီ လိုက်နာပြုစုထားပါသည်။
- Eni Myanmar နှင့် ၎င်း၏ ဆိုက်စမစ် ကန်ထရိုက်တာသည် စီမံကိန်းဆောင်ရွက်နေစဉ် အတွင်း ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း နှင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် ပါ ကတိကဝတ်များ၊ ပတ်ဝန်းကျင်ထိခိုက်မှုလျော့ချရေးလုပ်ငန်းများ နှင့် အစီအစဉ်များကို အပြည့်အဝ အစဉ်အမြဲ လိုက်နာဆောင်ရွက်မည် ဖြစ်ပါသည်။
- Eni Myanmar နှင့် ၎င်း၏ ဆိုက်စမစ် ကန်ထရိုက်တာသည် ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်းတွင် စီစဉ်ထားသော ဆိုက်စမစ်အစီအစဉ်နှင့် သင့်လျော်သည်ဟု သတ်မှတ်ထားသည့် ဥပဒေများ နှင့် စည်းမျဉ်းစည်းကမ်းများအားလုံးကို အပြည့်အဝ လိုက်နာဆောင်ရွက်ရန် ကတိကဝတ်ပြုပါသည်။
- Eni Myanmar သည် စီမံကိန်းအတွက် ဝန်ဆောင်မှုများပေးရာတွင် စီမံကိန်း၏ ကန်ထရိုက်တာများ နှင့် ဆပ်ကန်ထရိုက်တာများအားလုံးသည် သက်ဆိုင်ရာ ဥပဒေများ၊ နည်းဥပဒေများ၊ ဤလုပ်ထုံးလုပ်နည်းများ၊ ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ်၊ စီမံကိန်း ကတိကဝတ်များ နှင့် သဘောတူညီချက်များ အားလုံးကို အပြည့်အဝ လိုက်နာစေရန် တာဝန်ရှိပါသည်။
- Eni Myanmar သည် စီမံကိန်း၏ မည်သည့်အစိတ်အပိုင်းနှင့် မဆို ဆက်စပ်သည့် စီမံကိန်းလည်ပတ်ရေးလုပ်ငန်းများဆိုင်ရာ အသေးစိတ်ဒီဇိုင်းများ၊ ဆောက်လုပ်ရေးဆိုင်ရာ စာချုပ်အသေးစိတ်ဖော်ပြချက်များ နှင့် စာချုပ်များ နှင့် ထုတ်လွှတ်မှုကန့်သတ်ချက်ပမာဏ နှင့် ပတ်ဝန်းကျင်အရည်အသွေးစံနှုန်းများအပါအဝင်၊ တည်ဆောက်ရေးကာလအဆင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် နှင့်/သို့မဟုတ် လုပ်ငန်းလည်ပတ်ရေးကာလအဆင့် ပတ်ဝန်းကျင်စီမံခန့်ခွဲမှုအစီအစဉ် အတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းပါ သက်ဆိုင် ရာ ပတ်ဝန်းကျင်ဆိုင်ရာ ကတိကဝတ်များ နှင့် သတ်မှတ်ချက်များ အားလုံးကို ပေါင်းစပ် ဆောင်ရွက်သွားမည် ဖြစ်ပါသည်။
- Eni Myanmar သည် အောက်ပါတို့အတွက် ဥပဒေအရရော၊ ဘဏ္ဍာရေးအရပါ တာဝန်ရှိပါသည် -
    - o စီမံကိန်းဆိုင်ရာလုပ်ငန်းများဆောင်ရွက်ရာတွင်၊ ကုမ္ပဏီကိုယ်စား ဆောင်ရွက်ရန် ခန့်ထားသော၊ ငှားရမ်းထားသော သို့မဟုတ် အခွင့်အာဏာပေးအပ်ထားသော ကန်ထရိုက်တာများ၊ ဆပ်ကန်ထရိုက်တာများ၊ အရာရှိများ၊ အလုပ်သမားများ၊ ကိုယ်စားလှယ်များ ပြုလုပ်မှု နှင့် ပျက်ကွက်မှုများ အားလုံးတို့အတွက် တာဝန်ရှိပါသည်။
    - o စီမံကိန်းကြောင့်ထိခိုက်ခံစားရသူအား စီမံကိန်းမဆောင်ရွက်မီကာလထက် မနိမ့်ကျသော လူမှုစီးပွားတည်ငြိမ်ခိုင်မာမှုရရှိသည်အထိ ဆောင်ရွက်ပေးရန်နှင့် အသက်မွေးဝမ်းကျောင်းလုပ်ငန်းများ ပြည်လည်တည်ဆောက်ရေးနှင့် ပြန်လည်

နေရာချထားရေး အစီအစဉ်များကို စီမံကိန်းကြောင့်ထိခိုက်ခံစားရသူများ၊ သက်ဆိုင်ရာ အစိုးရဌာန၊ အဖွဲ့အစည်းများ နှင့် အခြားသက်ဆိုင်သူများသည် ပေါ်ပေါက်လာသည့် ဆိုးကျိုးသက်ရောက်မှုများအားလုံးတို့အတွက် တိုင်ပင်ဆွေးနွေး၍ ပံ့ပိုးပေးရန် စီစဉ်ဆောင်ရွက်ရန် တာဝန်ရှိပါသည်။

- Eni Myanmar သည် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဆိုင်ရာ လိုက်နာဆောင်ရွက်မှု သက်သေခံလက်မှတ် ပါ သတ်မှတ်ချက်များအားလုံး၊ သက်ဆိုင်ရာ ဥပဒေများ၊ နည်းဥပဒေများ၊ ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်းဆိုင်ရာ လုပ်ထုံးလုပ်နည်း နှင့် စံချိန်စံညွှန်း တို့ကို အပြည့်အဝ၊ ထိရောက်စွာ အကောင်အထည်ဖော်ဆောင်ရွက်ရန် တာဝန်ရှိပါသည်။

1.11 *နိဂုံး နှင့် အကြံပြုချက်များ*

လုပ်ကွက်အမှတ် MD-4 ရှိ အဆိုပြု ဆိုက်စမစ်တိုင်းတာရေးလုပ်ငန်းအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE လေ့လာချက်ကို သယံဇာတနှင့်သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဝန်ကြီးဌာန ပတ်ဝန်းကျင်ထိခိုက်မှုဆန်းစစ်ခြင်း (MONREC EIA) ဆိုင်ရာလုပ်ထုံးလုပ်နည်း ၏ သတ်မှတ်ချက်များ နှင့်အညီ ဆောင်ရွက်ခဲ့ပါသည်။ Eni သည် ဆောင်ရွက်နေသည့်ပတ်ဝန်းကျင်၊ ကျန်းမာရေး၊ ဘေးအန္တရာယ်ကင်းရှင်းရေး နှင့်လူမှုရေး အကြောင်းအရာများနှင့် အဆိုပြုစီမံကိန်းနှင့် စပ်လျဉ်း၍ အဓိကဖြစ်ပေါ်လာနိုင်သည့် ပတ်ဝန်းကျင် နှင့်လူမှုရေးသက်ရောက်မှုများကို အသေအချာ ဆန်းစစ်ခဲ့ပြီးကြောင်း ကနဦးပတ်ဝန်းကျင် ဆန်းစစ် ခြင်း-IEE မှ ထင်ရှားစေပါသည်။ စီမံကိန်းအသေးစိတ်ဖြစ်သော သတ်မှတ်ထားသည့် ပတ်ဝန်းကျင် စီမံခန့်ခွဲမှုအစီအစဉ်-EMP ကို စီမံကိန်းနှင့်စပ်လျဉ်း၍ သက်ရောက်မှုများကို စီမံခန့်ခွဲရန် နှင့် စီမံကိန်း ဆောင်ရွက်စဉ်အတွင်း ဥပဒေဆိုင်ရာ လိုက်နာဆောင်ရွက်မှုနှင့် အလေ့အထကောင်း စံနှုန်းများ ကို သေချာစေရန် ပြင်ဆင်ရေးဆွဲပြီး တင်ပြပါသည်။ အကြံပြုထားသော လျော့ချရေး လုပ်ငန်းများကို စနစ်တကျအကောင်ထည်ဖော် ဆောင်ခြင်းဖြင့်၊ အဆိုပြု စီမံကိန်း၏ ပတ်ဝန်းကျင်၊ ကျန်းမာရေး၊ ဘေးအန္တရာယ်ကင်းရှင်းရေး နှင့်လူမှုရေး သက်ရောက်မှုများကို Eni က ပညာရှင်ပီသပြီး ပြောင်မြောက်သော ပုံစံဖြင့် စီမံခန့်ခွဲ မည် ဖြစ်ပါသည်။ ဤသို့ဖြင့်၊ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE ကို ဤစီမံကိန်းမှ ပတ်ဝန်းကျင် နှင့် လူများအပေါ် ကြီးများသော သက်ရောက်မှုများမရှိနိုင်ကြောင်း နှင့် သက်ရောက်မှုအားလုံးကို လက်တွေ့ကျိုးကြောင်းဆီလျော် စွာဖြင့် နည်းနိုင်သမျှနည်းအောင် စနစ်တကျ လျော့ချနိုင်ကြောင်း ခြုံငုံသုံးသပ်ပါသည်။

ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင်ခံစာထုတ်ဖော်တင်ပြချက်လုပ်ငန်းစဉ်တွင် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE လေ့လာချက်၏ အစီရင်ခံစာအကျဉ်းချုပ်ကို အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးမှုများပြုလုပ်ခဲ့သောမြို့နယ်များဖြစ်သည့် တနင်္သာရီတိုင်းဒေသကြီးရှိ ထားဝယ် နှင့် မြိတ် မြို့နယ် တို့တွင် မြန်မာဘာသာဖြင့် ထုတ်ပြန်ချက်များ ပါဝင်မည် ဖြစ်ပါသည်။ ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း-IEE အစီရင်ခံစာထုတ်ဖော်တင်ပြချက်ကို သတင်းစာ များတွင် ကြေညာသွားမည် ဖြစ်ပါသည်။ ထိတွေ့ဆက်ဆံရေး လုပ်ငန်းများကို ကနဦးပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း-IEE လုပ်ငန်းစဉ်၏ အစိတ်အပိုင်းတစ်ရပ်အနေဖြင့် ဆောင်ရွက်ခဲ့ပြီးဖြစ်ပါသည်။ သို့ရာတွင်၊ အကျိုးသက်ဆိုင်သူများနှင့် ထိတွေ့ဆက်ဆံခြင်းဆိုသည်မှာ စီမံကိန်းသက်တမ်း တစ်လျှောက်လုံး ဆောင်ရွက် သွားရမည့် လုပ်ငန်းစဉ်ဟု နားလည်ပါသည်။ ဤကိစ္စရပ်တွင် ဆိုက်စမစ်တိုင်းတာရေးကာလတစ်လျှောက်လုံး ဆောင်ရွက်သွားရမည် ဖြစ်ပါသည်။ Eni သည် ဆက်လက်ဆောင်ရွက်လျက်ရှိသော တိုင်ပင်ဆွေးနွေးမှုများကို အကောင်အထည်ဖော် စီမံ သွားမည်ဖြစ်ပြီး၊ သက်ဆိုင်သူ အသစ်များမှ စိုးရိမ်မှုများ တင်ပြလာလျှင်လည်း ကိုင်တွယ် ဖြေရှင်းခြင်း နှင့် သက်ဆိုင်သူများ၏ တုန့်ပြန်ချက်များကို စောင့်ကြပ်ကြည့်ရှုခြင်းများမှ ဆောင်ရွက် သွားမည် ဖြစ်ကြောင်း တင်ပြ အပ်ပါသည်။

2 INTRODUCTION

2.1 PROJECT OVERVIEW

Eni Myanmar B.V. (Eni) is planning to conduct a 3D Offshore Seismic Survey in Myanmar Offshore Block MD-4, for which they signed a Production Sharing Contract (PSC) in March 2015 (the activity will be referred from now on as "the Project"). The survey is tentatively planned to start in Q4 of 2017, depending on the timeline for receiving the appropriate approvals, which will be discussed further in ***Chapter 3***.

Block MD-4 is located in the Moattama-South Andaman Basin, approximately 240 km West of Myeik and 450 km South of Yangon. The Block covers an area of 5,900 km^2, and water depths range from 1,500 to 2,200 m. The Project is expected to take 100 days from start to finish, as will be detailed further in ***Chapter 4***.

In Myanmar, as per Annex 1 of the EIA (Environmental Impact Assessment) Procedure dated 29th December 2015, an IEE study is required to be undertaken for Offshore Seismic Acquisition Projects that have the potential to cause environmental, social and health impacts in order to receive approval from the Myanmar authorities. The Ministry of Natural Resources and Environmental Conservation (MONREC) is responsible for environmental assessment in Myanmar. The Project has made reference to the final *EIA Procedure*[1] as well as the *Draft Administrative Instruction* provided by MONREC in July 2015.

2.2 OVERVIEW OF INITIAL ENVIRONMENTAL EXAMINATION (IEE) REPORT

This Initial Environmental Examination (IEE) report presents an assessment of the potential environmental, social and health impacts associated with the Project.

According to the definition from the EIA Procedure, an IEE Report is *"a report on an IEE Type economic activity prepared in accordance with the requirements stipulated in Article 36 and having a focus on: systematic identification and assessment of potential Adverse Impacts including Cumulative Impacts of the proposed Project, business, service or activity; systematic assessment of feasible Project alternatives; and determination of appropriate measures to mitigate potential Adverse Impacts. IEE Report shall include an EMP."*

1 Pursuant to Section 7 of the Environmental Conservation Law (2012) and Articles 52 and 53 of the Environmental Conservation Rules (2014) of the Republic of the Union of Myanmar

The objectives of this IEE are to:

- to review the proposed Project activities with respect to their potential to interact with environmental, social and health receptors and resources;
- to identify the potentially vulnerable environmental, social and health components of the baseline within the Study Area[1];
- to identify and evaluate potential environmental, social and health impacts from the Project;
- to recommend mitigation or enhancement measures to remove, reduce or avoid potential adverse impacts;
- to provide an Environmental Management Plan (EMP) including an approach for monitoring; and
- to summarise public consultation outcomes and disclosure of the Project.

2.3 PRESENTATION OF THE PROJECT PROPONENT

2.3.1 Overview

Eni S.p.A. is an integrated energy company, active in 69 countries in the world. and the sixth largest oil & gas company worldwide.

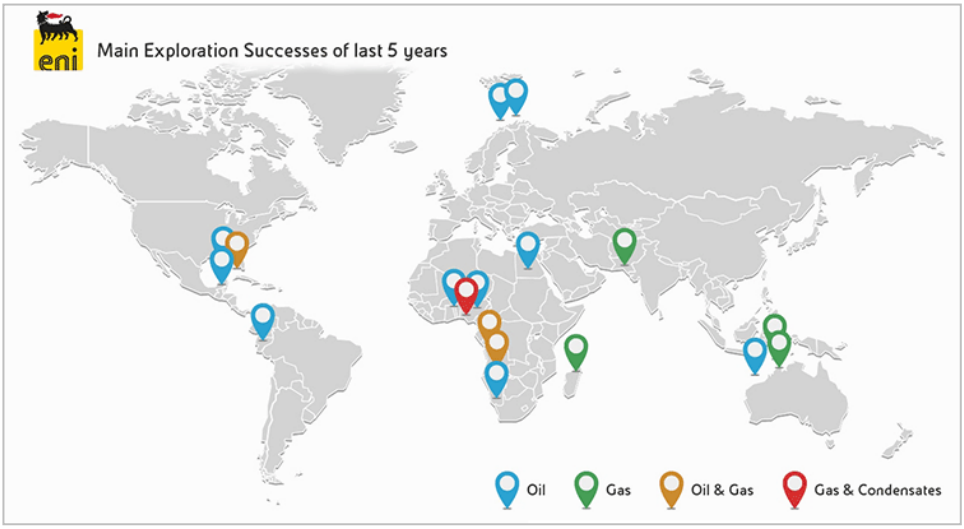
Eni is divided into Upstream and Mid-Downstream divisions: Eni Upstream services include oil & gas exploration, field development and production. Eni operates on a global scale, as shown in ***Figure 2.1***, while Eni Upstream division operates in the countries shown in ***Figure 2.2***.

(1) The **Area of Influence** is defined as the area within which the Exploration activities may potentially affect resource/receptor and within which potential impacts (both direct and indirect) should be assessed.
The **Study Area** is the area that needs to be studied in the ESHIA process, in order to adequately understand and characterise the Baseline. It encompasses the Area of Influence, and in some cases it may extend farther, depending on baseline data availability and/or data aggregation.

Figure 2.1 Eni S.p.A in the World

Source: Eni

Figure 2.2 Eni Upstream Main Exploration Activities in the World



Source: Eni, 2015

Eni is a socially responsible actor and contributes to the economic development of the countries where it operates. Sustainability is an integral part of Eni's governance model and represents the motor of a continuous improvement process that contributes to the achievement of the business targets. In the deployment of its activities, Eni has built important relations with the external world in order to maintain a constructive confrontation aimed at the diffusion and development of best practices. This approach is based on the respect of universal principles such as the protection of human rights, the adoption of the highest standards of work, the respect of the environment and communities. The respect for universal principles incorporated in Eni's business model is expressed mainly in responsibility towards applicable laws and the adoption of best standards, the inclusion of all its people through fair and non-discriminating policies, excellence in

operations with the adoption of quality systems and advanced technologies. Integration, innovation and cooperation are the competitive drivers allowing Eni to stand out in the oil & gas industry.

Eni Upstream division has adopted, implemented and constantly updates its own Health, Safety, Environment Public Safety, Quality and Radiation Protection Integrated management system (HSE IMS), since 1998.

The Eni Upstream division's HSE IMS has been developed to comply with the international standards concerning environmental management (ISO 14001), health and safety (OHSAS 18001), quality (ISO 9001), and social accountability (SA 8000); Eni Upstream is also involved in all the major initiatives in the HSE area being an active participant of international organizations as OGP and IPIECA.

At present, Eni Upstream division headquarters holds the following certificates:

- ISO 14001:2015 for "Strategic and operational planning and projects development in hydrocarbon exploration and production", starting from 2005;
- OHSAS 18001:2007 for "Strategic/operational planning and project development of hydrocarbon exploration and production operations. Testing, analysis and measurement activities aimed at characterization of hydrocarbon" issued in 2010;
- ISO 9001:2015 for "Survey Design, Acquisition and Processing of Geophysical Data" starting from 2002;
- ISO 9001:2015 for "Planning and Development of Radiation Protection Services, Radioecological Surveying, NORM Surveying, Dosimetry, Radiometric Analyses, Training, Electromagnetic Field Evaluation" starting from 1999.

Additional details will be provided in ***Chapter 3***.

2.3.2 Eni Myanmar

Eni was one of the first international oil and gas companies to enter Myanmar after the opening of the market to foreign investment following the removal of international sanctions in 2012.

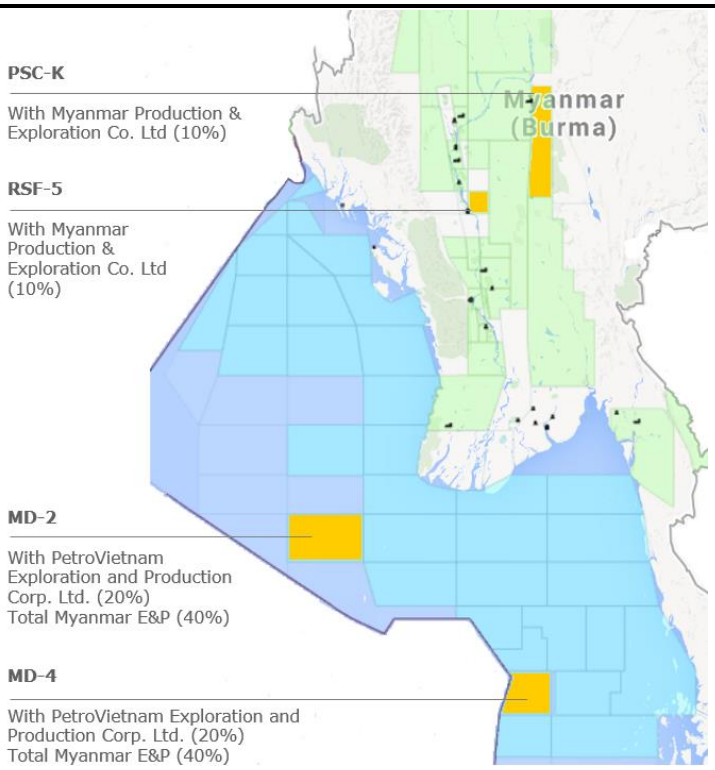
Since then, the country has embarked on a process of economic growth that has also involved the energy sector.

In 2013 the Ministry of Energy issued international tenders for the award of exploration licenses of still largely potentially untapped oil and gas resources.

Eni was subsequently awarded two onshore (RSF-5 and PSC-K) and two offshore (MD-4 and MD-2) exploration licenses. With four operated

exploration licenses, Eni is one of the largest international investors in the country and a major player in the energy sector.

Figure 2.3 Overview of Eni's Blocks in Myanmar



2.3.2.1 *Onshore Activities*

In October 2013 two onshore exploration licenses for the RSF-5 and PSC-K blocks were awarded to Eni, whom Production Sharing Contract (PSC) were signed in July 2014.

The joint venture is made up by Eni (operator with 90%) through Eni Myanmar, and the local company Myanmar Production and Exploration Company Ltd (10%)..

The RSF-5 block covers an area of 1,292 square kilometres and is located in the prolific Salin Basin, about 500 kilometres north of Yangon, while the PSC-K block covers an area of 6,558 square kilometres and is located in the unexplored Pegu Yoma-Sittaung Basin, in the central area of Myanmar.

2.3.2.2 *Offshore Activities*

In March 2015, Eni signed a PSC for the exploration of two offshore blocks, MD-2 and MD-4.

The joint venture is made up by Eni, operator with 40%, through Eni Myanmar BV , Total Myanmar E&P (40%) and Petrovietnam Exploration Production Corporation Limited (20%).

The MD-2 block is located in the southern part of the Bay of Bengal, in the Rakhine Basin, around 135 kilometres from the coast. The block covers 10,330 square kilometres in water depths ranging from 300 to 3,000 metres.

The MD-4 block is located in the Moattama South Andaman Basin, around 230 kilometres from the coast. The block covers 5,900 square kilometres in water depths ranging from 1,500 to 2,200 metres.

2.3.3 Contact Details

The contact details of Eni are presented in ***Table 2.1***.

Table 2.1 Contact Details of Eni

Company Name	Eni Myanmar B.V. (Eni)
Address	Sakura Tower, 6th floor, 339 Bogyoke Aung San Rd. Kyauktada Township, Yangon, Myanmar
Phone Number	(+95.1) 255364
Email	info.enimyanmar@eni.com

2.4 PRESENTATION OF ENVIRONMENTAL, SOCIAL AND HEALTH EXPERTS

2.4.1 Overview

Environmental Resources Management (ERM) has been contracted by Eni to prepare this IEE for the Project. This report presents the objectives, methodology and outcomes of the IEE.

ERM is a leading global provider of environmental, health, safety, risk, social consulting, and sustainability-related services. ERM has more than 160 offices in 40 countries and territories and employ more than 5,000 people. ERM has a 40-year track record of excellence on complex and challenging projects.

ERM has recently registered as a separate ERM Myanmar entity and has opened an office in Yangon with full-time staff. Copies of ERM's relevant registrations and licenses are presented in ***Annex A***.

An overview of the environmental, social and health experts involved with the preparation of this IEE report are presented in ***Table 2.2***, and brief descriptions of their backgrounds are included below.

Table 2.2 ***Environmental, Social and Health Specialists for the Offshore Block MD-4 Seismic IEE***

Organization/ Company	Name	Qualifications	Position/ Specialization
ERM-Siam	Kamonthip Ma-oon	• Executive Study: General Management Programme, Judge Business School, University of Cambridge, UK • MSc. (DIC) in Environmental Engineering and Business Management, Imperial College, London • BEng. in Environmental Engineering, Chulalongkorn University, Thailand	Partner-In-Charge
	Chris Brown	• MSc (Environmental Engineering) • BSc (Manufacturing Engineering)	Principal Consultant, Project Manager
	Christine Bryant	• MSc Ecological Economics, University of Edinburgh, UK • BSc Economics (with specialization in Environmental Economics) George Mason University, USA	Environmental Lead
	Vincent Lecat	• Mastère spécialisé Management du Développement Durable, HEC Paris Business School, France • Maitrise en Ecologie et Environnement (Msc in Ecology and Environment), Université Pierre et Marie Curie, France • Licence en Biologie et Ecologie (Bsc in Biology and Ecology), Université Pierre et Marie Curie, France	Social Lead
	Craig Reid	• BSc (Hons), Marine Biology, University of • Stirling, Scotland, United Kingdom, 1997	Partner, Asia Pacific

Organization/ Company	Name	Qualifications	Position/ Specialization
	Kanokphorn Chaivoraphorn	• M.A. (Social Development – Social Organization and Development) • B.Sc. (Industrial Chemistry) B.P.H. Major in Occupational Health and Safety	Principal Consultant, Health Specialist
	Busaya Jutatipatai	• MSc (Environmental Management) • BSc (Environmental Science)	Associate Consultant
Resource & Environment Myanmar (REM)	Phyu Phyu Shein	• BSc Physics • Diploma in Business Studies • Certificate in Environmental Studies	Social Consultant
	Nan Thazin Oo	• BSc Geography • Certificate in Envionmentla Studies	Social Consultant
	Aung Thu Phyo	• BSc Physics • Certificate Environmental Studies • Certificate Stakeholder Engagement	Social Consultant

Partner-In-Charge – Ms. Kamonthip Ma-oon

Ms. Kamonthip Ma-oon is a Partner with the Impact Assessment and Planning (IAP) Team at ERM-Siam, based in Bangkok Office. Kamonthip has extensive experience as a professional environmental engineer and as project manager for various projects in different sectors i.e. Oil & Gas, Power and Transportation both in Europe and South East Asia regions.

She will be accountable for technical peer review of the documents at various stages and the QA/QC in order to ensure the quality of ERM's service and deliverables to clients.

Project Manager – Mr. Chris Brown

Mr. Chris Brown is a Principal Consultant with the Impact Assessment and Planning Team at ERM-Siam, based in Bangkok, Thailand, with over 10 years' work experience. His educational background is Environmental Engineering, and he has key experience in Water Resources Engineering and Environmental Impact Assessments for various industries across Southeast Asia. Chris has experience with project management and technical review of environmental impact assessments for oil and gas projects in Myanmar.

Environmental Consultant – Ms. Christine Bryant

Ms. Christine Bryant is an Environmental Specialist within Impact Assessment and Planning Team, based in Bangkok Office. Christine has worked in a number of ERM offices in both the USA and the UK. Christine is specialised in ecosystem services and environmental/ socio-economic impact assessment for inclusion in ESIAs. Her expertise also includes natural capital assessment, economic analysis and sustainable finance.

Social Consultant – Mr. Vincent Lecat

Mr. Vincent Lecat is a Senior Consultant within Impact Assessment and Planning Team, based in Bangkok, Thailand. Vincent has extensive experience in Social Impact Assessment, Resettlement, ESIA and Stakeholder engagement across South East Asia and Africa.

His work includes stakeholder engagement, public consultations, resettlement and ESIA projects in Myanmar, West Africa, Central and Northern Europe. His experience in the field and on several diverse and challenging projects, especially in Myanmar, provided him a great understanding of local/ regulatory requirements in Myanmar together with the successful techniques for public consultation and sub-contractor management and supervision.

Associate Consultant (General Environmental SME) – Ms. Busaya Jutatipatai

Busaya Jutatipatai is an Assistant Consultant within ERM based in Bangkok, Thailand. Busaya has experience in the field of Environmental Impact Assessment, Environmental Monitoring Project, HES Risk Management Process, and other technical support.

Health Specialist – Ms. Kanokphorn Chaivoraphorn

Ms. Kanokphorn Chaivoraphorn is a Thailand EIA License Holder and Principal Consultant of the Impact Assessment and Planning team at ERM's office in Bangkok, with over 17 years' experience in Environmental Impact Assessment (EIA) and Environmental and Health Impact Assessment (EHIA) projects in the Power sectors and Oil &Gas. Her expertise includes in depth understanding of Equator Principles, International Finance Corporation (IFC) Performance Standards (PS) and the relevant Environmental, Health, and Safety (EHS) Guidelines and their application to various type of projects including power sector.

Partner, Asia Pacific (Myanmar) – Mr. Craig Reid

Mr. Reid is a Partner with over fifteen years experience in environmental management at ERM. Mr Reid is the Manager of the Marine Sciences Team in Hong Kong, with overall responsibility for a wide range of projects spanning across sectors including power, oil and gas, infrastructure, utilities, property

and mining. Mr Reid is also highly active in Myanmar, providing direct support to ERM's operations there.

2.4.2 Declaration of IEE Experts

ERM hereby state that the IEE Study has been carried out according to the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (2015). To our knowledge, all information contained in this report is accurate and a truthful representation of all findings as relating to the Project.

2.5 REPORT STRUCTURE

This IEE Report has been structured according to the Environmental Impact Assessment Procedure (2015), as well as the Administrative Instruction of Environmental Impact Assessment Procedure (2015), which are described further in ***Chapter 3***. The structure of this IEE is as follows:

- ***Chapter 1*** presents the Executive Summary in both English and Myanmar language.
- ***Chapter 2*** presents an introduction to the project overview, IEE, project proponent, environmental, social and health experts, report structure, and statement of commitments.
- ***Chapter 3*** describes the policy, legal and institutional framework relevant to the Project.
- ***Chapter 4*** presents the Project Description which has been used as the basis for this IEE. The chapter presents all phases of the Project, and also provides information on the alternatives that have been considered for the Project.
- ***Chapter 5*** describes the environmental, social and health baseline relevant to the Project and its area of influence, which forms the basis for assessment of potential impacts.
- ***Chapter 6*** presents the details of scoping, findings of the impact assessment, the recommended mitigation and enhancement measures, and the conclusions as to significance of impacts considering implementation of mitigation measures.
- ***Chapter 7*** presents the Environmental Management Plan (EMP), which describes how the Project will manage and ensure the implementation of the proposed mitigation measures and how the achievement of the required standards of environmental, social and health performance will be monitored and audited.
- ***Chapter 8*** presents details of the public consultation activities carried out for the Project, summarises the related findings and lays out plans for continuing engagement as the Project moves forward.
- ***Chapter 9*** presents the main conclusions of the IEE report, and recommendations for future actions (if any) to be taken.
- ***Chapter 10*** presents the references for the report.

2.6 STATEMENT OF COMMITMENTS

Eni will at all times comply fully with the commitments, mitigation measures, and plans that have been presented in this IEE Report.

Eni shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, including the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (2015), as well as the EMP, Project commitments and conditions.

Eni and ERM hereby confirm that:

(1) The IEE Report is accurate, consolidated and complete;
(2) The IEE has been conducted in accordance with relevant laws, including the EIA Procedure (2015).
(3) The Project will fully follow the commitments, mitigation measures and plans set out in this IEE Report.

In addition, as requested and in compliance to articles 62, 76 and 100 – 105 of the new EIA procedure, Eni Myanmar B.V. endorses and confirms to Ministry of Natural Resource and Environmental Conservation the following:

- the accuracy and completeness of the IEE and relevant EMP;
- that the IEE and the EMP have been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures;
- that eni Myanmar and its Seismic Contractor during the execution of the Project will at all times comply fully with the commitments, mitigation measures and plans set out in the IEE and the associated EMP;
- that Eni Myanmar and its Seismic Contractor confirm full commitment in complying with all laws and regulations as detailed in the IEE determined to be relevant to the planned seismic program;
- that Eni Myanmar is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.
- that Eni Myanmar shall incorporate all relevant environmental commitments and requirements set forth in the IEE Report, for the Construction Phase EMP and/or Operational Phase EMP as the case may, including applicable Emission Limit Values and Environmental Quality Standards, into detailed designs, construction contract specifications, and contracts on Project operations related to any part of the Project;
- that Eni Myanmar shall bear full legal and financial responsibility for:
    - all actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the

Company acting for or on behalf of the Company, in carrying out work on the Project; and

- Person Affected by the Project (PAP) until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.

- that Eni Myanmar shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC (or letter of Approval Letter equivalent of ECC), applicable Laws, the Rules, the EIA Procedure and standards.

3 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter sets out the relevant legal and policy context in Myanmar and documents the environmental and social standards the Project has to comply with, as well as the international standards that the Project will follow. Specifically, this chapter summarises the following:

- Eni's HSE Policy;
- Policy and Legal Framework, including EIA Legislation in Myanmar, relevant Myanmar legislation and international conventions, standards and guidelines relevant to the Project;
- Institutional Framework of the Project Proponent and Myanmar, including the requirements of the Production Sharing Contract (PSC); and
- Environmental and/or health standards related to the Project.

3.1 PROJECT'S ENVIRONMENTAL, SOCIAL AND HEALTH POLICIES

Eni Upstream division has adopted, implemented and constantly updates its own Health, Safety, Environment Public Safety, Quality and Radiation Protection Integrated management system (HSE IMS), since 1998.

The Eni Upstream division's HSE IMS has been developed to comply with the international standards concerning environmental management (ISO 14001), health and safety (OHSAS 18001), quality (ISO 9001), and social accountability (SA 8000); Eni Upstream is also involved in all the major initiatives in the HSE area being an active participant of international organizations as OGP and IPIECA.

Eni is committed to sharing information and experience for the continual development of industry standards and improved practices for health, safety and environmental protection. This has allowed Eni Upstream to develop a strong culture on HSE issues.

The Eni Upstream division's HSE IMS operates according to the Deming cycle method, in order to guarantee a continuous improvement of the associated activities; in particular, the HSE process is composed of four sub-processes:

- Planning;
- Implementation and operation;
- Checking and corrective actions; and
- Management review.

For each of the abovementioned sub-processes, the HSE IMS identifies and describes their inherent phases with their characteristics and the main operating modalities, as well as the associated roles and responsibilities.

At present, Eni Upstream division headquarters holds the following certificates:

- ISO 14001:2015 for "Strategic and operational planning and projects development in hydrocarbon exploration and production", starting from 2005;
- OHSAS 18001:2007 for "Strategic/operational planning and project development of hydrocarbon exploration and production operations. Testing, analysis and measurement activities aimed at characterization of hydrocarbon" issued in 2010;
- ISO 9001:2015 for "Survey Design, Acquisition and Processing of Geophysical Data" starting from 2002;
- ISO 9001:2015 for "Planning and Development of Radiation Protection Services, Radioecological Surveying, NORM Surveying, Dosimetry, Radiometric Analyses, Training, Electromagnetic Field Evaluation" starting from 1999.

Further information on Eni's activities is available on Eni's website (https://www.eni.com/en_IT/media/focus-on/eni-myanmar.page).

Eni Myanmar has adopted HSE & Sustainability Management Systems of Eni Upstream and customized it to be fit with the project typology and Country profile. The main policy and commitment of Eni Myanmar can be identified in the following points:

- the protection of public safety, the health and safety of the workforce and the local communities
- the protection and promotion of human rights, the economic and social development of local communities;
- the protection of the environment and the conservation of biodiversity and ecosystems;
- the continuous improvement of the quality of the processes, services and products of our activities and operations;
- the compliance with with Myanmar laws, regulations and industrial standards regarding the environment, health, safety and hygiene at work in all of our operations
- visible and active leadership that promotes HSE excellence, which engages and motivates employees and contractors alike to succeed
- setting objectives and targets for measuring and improving HSE performance in line with Company activities and strategic objectives
- manage HSE in order to achieve our objective of incident free operations
- implementing sustainable development principles in our activities
- seek and achieve continuous improvement in our processes, consistent with our strategic objectives and priorities, by adopting the most advanced systems for environmental protection and energy efficiency

- measure, audit and report HSE performance and maintain open dialogue with employees and stakeholder groups in order to continuously improve our HSE management system
- creating a culture in which eni Myanmar employees, Contractors and Visitors share these commitments and understand that working safely is a condition of employment.

Additionally, Eni has developed specific guidelines and standards for its operations that will be met during project activities as far as practicable. A summary of these guidelines are included below:

- Eni E&P Division – Quality Requirements: this document defines the contractor's Management System requirements to be applied to the Contract Scope of Work during the bid stage and during the execution of works.
- Eni E&P Division - Contract HSE Requirements for abroad services (Rev 01, Aug 2010): Sets out the minimum requirements, as well as recommendations for everything relevant to the Health, Safety & Environment aspects of the project.
- Eni Upstream Technical Guideline – AMTE-TG-002 "Environmental & Social Impacts in Exploration" (11/03/2016),. This technical guideline describes the purpose and the basic steps to identify appropriate contents, relevant methodologies and responsibilities for the preparation and the implementation of an ESHIA.
- Eni Upstream Technical Guideline - AMTE-TG-013 "Biodiversity and Ecosystem surveys Impact Assessment and Management". This Technical Guideline (TG) provides guidance for managing Biodiversity and Ecosystem Services (BES) issues in onshore and offshore oil and gas projects during all project phases, from exploration to decommissioning.
- Eni Upstream Professional Operating Instruction: Local Stakeholder Engagement (opi ssc 001 Eni spa); Social Context Analysis (opi ssc 002 Eni spa); Community Investment Management (opi ssc 003 Eni spa); Monitoring, reporting and audit activities (opi ssc 004 Eni spa); Local Content (opi ssc 005 Eni spa); Land Acquisition and Management (opi ssc 006 Eni spa) – all issued in July 2015. These guidelines area aimed to ensure that Eni Upstream activities are carried out and developed in a sustainable way.
- Eni Upstream Technical Operating Instruction – opi sg hse 028 ups (11/03/2016) "Identification of significant environmental aspects". It sets the standards relevant to the methodology for the identification of significant environmental aspects.
- Eni E&P division- Doc N° 1.3.2.11 MHS 2 "Health Risk Assessment".
- Eni Upstream Technical Operating Instruction- AMTE-TG-010 "Waste Management in Upstream Oil&Gas Activities". It provides a set of minimum requirements and treatment options that shall be considered for the preparation of dedicated local-specific procedures for a correct

management of all wastes, including waste-water, drilling waste and TENORM waste produced during e&p activities.

- Eni Upstream Operating Technical Guideline - Air Quality Monitoring in Upstream Oil&Gas activities (AMTE-TG-006). It provides a guide or the design, installation and management of Air Quality Monitoring Systems.
- Eni Upstream Operating Technical Guideline - Sustainable Water Management for Upstream Sector (AMTE-TG-012). It defines the procedure for proper and sustainable water management, thus resulting in a usable instrument both for design and operational phases. Moreover it is conceived to be a guideline to develop a Water Management Plan.
- Eni Minimum HSE Requirements in Geophysical Operations (opi sg hse 002 e&p r01). It defines the minimum HSE requirements to apply in geophysical operations (including land seismic acquisition and processing, gravity and magnetic survey) in order to ensure compliance with the commitments of Eni spa Policies as well as the requirements of internationally recognized best practices.
- Eni Code of Ethics (Mar 2008): Lays out Eni's Code of Ethics for its operations.
- Eni Guidelines on the Protection and Promotion of Human Rights (Apr 2007).
- Moreover Eni Myanmar refers to some international policies, principles, and standards for its activities; the main of them are listed below:
- OGP/IPIECA - Ecosystem services guidance, 2011;
- International Union for Conservation of Nature (IUCN) Red List;
- International Finance Corporation (IFC) – Performance Standard 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources, 2012;
- International Finance Corporation (IFC) – Performance Standard 7 Indigenous People, 2012;
- International Finance Corporation (IFC) – Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007;
- WHO – World Health Organization;
- OGP/IPIECA - A Guide to Health Impact Assessment for oil and gas industry, 2007;
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978; Annex I-VI.

Sustainability Policy

Eni's sustainability model is "To operate in a sustainable manner means to create value for stakeholders, and to use resources so that the needs of future generations will not be compromised, respecting people, the environment and the society as a whole." Eni adheres to a sustainability policy, which is composed of the following principles:

- Stakeholder relations – *"Engaging stakeholders and involving them in company's business are both prerequisites for sustainability and for the construction of reciprocal value."*
- Human Rights – *"The respect of Human Rights represents the basis for an inclusive growth of societies, of the territories and, consequently, of the companies that work there."*
- Relations with communities and contribution to local development – *"Dialogue, the respect of local communities, the evaluation of impacts are all preconditions for an effective cooperation, targeted at creating territorial value."*
- Climate strategy – *"To satisfy the world's energy demand, by containing, at the same time, emissions of gases that have an impact on climatic change, is one of the greatest challenges of modern society."*
- Safeguarding biodiversity and ecosystems – *"The conservation of biodiversity and ecosystems is a fundamental need of humanity. They support life, human wellbeing and business activities. The benefits they provide (ecosystem services) such as food, fresh water, climate regulation and nutrient recycling, are vital for the livelihood communities and for the equilibrium of the whole planet."*

The full policy is included in ***Annex B.***

3.2 POLICY AND LEGAL FRAMEWORK

This section of the IEE report provides a synopsis of the environmental, social, health and health & safety regulatory framework that is considered relevant to the project in terms of national requirements as well as main conventions and international treaties ratified by Myanmar.

3.2.1 IEE/EIA Requirements in Myanmar

The *EIA Procedure* for Myanmar was promulgated on 29th December 2015. The procedure was prepared by the Ministry of Natural Recourses and Environmental Conservation (MONREC), formerly called the Ministry of Environmental Conservation and Forestry (MOECAF), along with the support of an EIA Review Team Committee comprising the members of relevant union ministries, union attorney general's office, three city development committees and Non-governmental Organisations (NGOs) and technical support by experts from the Asian Development Bank Greater Mekong Region – Environment Operations Centre (ADB GMS-EOC).

The EIA Procedure sets out the requirements for development, assessment and subsequent monitoring of an IEE. The requirements to conduct an IEE or EIA are outlined in the Environment Conservation Law (2012) and Environment Conservation Rules (2014). In addition; the EIA Procedure is supported by the draft Administrative Instruction which sets out a proposed format and content for reports.

Under Myanmar's EIA Procedure, there is a requirement for the undertaking of an IEE or an EIA in order to obtain an Environmental Compliance Certificate (ECC) for certain development projects(1). The process as outlined in the EIA Procedure is described in the following sections.

3.2.1.1 *Screening*

The process starts with screening and MONREC has the exclusive authority to define screening criteria for a project which are provided in the EIA Procedure. MONREC determines whether the project requires an IEE, an EIA, or is exempt from undertaking any environmental assessment. If an IEE or an EIA is required, Eni would be obliged to prepare an IEE / EIA and obtain approval as well as prepare and implement an appropriate Environmental Management Plan (EMP).

For this Project, Eni was required to submit a Project Proposal Report (2) (PPR) to the Environmental Conservation Department (ECD) of MONREC for screening. This PPR was submitted by Eni in March 2017. It is expected that MONREC will determine that the Project will require an IEE i.e. categorised as "Offshore Oil and Gas Seismic Surveys (all sizes)", as this is the stated requirement according to *Annex I* of the EIA Procedure. Therefore, ENI has followed the IEE Type Project requirements of the EIA Procedure for this report.

3.2.1.2 *Initial Environmental Examination and Report Preparation*

In accordance with the final EIA Procedure dated 29th December 2015, Eni has prepared this IEE Report which properly addresses all adverse physical, biological, social, economic and cultural impacts with appropriate mitigation measures proposed. The IEE Report format and structure follows the requirements of the EIA Procedure and Annex 4 of the Administrative Instruction of Environmental Impact Assessment Procedure (2015).

3.2.1.3 *Public Consultation and Project Disclosure*

As per the requirements of the EIA Procedure, this IEE Report also includes the results of public consultations and takes into account the most relevant and significant aspects of public opinion and the main stakeholders when assessing impacts, designing mitigation measures and selecting monitoring parameters. After conducting a single round of public consultation (as required for an IEE as per Myanmar's EIA Procedure) and incorporating the analysis and results in to the IEE Report, the Report is submitted to MONREC.

After submission to MONREC, the IEE Report should be disclosed to the public, Project Affected Populations (PAPs), concerned government organizations and other interested stakeholders. Eni will disclose the

(1) Under Section 7 of the Environmental Conservation Law (2012) and Articles 52, 53 and 55 of the Environmental Conservation Rules (2014) of the Republic of the Union of Myanmar.

(2) ERM (2016) Project Proposal Report for the Marine Seismic Survey for Block MD-4, Offshore Myanmar.

Myanmar language Executive Summary of this IEE Report at the township General Administrative Department (GAD) offices in relevant Project townships. The IEE Report disclosure will also be advertised in national and local newspapers. The full IEE Report (in English) and Executive Summary (in Myanmar local language) will be available from https://www.eni.com/en_IT/media/focus-on/eni-myanmar.page. Further information on Public Consultation and Project Disclosure is presented in ***Chapter 8 – Public Consultation***.

3.2.1.4 Overview of IEE Review and Approval Process

An overview of the IEE Review and Approval Process is presented below, as excerpted from Articles 39 – 42 of the EIA Procedure:

"39. Upon receipt of the IEE Report from the Project Proponent, the Department shall:
a) disclose the IEE Report to the public on the Ministry and/or Department website(s), and/or through other appropriate media;
b) invite comments and suggestions on the IEE Report from all relevant parties including relevant government organizations, institutions, civil society organizations, and PAPs, as appropriate;
c) arrange public consultation meetings at the local level, at which the Project Proponent shall present the IEE Report; and
d) collect and review all comments and recommendations received, and forward the same to the Ministry to enable it to make a final decision on approval of the IEE Report.

40. If it is determined by the Ministry that the IEE Report does not satisfy requirements, then the Project Proponent shall be called upon by the Department to undertake necessary amendments and/or to provide supplementary information as directed by the Ministry.

41. Upon completion of its review of the IEE Report, the Ministry shall;
a) approve the IEE Report, subject to any conditions it may prescribe, and issue an ECC; or
b) require that the Project carry out an EIA, citing the reasons for this decision and informing the Project Proponent of its decision; and, in either case
c) publicly disclose its decision.

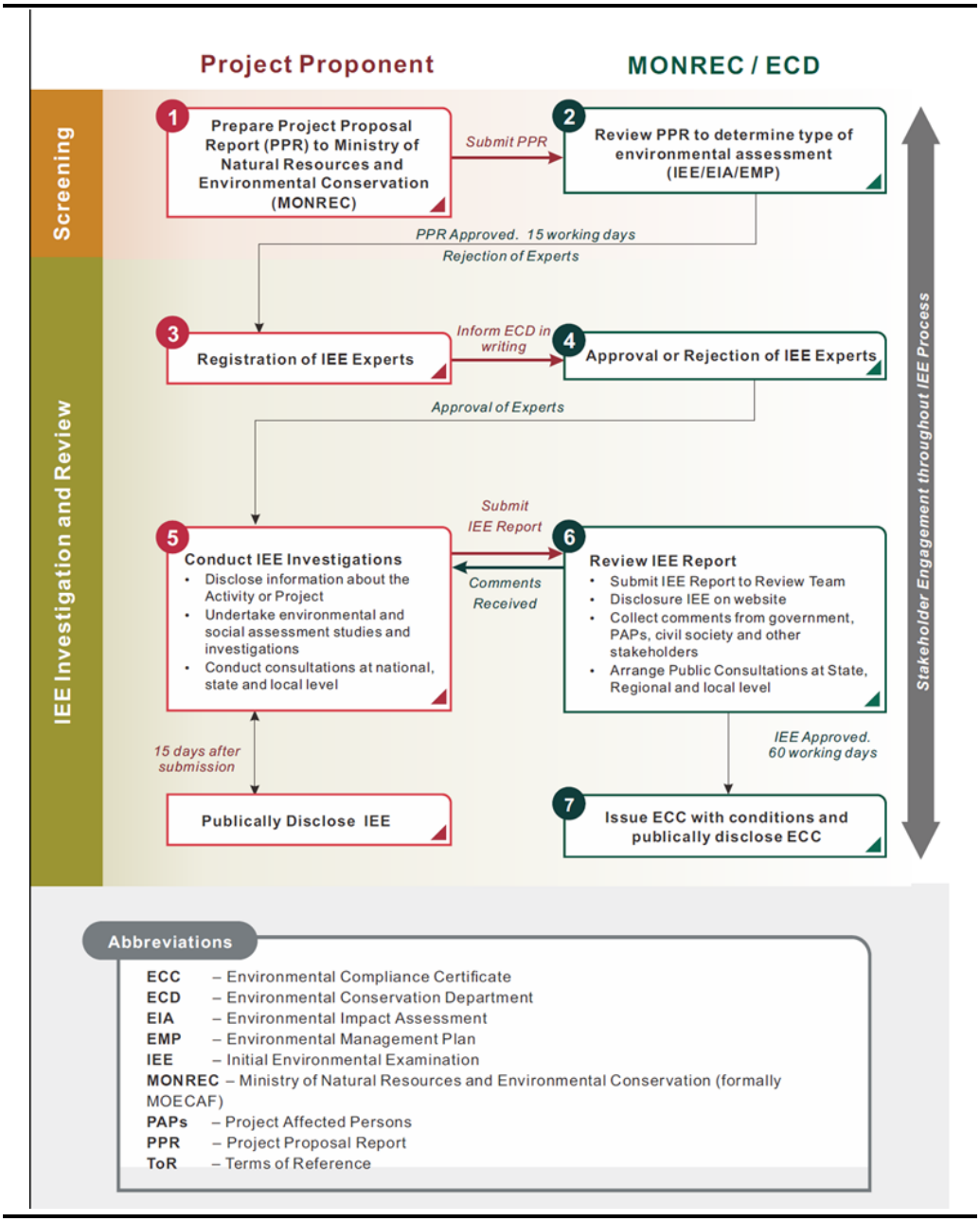
42. The Department shall deliver the final decision of the Ministry within sixty (60) working days of receipt of an IEE Report. If the Ministry requires an IEE Report to be amended, then the due date for delivery of the Ministry's decision shall be extended accordingly."

An overview of the above procedure is depicted in *Error! Reference source not found.*.

As noted above, after submission of the IEE report to MONREC for review, MONREC should deliver its final decision within 60 working days of receipt of the IEE Report. Upon completion of its review of the IEE Report, MONREC

will either issue an ECC or inform Eni that the Project is required to undergo the EIA process (if impacts are larger than those anticipated during the screening / scoping phase) and publically disclose its decision. If the IEE is satisfactory, MONREC will approve the IEE Report, and issue an ECC.

Figure 3.1 *IEE Review and Approval Process*



3.2.2 *Relevant Legislation in Myanmar*

Laws related to environmental and social issues and hence relevant to the IEE Study for the proposed seismic survey are included in ***Table 3.1***.

As mentioned in *Section 2.6*, Eni will comply with all applicable laws, and also is liable to ensure that all contractors and subcontractors for the Project comply fully with all applicable laws.

3.2.3 International Agreements and Conventions

A list of Project-relevant international treaties and conventions of which Myanmar is a signatory is provided in ***Table 3.2***.

Table 3.1 Myanmar Legislation and Relevance to Project

Laws and Regulations	Description
Constitution of the Republic of the Union of Myanmar, 2008	
The Constitution of the Union of Myanmar is the supreme law of the country and has provisions regarding the protection of the environment in Myanmar. Articles in the Constitution relevant to environmental protection are Articles 37, 42 and 390. They are quoted below:	
Article 37	(a) The Union is the ultimate owner of all lands and all natural resources above and below the ground, above and beneath the water and in the atmosphere in the Union; (b) The Union shall enact necessary law to supervise extraction and utilization of State owned natural resources by economics forces;
Article 42	The Union shall protect and conserve natural environment.
Article 390	Every citizen has the duty to assist the Union in carrying out the following matters: (a) preservation and safeguarding of cultural heritage; (b) environmental conservation; (c) striving for development of human resources; (d) protection and preservation of public property. These three Articles in the Constitution provide a basis for legalizing and institutionalizing environmental health impact assessment and social impact assessment.
The Environmental Conservation Law, 2012	
he Pyidaungsu Hluttaw enacted this law by Law No. 9 of 2012 on the date of 30th March, 2012. March, 2012. The legal mechanism for ESHIA has been put in this law. This law was enacted with the objectives of: (a) To enable to implement the Myanmar National Environmental Policy; (b) To enable to lay down the basic principles and give guidance for systematic integration of the matters of environmental conservation in the sustainable development process; (c) To enable to emerge a healthy and clean environment and to enable to conserve natural and cultural heritage for the benefit of present and future generations; (d) To reclaim ecosystems as may be possible which are starting to degenerate and disappear; (e) To enable to manage and implement for decrease and loss of natural resources and for enabling the sustainable use beneficially; (f) To enable to implement for promoting public awareness and cooperation in educational for dissemination of environmental perception; (g) To enable to promote international, regional and bilateral cooperation in the matters of environmental conservation; (h) To enable to cooperate with Government Departments, Government Organizations, International Organizations, non-government organizations and individuals in matters of environmental conservation.	
The Environmental Conservation Rules, 2014	
The Ministry of Natural Resources and Environmental Conservation, in exercise of power conferred under sub-section (a) of section 42 of the Environmental Conservation Law, issues this rules by No. 50 of 2014 on the date of 5 June, 2014.	

Laws and Regulations	Description
Rule 51	The Ministry shall assign duty to the Department for enabling to adopt and carry out the environmental impact assessment system.
Rule 52	The Ministry shall determine the categories of plan, business or activity which shall carry out environmental impact assessment
Rule 53	The Ministry shall to scrutinize whether or not it is necessary to conduct environmental impact assessment, determine the proposed plans, businesses or activities which do not include in stipulation under rule 52
Rule 56	The person who carries out any project, business or activity shall arrange and carry out for conducting the environmental impact assessment for any project, business or activity by a qualified third person or organization accepted by the Ministry.
Rule 58	The Ministry shall form the Environmental Impact Assessment Report Review Body with the experts from the relevant Government departments, Government organizations.
Rule 61	The Ministry may approve and reply on the EIA report or IEE or EMP with the guidance of the Committee
Rule 69	i. Any person shall not emit, cause to emit, dispose, cause to dispose, pile and cause to pile, by any means, the pollutants and the hazardous waste or hazardous material stipulated by notification under the Law and any of these rules at any place which may affect the public directly or indirectly. ii. Any person shall not carry out to damage the ecosystem and the natural environment which is changing due to such system, except for carrying out with the permission of the Ministry for the interest of the people.
EIA Procedure(2015)	
The EIA Procedure sets out the procedures for completing an IEE, EIA and/or EMP in Myanmar. This includes information on project categorisation, responsibilities of project developers and ministries, EIA review, monitoring and auditing, among other issues.	
National Environmental Quality Guidelines (NEQG) (2015)	
The NEQG sets out emission standards for air, noise and effluent discharges for oil and gas operations. The project shall consider emissions standards in its environment impact assessment and environmental management plan. These rules state that: "…all Projects and Project expansions undertaken by any ministry, government de-partment, organization, corporation, board, development committee and organiza-tion, local government or authority, company, cooperative, institution, enterprise, firm, partnership or individual (and/or all Projects, field sites, factories and busi-nesses including expansions of such Projects, field sites, factories and businesses identified by the Ministry, which may cause impact on environmental quality and are required to obtain Prior Permission in accordance with Section 21 of the Law, and Article 62 of the Rules) having the potential to cause Adverse Impacts, are re-quired to undertake IEE or EIA or to develop an EMP, and to obtain an ECC in ac-cordance with this Procedure."	

Laws and Regulations	Description
Myanmar Investment Law, 2016	
3. The objectives of this Law are as follows: (a) To develop responsible investment businesses which do not cause harm to the natural environment and the society for the benefit of the Union and its citizens; (b) To protect the investors and their investments in accordance with the law; (c) To create job opportunities for the people; (d) To develop human resources; (e) To develop high functioning production, service, and trading sectors. (f) To develop technology and the agriculture, livestock and industrial sectors; (g) To develop various professional fields including infrastructure across the Union; (h) To enable the citizens to be able to work alongside with the international community; and (i) To develop businesses and investments that meet international standards.	
Conservation of Water Resources and Rivers Law (2006)	
Section 6 outlines prohibitions for the following activities: • "No person shall anchor the vessels where vessels are prohibited from anchoring in the rivers and creeks. • No person shall dispose of engine oil, chemical, poisonous material and other materials which may cause environmental damage, or dispose of explosives from the bank or from a vessel which is plying, vessel which has berthed, anchored, stranded or sunk. • No one shall dispose of any substance into the rivercreek that may cause damage to waterway or change of watercourse from the bank or vessel." The aims of this Law are as follows: • to conserve and protect the water resources and river systems for beneficial utilization by the public; • to smooth and enhance safety of waterways navigation along rivers and creeks; • to contribute to the development of State economy through improving water resources and river systems; • to protect environmental impact. The empowerment of this Law is provided to the Ministry of Transport for controlling navigation of vessels in the rivers and creeks as well as communicating with local and foreign government and organizations for conservation of water resources, rivers and creeks. Also, to carry out conservation works for water resources, rivers and creeks, in accordance with the relevant international conventions, regional agreements and bilateral agreements for environmental conservation.	

Laws and Regulations	Description
Rules On Protection Of Wildlife, And Protected Area Conservation Law (2003) And The Protection Of Wildlife, And Wild Plant And Conservation Of Natural Areas Rules (2002)	
Objectives	The objectives of this Law are as follows:- a) to implement the Government policy for wildlife protection; b) to implement the Government policy for natural areas conservation; c) to carry out in accordance with the International Conventions acceded by the State in respect of the protection and conservation of wildlife, ecosystems and migratory birds; d) to protect endangered species of wildlife and their natural habitats.
Protected Wildlife	15. The Director General shall, with the approval of the Minister: a) determine and declare endangered species of wild animal which are to be protected according to the following categories: i. completely protected species of wild animals; ii. normally protected species of wild animals; iii. seasonally protected species of wild animals; b) determine and declare the endangered species of wild plants and their nature habitats thereof; c) lay down and carry out measures for the preservation of protected wildlife species;
Taking Administrative Action	31. A Forest Officer may pass an administrative order causing a fine that may extend to Kyat 10,000 to be paid, on a person who kills, hunts, wounds or raises a seasonally protected wild animal without permission during the closed season.
The Burma Wildlife Protection Act 1936 and The Burma Wildlife Protection Rules 1941 (Burma Act No. Vii Of 1936)	
This legislation makes provision for the establishment of sanctuaries (game sanctuaries) on any land at the disposal of the government or, subject to the consent of the owner, any land which is private property. It also provides for the protection of a number of named species outside sanctuaries and reserved forests.	
National Environmental Policy (1994)	
Under this policy, the main environmental body was the NCEA. Prior to the establishment of MONREC, environmental conservation was undertaken by various ministries and departments. In 1990, the NCEA was established to advise the government on environmental policy, to act as a focal point and as a coordinating body for environmental affairs and to promote environmentally sound and sustainable development. The NCEA's main mission is to ensure sustainable use of environmental resources and to promote environmentally sound practices in industry and other economic activities, objectives and mandates.	
National Sustainable Development Strategy (2009)	
Sustainable management of natural resources in Myanmar, from environmental perspective comprises 11 areas, in which mining sector development concerned are as follow: • Sustainable forest resources management; • Biodiversity conservation; • Sustainable fresh water resources management ; • Environmental quality management and enhancement; • Sustainable management of land resources;	

- Sustainable management for mineral resources utilization;
- Sustainable energy production and consumption; and
- Sustainable industrial, transport and communication development.

The Protection and Preservation of Cultural Heritage Regions Law, 1998

The State Peace and Development Council Law enacted this law by Law No. 9/ 98 on the date of 10 September, 1998. The Ministry of Culture may, with the approval of the Government issue notification for the protection of cultural heritage areas are categorized as following kinds of zones / region:

a) Ancient monumental zone;

b) Ancient site zone.

Objectives:

a) to implement the protection and preservation policy with respect to perpetuation of cultural heritage that has existed for many years;
b) to protect and preserve the cultural heritage regions and the cultural heritage therein so as not to deteriorate due to natural disaster or man-made destruction;
c) to uplift hereditary pride and to cause dynamism of patriotic spirit of citizens by protecting and preserving the cultural heritage regions;
d) to promote public awareness and will as to the high value of the protection and preservation of the cultural heritage regions;
e) to protect the cultural heritage regions from destruction;
f) to carry out protection and preservation of the cultural heritage regions in conformity with the International Convention approved by the State.

The Conservation of Antique Objects Law 2016

The objectives of this law are as follows:

a) to implement the policy of protection and preservation for the perpetuation of antique objects;
b) to protect and preserve antique objects so as not to deteriorate due to natural disaster or man-made destruction;
c) to uplift hereditary pride and to cause dynamism of patriotic spirit by protection and preservation of antique objects;
d) to have public awareness of the high value of antique objects;
e) to carry out in respect of protection and preservation of antique objects in conformity with the International Convention and Regional Agreement ratified by the State.

The Protection and Preservation of Ancient Monuments Law (2016)

3. The objectives of this law are as follows:
   a. To implement the protection and preservation policy for the perpetuation of ancient monuments which have existed for many years;
   b. To protect and preserve cultural heritage regions and ancient monuments so that they are not destroyed by natural disaster or man;
   c. To uplift hereditary pride and to cause dynamism of patriotic spirit of citizens by protecting and preserving cultural heritage regions;
   d. To promote public awareness and will as to the high value of the protection and preservation of cultural heritage regions;
   e. To explore and preserve new ancient monuments;
   f. To protect cultural heritage regions from destruction;
   g. To implement protection and preservation of ancient monuments in conformity with international conventions and regional agreements.

5. Every person desirous to engage in the following within the area of certain ancient monuments has to apply for the permission of the administration department:

(e) digging a ***well, pond*** or fish-breeding pond;

Laws and Regulations	Description
(f) **mining** for gold, producing sand, digging stones, brickworks and other works which can impact the soil density and ground structure;	
The Private Industrial Enterprise Law, 1990	
The State Law and Order Restoration Council enacted this law by Law No.22/90 on 26th November, 1990.According to this law; all private industrial enterprises shall avoid or reduce the use of polluting technology. The Supervisory Body supervises and inspects the enterprise to ensure the following: o No health threats from the industrial enterprise to the nearby residence; o No fire threats or hazards; o No source of nuisance or pollution originating from the enterprise; o No occupational hazard to the workers and o Compliance with the existing law.	
Myanmar Fire Force Law, 2015	
The objectives of Myanmar Fire Force Law are: a) To take precautionary and preventive measure and loss of state own property, private property, cultural heritage and the lives and property of public due to fire and other natural disasters b) To organize fire brigade systemically and to train the fire brigade c) To prevent from fire and to conduct release work when fire disaster, natural disaster, epidemic disease or any kind of certain danger occurs d) To educate, organize an inside extensively so as to achieve public corporation e) To participate if in need for national security, peace for the citizens and law and order The relevant Government Department or organization shall, for the purpose of precaution and prevention, obtain the approval of the Fire force Department before granting permission for the following cases: a) Constructing three-storied and above buildings market and condominium buildings, b) Operating hotel ,motel, guest house enterprise c) Constructing factory, workshop ,storage facilities and warehouse d) Operating business expose to fire hazard by using in inflammable materials or explosive materials e) Producing and selling fire-extinguishing apparatuses Doing transport business, public utility vehicles train, airplane, helicopter, vessel, ship, etc. The relevant government department or organization shall obtain the opinion of the Fire Services Department for the purpose of fire precaution and prevention, when laying down plans for construction for town, village and downtown or village development plans.	
Prevention from Danger of Hazardous Chemical and Associated Material Law (Pyidaungsu Hluttaw Law No 28/2013)	
The objectives of this law are: f) to prevent damage to environmental resources and living organisms due to chemicals and associated materials g) to provide for the systematic control of businesses using chemicals and associated materials in accordance with government approvals h) to carry out data gathering and to undertake education and research regarding the safe and systematic utilization of chemicals and associated materials i) to achieve continuous improvements in worksite safety, health and environmental conservation Chapter 7 – "Any person, who wants to do the business of chemical and associated materials, shall apply to the central body for the acquisition of the license, attached with the management	

plan for the environmental conservation in accord with the stipulations".

Chapter 8 – "20. License holder shall apply to the central supervising body in accord with the stipulation for the relevant chemicals and associated materials using for his chemicals and associated materials business" for a certificate.

"22. The registered certificate holder shall abide by the regulations contained in the registered certificate and shall follow the order and directives issued from time to time by the central supervising body".

Myanmar Agenda 21 (1997)

The Myanmar Agenda 21 makes recommendations for the drafting and promulgation of a framework law which can further promote the integration of environmental and developmental concerns in the decision-making processes of the country.

The Myanmar Agenda 21 contains guidelines to address the following issues:

- increasing energy and material efficiency in production processes;
- reducing wastes from production and promoting recycling;
- promoting use of new and renewable sources of energy;
- using environmentally sound technologies for sustainable production;
- reducing wasteful consumption;
- increasing awareness for sustainable consumption.

Myanmar Insurance Law (1993)

The Myanmar Insurance is established under this Law as a legal entity having perpetual succession, capable of suing and being sued in its own name. The rules for establishing insurances in the country are established.

The Myanmar Insurance is established with the following aims:

- to overcome financial difficulties by effecting mutual agreement of insurance against social and economic losses which the people may encounter, due to common perils;
- to promote the habit of savings individually by effecting life assurance, thus contributing to the accumulation of resource, of the State;
- to win the trust and confidence of the people in the insurance system by providing effective insurance safeguards which may become necessary in view of the social and economic developments.

The Law On Standardization (2014)

The objectives of Law on Standardization are as follows:

- to enable to determine Myanmar Standards;
- to enable to support export promotion by enhancing quality of production organizations and their products, production processes and services;
- to enable to protect the consumers and users by guaranteeing imports and products are not lower than prescribed standard, and safe from health hazards;
- to enable to support protection of environment related to products, production processes and services from impact, and conservation of natural resources;
- to enable to protect manufacturing, distributing and importing the disqualified goods which do not meet the prescribed standard and those which are not safe and endangered to the environment;

Laws and Regulations	Description
	• to support on establishing the ASEAN Free Trade Area and to enable to reduce technical barriers to trade. • to facilitate technological transfer and innovation by using the standards for the development of national economic and social activities in accordance with the national development program.
The Science and Technology Development Law (1994)	
	• To carry out development of Science and Technology for promotion of industrial production contributory towards the National Economic Development Plans; • To carry out Research and Development for the increased extraction and utilization of domestic raw materials and the promotion of industrial production enterprises based on modern Science and Technology; • To effect Technology Transfer for the promotion of production processes and the improvement of the quality of goods; • To nurture luminaries required for the development of Science and Technology and for Research and Development and to improve their qualifications.
Myanmar Port Authority Law 2015	
	"Any person who by himself or another so casts or throws any ballast or rubbish or any such other thing or so discharges any oil or water mixed with oil, or the master of any vessel from which the same is so cast, thrown or discharged, shall be punishable with fine not exceeding fifty thousand kyats, and shall pay any reasonable expenses which may be incurred in removing the same".
Law Amending the Territorial Sea and Maritime Zone Law (2008)	
	After clause 3 of the annex to the Territorial Sea and Maritime Zone Law, clause 4 and clause 5 have been inserted with new coordinates which have no impact on the Project.
Union of Myanmar Marine Fisheries law (25 April1990, amended 1993)	
	The relevance of this law to the offshore component of the Project is that it places restriction on pollution: "No person shall dispose of living aquatic creatures or any material into the Myanmar Marine Fisheries Waters to cause pollution of water or to harass fishes and other marine organisms."
The Law Relating to Aquaculture, 1989	
	To avoid impacts to the environment from aquaculture.
The Law Relating to the Fishing Rights of Foreign Fishing Vessels, 1989	
	To govern foreign fisheries in Myanmar waters.
Territorial Sea and Maritime Zones law (1977)	
	The Union of Myanmar has exclusive jurisdiction for the construction, maintenance or operation of offshore terminals and exclusive jurisdiction to preserve and protect the marine environment, and to prevent and control marine pollution.
The Petroleum Act (1939) and Rules (1937)	
	This act refers that the import, transport or store of any petroleum cannot be made save in accordance to the rules that may be defined by the President of the Union. "All receptacles containing dangerous petroleum shall have a stamped, embossed, painted or printed warning, either on the receptacle itself or, where that is impracticable, displayed near the receptacle, exhibiting in conspicuous characters the words "Petrol" or "Motor Spirit", or an equivalent warning of the dangerous nature of the petroleum".

Laws and Regulations	Description
It also establishes the needs and exemptions from licenses and authorizes the testing of petroleum by the President of the Union and rules that might issue rules on that regard.	
The Oilfields Act (1918)	
This act provides clarification on activities within the oil and gas industry, and provides the Government with the power to define and alter limits of any notified oilfield. In addition, the Government may make rules for regulating all matters connected with many operations related to the extraction of oil and/or gas. The Act also provides guidance and issues such as preventing oil and gas wastes, reporting of fires, accidents and other occurrences and regulating the collection and disposal of both oil and gas.	
Public Health Law, 1972	
Purpose: to ensure the public health include not only employees but also resident people and cooperation with the authorized person or organization of health department. It is concerned with the protection of peoples' health by controlling the quality and cleanliness of food, drugs, environmental sanitation, epidemic diseases and regulation of private clinics. The project owner will cooperate with the authorized person or organization in line with the section 3 and 5 of said law. Section 3: The project owner will abide by any instruction or stipulation for public health. Section 5: The project owner will accept any inspection, anytime, anywhere if it is needed.	
The Protection and Prevention of Communicable Disease Law, 1995	
Chapter 5 of this law states that all persons are responsible for reporting an outbreak of a communicable disease to the nearest Health Officer.	
The Control of Smoking and Consumption of Tobacco Product Law, 2006	
3. The objectives of this Law are as follows; (a) to convince the public that health can be adversely affected due to smoking and consumption of tobacco product and to cause refraining from the use of the same; (b) to protect from the danger which affects public health adversely by creating tobacco smoke-free environment; (c) to obtain a healthy living style of the public including child and youth by preventing the habit of smoking and consumption of tobacco product; (d) to uplift the health, economy and social standard of the public through control of smoking and consumption of tobacco product; (e) to implement measures in conformity with the international convention ratified by Myanmar to control smoking and consumption of tobacco product;	
The Development of Employees and Expertise (Skill), 2013	
5. (a) (1) If the employer has appointed the employee to work for an employment, the employment agreement shall be made within 30 days. But it shall not be related with government department and organization for a permanent employment. (2) If pre training period and probation period are stipulated before the appointment the said trainee shall not be related with the stipulation of sub-section (1). (b) The following particulars shall be included in the employment agreement: (1) the type of employment;	

Laws and Regulations	Description

(2) the probation period;

(3) wage, salary;

(4) location of the employment;

(5) the term of the agreement;

(6) working hour;

(7) day off, holiday and leave;

(8) overtime;

(9) meal arrangement during the work hour;

(10) accommodation;

(11) medical treatment;

(12) ferry arrangement to worksite and travelling;

(13) regulations to be followed by the employees;

(14) if the employee is sent to attend the training, the limited time agreed by the employee to continue to work after attending the training;

(15) resigning and termination of service;

(16) termination of agreement;

(17) the obligations in accord with the stipulation of the agreement;

(18) the cancellation of employment agreement mutually made between employer and employee;

(19) other matters;

(20) specifying the regulation of the agreement, amending and supplementing;

(21) miscellaneous.

(c) The worksite regulations contained in the employment agreement shall be in compliance with any existing law and the benefits of the employee shall not be less than those of the any existing law.

(d) According to the employment agreement, the Ministry shall issue the notification for

paying the stipulated compensation to the employee by the employer, if the work is completed earlier than the stipulated period or the whole work or any part of it have to be terminated due to unexpected condition or the work has to be terminated due to various conditions.

(e) The employment agreement made under sub-section (a) shall be related with daily wage workers, piece rate workers who are appointed temporarily in the government department and organization.

(f) The worksite regulations and benefits contained in the employment agreement mutually made between the employer and employee or among the employees shall be amended as necessary, in accord with the existing law.

(g) The employer shall send a copy of the employment agreement made between the employer and employee, to the relevant employment and labour exchange office within the stipulated period and shall get the approval of it.

(h) The employment agreement made before the enforcement of this law shall be confirmed up to the end of the term of the original agreement.

Laws and Regulations	Description
14. The employer shall carry out the training program in accord with the work requirement in line with the policy of the skill development team to develop the skill relating to the employment for the workers who are proposed to appoint and working at present. 15. The Employer: (a) shall carry out the training for each work or compounding the work individually or group-wise by opening on-job training, training systematically at worksite, sending outside training and training by using information technology system, for arranging the training program to enhance the employment skill of the workers; (b) appointing the youths of 16 years as apprentice, shall arrange the training for technology relating to the employment systematically in accord with the regulations prescribed by the skill development team. 30. (a) The employer of the industry and service business shall put in to the fund monthly as put in fees without fail for the total wages of the subordinates and the supervisors' salary for not less than 0.5%; (b) Put in money paid under sub-section (a) shall not be deducted from the wage and salary of the employees.	
The Settlement of Labour Dispute Law, 2012	
The Pyidaungsu Hluttaw hereby had enacted this Law for safeguarding the right of workers or having good relationship between employer and workers and making peaceful workplace or obtaining the rights fairly, rightfully and quickly by settling the dispute of employer and worker justly.	
The Welfare of Labours of Oilfield Act, 1951 (After notification)	
The act provide for the prevention of waste of oil or gas and also the prevention of environmental pollution by petroleum operations. For the labours' Working hours: Higher physical danger risk establishment (e.g. an oil rig): 8 hours/day or 40 hours/week, Medium physical danger risk establishment (e.g. factory, oilfield, open mine): 8 hours/day or 44 hours/week. If factory work is part of a continuous process (i.e. technical reasons): admissible 48 hours/week, 10 hours a day Max. 6 days/week (i.e. Sunday = weekly holiday). For Overtime: 2x normal pay rate. Work on weekly holiday = alternative day off within a period of 2 months. In Practice: No specific rules for offshore workers except in old law—oilfields act. Workers in industrial zones work around 11 hours a day, 6 days a week. Many in oilfields the same, but more dangerous jobs, 40/ week.	
The Workmen Compensation Act, 1923 (amended 2005)	
In the Workmen's compensation Act, 1923, the expression" Kyats 2,160 and Kyats 7,200" contained in clause A (i) of sub-section (1) of section 4, the expression "two hundred Kyats" contained in clause A (ii) of sub-section (1) of section 4, the expression "Kyats 3,024and Kyats 10,080" contained in clause B (i) of sub-section (1) of section 4, the expression "twelve hundred Kyats" contained in clause B (ii) of sub-section (1) of section 4, the expression. • "one hundred Kyats" contained in the proviso of sub-section (1) of section 8 shall be substituted respectively by the expression "the amount of compensation prescribed by notification by the Ministry of Labour, with the approval of the Government." The expression "subject to a maximum of thirty Kyats" contained in clause D (ii) of sub-section (1) of section 4 of the Workmen's Compensation Act, 1923 shall be deleted. The expression "ten Kyats" contained in sub-section (2) of section 8, the expression "twenty five Kyats" contained in sub-section (4) of section 8, the expression "three hundred Kyats" contained in the first proviso of sub-section (1) of section 30 of the Workmen's Compensation Act, 1923 shall be substituted respectively by the expression "the amount of money prescribed by notification by the Ministry of Labour, with the approval of the Government. The expression "shall be punishable with fine which may extend to one hundred Kyats" contained in sub-section (1) of section 18 A of the Workmen's Compensation Act, 1923 shall be substituted by the expression "shall be punishable with fine which may extend to Kyats 10,000."	

Laws and Regulations	Description
Labour Organization Law, 2012	
This Law was enacted, to protect the rights of the workers, to have good relations among the workers or between the employer and the worker, and to enable to form and carry out the labour organizations systematically and independently.	
Minimum Wages Law, 2013	
This Law was enacted to meet with the essential needs of the workers, and their families, who are working at the commercial, production and service, agricultural and livestock breeding businesses and with the purpose of increasing the capacity of the workers and for the development of competitiveness,.	
Payment of Wages Law, 2016	
Salaries are to be paid at the end of the month or, depending on the size of the employing enterprise, between 5-10 days before the end of the month. The employer is permitted and required to withhold income tax and social security payments. Other deductions, e.g. for absence, may only be withheld in accordance with the law. Section 3 The employer (a) will pay for salary either Myanmar Kyats or Foreign Cash permitted by National Bank of Myanmar. When delivery the salary (b) If the employer needs to pay the other opportunities or advantages, he can pay cash together with other materials according employee's attitude. Section 4 When the contract finish, employer need to pay the salary (not more than one month) to employees. For the permanent worker, need to pay per monthly. If more than 100 employees, need to pay within the 5 days from the end of month. If fire the employees, need to pay salary within two days after fire. When employee dies due to the accident, need to pay money as an insurance to employee's family within two days. Section 9 When cut the salary due to the employees' absence, total cut salary not more than 50 % of his salary. Section 10 Employer need to approval form the department as a penalty and cannot more than actual ravage rate when cut salary. No cut salary from the employees under 16 age.	
Social Security Law, 2012	
The Establishments Applied Section 11. (a) The following establishments shall be applied with the provisions for compulsory registration for social security system and benefits contained in this Law if they employ minimum number of workers and above determined by the Ministry of Labour in co-ordination with the Social Security Board: (i) production industries doing business whether or not they utilize mechanical power or a certain kind of power, works of production, repairing or services, or engineering works, mills, warehouses, establishments; (ii) Government departments, Government organizations and regional administrative organizations doing business; (iii) development organizations; (iv) financial organizations, (v) companies, associations, organizations and their subordinate departments and branch offices doing business; (vi) shops, commercial establishments, public entertaining establishments; (vii) Government departments and Government organizations doing business or transport businesses owned by regional administrative body, and transport businesses carried out with the permission of such department, body or in joint venture with such department or body; (viii) construction works carried out for a period of one year and above under employment agreement; (ix) works carried out with foreign investment or citizen investment or joint ventured businesses;	

Laws and Regulations	Description
	(x) works relating to mining and gemstone contained in any existing law; (xi) works relating to petroleum and natural gas contained in any existing law; (xii) ports and out-ports contained in any existing law; (xiii) works and organizations carried out with freight handling workers; (xiv) Ministry of Labour and its subordinate departments and organizations; (xv) establishments determined by the Ministry of Labour from time to time, in co-ordination with the Social Security Board and with the approval of the Union Government; that they shall be applied with the provisions of compulsory registration for Social Security System and benefits contained in this Law. (b) Any establishment which is applied with the provisions of compulsory registration under sub-section (a) shall continue to be applied by this Law even though any of the following situations occurs if it continues to carry out such work: (i) carrying out work by employing under stipulated minimum number of workers but more than one worker; (ii) changing the employer or changing the type of business. Section 48 (a) The employer shall effect insurance by registering for employment injury benefit insurance system containedin section 45 at the relevant township social security office and pay contribution to employment injury benefit fund in accord with stipulations in order that workers applied to provisions of compulsory registration may obtain the employment injury benefits. Section 51 The employer (a) shall pay contribution monthly to Employment Injury Benefit Fund at the rates stipulated under section 50. Moreover he shall also bear the expenses for paying as such; (b) shall pay defaulting fee stipulated under section 88, in addition to the contribution if fails to contribute after effecting insurance for employment injury benefit. Section 53 (a) The employers and workers shall co-ordinate with the Social Security Board or insurance agency in respect of keepingplans for safety and health in order to prevent employment injury, contracting disease and decease owing to occupation and in addition to safety and educational work of the workers and accident at the establishment; Section 54 - (a) The employer shall report to the relevant township social security office immediately if a serious employment accident occurs to his insured worker. There shall not be any delay without sufficient cause to report as such. (b) A team of officers and other staff who inspect the establishments, if it is found out the employment injury, death, and contracting disease, shall report to the relevant township social security office in accord with the stipulations.
The Protection of rights of National Race Law, 2015	
Consists of four bills, as submitted to the legislature; Buddhist Women's Special Marriage Bill, Religious Conversion Bill, Monogamy Bill and Population Control Bill.	
Leaves and Holidays Act, 1951	
Under the Leave and Holidays Act (1951), every employee shall be granted paid public holidays as announced by the Government in the Myanmar Gazette. On average, Myanmar has 26 public holidays per year, depending on the date of the variable holidays. Myanmar law recognizes various types of leave. Leave is governed by the Leave and Holidays Act (1951), but additional rules may apply in accordance with other laws, such as the Social Security Law (2012) for employees contributing to the Social Security Fund.	
The Import and Export Law, 2012	
7. A person who obtained any license shall not violate the conditions contained in the license.	

Table 3.2 International Conventions of Relevance to the Project

Legislation	Description	Relevance to the Project	Ratification Status
Environmental			
The International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto and by the Protocol of 1997(MARPOL)	Regulates waste, emission and discharges from vessels. Contains the following Annexes: • Annex I: Regulations for the Prevention of Pollution by Oil (October 1983) • Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (1986) • Annex III: Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (1992) • Annex IV: Regulations for the Prevention of Pollution by Sewage from Ships (September 2003) • Annex V: Regulations for the Control of Pollution by Garbage from Ships (December 1998) • Annex VI: Regulations for the Prevention of Air Pollution from Ships (1997)	The Project vessels will comply with emissions and discharge standards. Annex I, IV, V and VI are of relevance to the Project.	Entered into force 4th August 1988; (Annexes I and II only)
Vienna Convention for the Protection of the Ozone Layer 1988 and Montreal Protocol on Substances that Deplete the Ozone Layer 1989	Aims at the protection of the ozone layer, including requirements for limiting the production and use of ozone depleting substances.	Not relevant to the Project as the Project will not use any ozone depleting substances.	Accession 16th Sep 1998 (Vienna) & Accession 24th Nov 1993 (Montreal)
Convention on Biological Diversity 1992	Aims to promote national policies for the conservation of wild flora, fauna and habitat that needs to be included in planning policies. The three main goals are: (1) the conservation of the biological diversity; (2) the sustainable use of its components; (3) fair and equitable sharing of the benefits.	The Project will be undertaken in offshore habitats.	Ratified 25th Nov 1994
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	The Convention regulates the transboundary movements of hazardous wastes and provides obligations to its parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.	The Project may generate hazardous wastes.	Entered into force 6th April 2015
United Nations Framework Convention on Climate Change 1992 (UNFCCC) and Kyoto Protocol 1997	Provide a framework for intergovernmental efforts to tackle climate change. Recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.	The Project will form part of Myanmar's total emissions output.	Entered in force 23rd Feb 1995 (UNFCCC) and 16th Feb 2005 (Kyoto Protocol)
Asia Least Cost Greenhouse Gas (GHG) Abatement Strategy (ALGAS) 1998	Develop national and regional capacity for preparation of GHG inventories. Assist in identifying GHG abatement options and preparation of a portfolio of abatement projects for each country.	The Project will produce air emissions from the vessels.	1998

Legislation	Description	Relevance to the Project	Ratification Status
United Nations Agenda 21	Formed by the National Commission for Environmental Affairs (NCEA) in Myanmar. Provides a framework of programmes and actions for achieving sustainable development in the country. Building on the National Environment Policy of Myanmar, takes into account principles contained in the Global Agenda 21. Myanmar Agenda 21 also aims at strengthening and promoting systematic environmental management in the country.	Not relevant to Project. Relevant to the government.	Since 1997
Social			
The International Convention for the Safety of Life at Sea (SOLAS) 1974	Ensures that ships flagged by signatory states comply with minimum safety standards in construction, equipment and operation.	The Project vessels will comply with safety standards.	Entered into Force 11th Feb 1988
Convention on the International Regulations for Preventing Collisions at Sea (COLREG) 1972	Sets out the navigation rules to be followed by ships and other vessels at sea to prevent collisions between two or more vessels.	The Project vessels will comply with navigation rules.	Entered into Force 11th Nov 1987
International Convention on Standards of Training, Certification and Watch-keeping for Seafarers 1978 (STCW)	Sets out requirements for marine environment awareness training and training in leadership and teamwork including new training guidance for personnel operating Dynamic Positioning (DP) Systems.	The Project vessels will comply with training requirements including for DP.	Entered into Force 1988
Relevant ILO Conventions in force in Myanmar • C1 Hours of Work (Industry) • C14 Weekly Rest (Industry) • C17 Workmen's Compensation (Accidents) • C19 Equality of Treatment (Accident Compensation) • C26 Minimum Wage Fixing Machinery • C29 Forced Labour Convention • C42 Workmen's Compensation (Occupational Diseases) Revised 1934 • C52 Holidays with Pay • C87 Freedom of Association and Protection of the Right to Organize	Sets out legal instruments drawn up by the ILO's constituents (governments, employers and workers) and setting out basic principles and rights for workers.	The Project will comply with the reccommendations for workers.	

3.3 INSTITUTIONAL FRAMEWORK

3.3.1 Administrative Divisions of Myanmar

Myanmar is divided into twenty-one (21) main administrative subdivisions, which include:

- Seven states;
- Seven regions (Note that regions were previously referred to as "divisions", prior to August 2010);
- Five self-administered zones;
- One self-administered division; and
- One union territory.

The administrative subdivisions are detailed in ***Table 3.3***, and an administrative map is presented in ***Figure 3.1***.

Table 3.3 ***Administrative Regions of Myanmar***

Name	Capital	Population (2014)	Area
Ayeyarwady Region	Pathein	6,184,829	35,031.8
Bago Region	Bago	4,867,373	39,402.3
Chin State	Hakha	478,801	36,018.8
Kachin State	Myitkyina	1,689,441	89,041.8
Kayah State	Loikaw	286,627	11,731.5
Kayin State	Pa-an	1,574,079	30,383.0
Magway Region	Magwe	3,917,055	44,820.6
Mandalay Region	Mandalay	6,165,723	37,945.6
Mon State	Mawlamyaing	2,054,393	12,296.6
Rakhine State	Sittwe	3,188,807	36,778.0
Sagaing Region	Sagaing	5,325,347	93,704.8
Shan State	Taunggyi	5,824,432	155,801.3
Tanintharyi Region	Dawei	1,408,401	44,344.9
Yangon Region	Yangon	7,360,703	10,276.7
Naypyidaw Union Territory	Naypyidaw	1,160,242	7,054
Danu Self-Administered Zone	Pindaya	N/A	N/A
Kokang Self-Administered Zone	Laukkai	N/A	N/A
Naga Self-Administered Zone	Lahe	N/A	N/A
Pa-O Self-Administered Zone	Hopong	N/A	N/A
Pa Laung Self-Administered Zone	Namhsan	N/A	N/A
Wa Self-Administered Division	Hopang	N/A	N/A

Source: World Library, http://www.worldlibrary.org/articles/administrative_divisions_of_myanmar

States and regions are divided into districts. Districts consist of townships, which are composed of towns, wards and village-tracts. Village-tracts are

groups of adjacent villages. The administrative structure of the states, regions and self-administering bodies is defined in the Constitution.

Each region and state has a Regional/State Government, consisting of a Chief Minister, Ministers and an Advocate General. Legislative authority resides with the State/Regional "Hluttaw" (a parliament or legislative body), which are made up of elected civilian members and representatives of the military.

The Constitution states that Naypyidaw is a Union Territory under the direct administration of the President. The Naypyidaw Council, led by a Chairperson, carries out general functions on behalf of the President. The Chairpersons of the Naypyidaw Council are appointed by the President, and include civilians and representatives of the military.

Self-Administered Zones and Self-Administered Divisions are administered by a Leading Body, which is headed by a Chairperson, and has executive and legislative powers. The Leading Body consists of elected State/Regional Hlutttaw members and military personnel.

Figure 3.2 Myanmar States/Regions and Townships

Source: Myanmar Information Management Unit

3.3.2 *Myanmar Regulatory Authorities*

In Myanmar, matters pertaining to Health, Safety and Environment (HSE) requirements are generally under the jurisdiction of the ministries and state-owned enterprises. Key ministries, agencies and state-owned enterprises that have jurisdiction over HSE matters in oil and gas operations are included in ***Table 3.4***.

Table 3.4 Key Ministries, Agencies and State-Owned Enterprises Involved in HSE

Ministry/Agency	Responsibility
Ministry of Natural Resources and Environmental Conservation (MONREC)	The Environmental Conservation Department (ECD) of MONREC has ultimate responsibility in the review and approval, or otherwise, of submissions under the IEE/EIA process.
Myanmar Oil and Gas Enterprise (MOGE)	MOGE is the state-owned enterprise responsible for working together with oil and gas companies (local and international) in Myanmar and oversees the PSCs in cooperation with foreign oil companies. MOGE is involved in direct communication and coordination with various levels of different government agencies for HSE related issues
Ministry of Electricity and Energy (MOEE)	MOEE jointly works with MOGE in managing HSE issues of oil and gas operators in Myanmar, in which MOEE encourages operators to establish a HSE Management System and prepare their own EIA/SIA for their project
Myanmar Investment Commission (MIC)	MIC is a government agency responsible for coordinating with ministries (such as the MOEE) and other state entities to facilitate foreign investment in Myanmar. The MIC is also responsible for granting MIC permits which enable foreign investors to carry out business activities under the Myanmar Investment Law (2016). The Law specifies MIC shall "take consideration on the facts such as financial credibility, economic justification of the business, appropriateness of technology and protection and conservation of environment in scrutinizing the proposals of investment".
Ministry of Defence	The Ministry of Defence (MoD) is a government ministry in Myanmar, responsible for the country's national security and the armed forces.
Myanmar Navy	The Myanmar Navy is the naval branch of the armed forces. It currently operates more than 122 vessels, and it plays an important role in Myanmar's security, particularly in relation to protection of Myanmar's territorial waters.
Ministry of Transport	The Ministry of Transport isresponsible for the country's transport infrastructure, and also operates the Myanma Port Authority and Marine Administration, which are discussed further below.
Department of Marine Administration	The Department of Marine Administration's basic functions are to implement policies and assist policy makers with regards to maritime legislation. Specifically, they have the

Ministry/Agency	Responsibility
	following policies in Myanmar: • To conform National Flagged Ships to Safety standard, Safe practices and standard of competence required of its marine personnel; • To promote development of human resources, man-power planning and optimum utilization of such man-power in the maritime sector; • To Improve the safety record of Myanmar registered vessels; and • To improve specific obligation to save lives in distress at sea and protection of the marine environment.
Myanma Port Authority	The Myanma Port Authority is responsible for regulating and administering the coastal ports of Myanmar. Major port facilities administered by the MPA include: • Myanmar Port Authority, Yangon; • Asia World Port Terminal, located in Ahlone Township of Yangon; • Myanmar Industrial Port, Yangon; • Myanmar International Terminal Thilawa, (MITT) 25 km from Yangon; and • Myanmar Integrated Port Limited (MIPL), Yangon. Also, particularly in Tanintharyi Region: • Dawei; • Myeik; and • Kawthaung.
Department of Fisheries	The Department of Fisheries (DoF), under the Ministry of Livestock and Fisheries, is the main institutional body which governs the fishing ground, methods and catch volume for the fishing rights operations. The DoF is responsible for the all-round development of the fisheries sector and management of the commercial fisheries activities including exports. The head office dedicates fisheries administrations to the provincial offices in States / Regions and Divisions. The DoF is responsible for the following: • Issuing of licenses for fisheries/gear/ vessels/sites and aquaculture sites/ ventures; • Advise the Ministry of Livestock and Fisheries and the Divisional and State /Regional Government on fisheries and aquaculture matters; • Act as regulatory body for the correct and proper conduct of fisheries and aquaculture;

Ministry/Agency	Responsibility
	• Facilitating the technical needs and equipment of the marine sector; • Undertaking research and development activities; and • Training.
Myanmar Fisheries Federation	The Myanmar Fisheries Federation (MFF) was formed in 1998 from the Myanmar Fishery Association. It is a NGO that deals with the fisheries industries. It was formed as part of the Association of Southeast Asian Nations (ASEAN) Fisheries Federation. The organisation operates at a local and national level with most of the larger fish farmers being members of the local MFF branch. The MFF is governed by a Central Executive Committee which plays a coordinating role and supported by office holders. The roles of the MFF are as follows: • Support applications made by its members to DoF for the license to undertake fisheries and aquaculture activities; • Support loan applications to the Livestock and Fisheries Bank; • Raise issues of collective importance to their members with the DoF, such as accessing initial investment, raw materials for feeds, negotiating with local authorities to change use of land; • Assist in the negotiation of selling and harvesting and working collectively; • Assist in the transferring of technology to fish farmers; and • Assist in the communication and cooperation with trans-boundary organization.

3.4 PROJECT'S ENVIRONMENTAL, SOCIAL AND HEALTH STANDARDS

3.4.1 Myanmar's National Environmental Quality (Emission) (NEQ) Guidelines

Myanmar's National Environmental Quality (Emission) (NEQ) Guidelines were promulgated on December 29th, 2015. The Guidelines are largely based on International Finance Corporation (IFC) Environmental Health and Safety (EHS) Guidelines, and provide the basis for regulation and control of various environmental parameters, including noise and vibration, air emissions, and effluent discharges, from various sources.

Relevant excerpts from the guidelines are as follows:

"*6. Provisions of the general and applicable industry-specific Guidelines shall be reflected in project environmental management plan (EMP) and environmental compliance certificate (ECC) and together constitute a project's commitment to take necessary measures to avoid, minimize and control adverse impacts to human health and safety, and the environment through reducing the total amount of emissions generation; to adopting process modifications, including waste minimization to lower the load of pollutants requiring treatment; and as necessary, to apply treatment techniques to further reduce the load of contaminants prior to release or discharge.*

7. Recognizing that these Guidelines are intended to prevent pollution through reducing the mass of pollutants emitted to the environment, dilution of air emissions and effluents to achieve maximum permitted values is not acceptable. Specified guideline values should be achieved, without dilution, at least 95 percent of the time that a project is operating, to be calculated as a proportion of annual operating hours.

8. Further reference should be made by projects to applicable industry-specific IFC EHS guidelines for advice on means of achieving guideline values set out in Annex 1.

9. As specified in the EIA Procedure, all projects are obliged to use, comply with and refer to applicable national guidelines or standards or international standards adopted by the Ministry. These Guidelines will henceforth be applied by the Ministry in satisfying this requirement until otherwise modified or succeeded by other guidelines or standards.

…

11. While these Guidelines generally apply to all projects subject to the EIA Procedure, it is the prerogative of the Ministry to decide how the Guidelines should be applied to existing projects as referred to in the EIA Procedure, as distinguished from new projects. At the Ministry's discretion less stringent levels or measures than provided for in these Guidelines may be specified as appropriate, and a timeframe agreed for a project to fully comply with these Guidelines.

12. As specified in the EIA Procedure, projects shall engage in continuous, proactive and comprehensive self monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be

responsible for the monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC.

13. Air emissions, noise, odor, and liquid / effluent discharges will be sampled and measured at points of compliance as specified in the project EMP and ECC. "

A summary of environmental standards that are relevant to the Project are shown below.

Industry-Specific Requirements for Offshore Oil and Gas Development

The guideline values in ***Table 3.5*** apply to seismic exploration, exploratory and production drilling, development and production activities, offshore pipeline operations, offshore transportation, tanker loading and unloading, ancillary and support operations, and decommissioning.

The guideline is primarily applicable to discharges in offshore locations (i.e. greater than 12 nautical miles from shore). Discharge water quality to near-shore waters should be established on a case specific basis taking into account the environmental sensitivities and assimilative capacity of receiving waters.

With regards to seismic operations, the most relevant parameters from ***Table 3.4*** include the following:

- Sewage
- Food Waste
- Bilge Water
- Deck Drainage

Table 3.5 Effluent and Emission Standards for Offshore Oil and Gas Development

Parameter	Guideline
Drilling fluids and cuttings (non-aqueous drilling fluid)	Non-aqueous drilling fluid, re-inject or ship-to-shore; no discharge to sea Drilled cuttings, re-inject or ship-to-shore; no discharge except: - Oil concentration lower than 1% by weight on dry cuttings* - Mercury maximum 1 mg/kg dry weight in stock barite - Cadmium maximum 3 mg/kg dry weight in stock barite - Discharge via a caisson at least 15 meters below sea surface**
Drilling fluids and cuttings (water-based drilling fluid)	- Water-based drilling fluid, re-inject or ship-toshore; no discharge to sea Water-based drilled cuttings, re-inject or ship-to-shore; no discharge except: - Mercury 1 mg/kg dry weight in stock barite - Cadmium 3 mg/kg dry weight in stock barite - Maximum chloride concentration must be less than four time's ambient concentration of fresh or brackish receiving water - Discharge via a caisson at least 15 meters below sea surface**
Produced water	Re-inject, discharge to sea maximum one day oil and grease discharge should not exceed 42 mg/l; 30 day average should not exceed 29 mg/le

Parameter	Guideline
Completion and well work-over fluids	Ship-to-shore or re-inject, no discharge to sea except: - Maximum one day oil and grease discharge should not exceed 42 mg/l; 30 day average should not exceed 29 mg/l - Neutralize to attain a pH of 5[a] or more
Produced sand	Ship-to-shore or re-inject, no discharge to sea except when oil concentration lower than 1% by weight on dry sand
Hydrotest water	- Send to shore for treatment and disposal - Discharge offshore following environmental risk analysis, careful selection of chemicals - Reduce use of chemicals
Cooling water	The effluent should result in a temperature increase of no more than 3°C at edge of the zone where initial mixing and dilution take place; where the zone is not defined, use 100 meters from point of discharge
Desalination brine	Mix with other discharge waste streams if feasible[b]
Sewage	Compliance with MARPOL 73/78[b]
Food waste	Compliance with MARPOL 73/78[b]
Storage displacement	Compliance with MARPOL 73/78[b]
Bilge water	Compliance with MARPOL 73/78[b]
Deck drainage	Compliance with MARPOL 73/78[b]

Note:
[a] Standard unit
[b] In nearshore waters, carefully select discharge location based on environmental sensitivities and assimilative capacity of receiving waters
** It is noted that, in the *2015 IFC EHS Guidelines for Offshore Oil and Gas Development, Table 1: Effluent Levels from Offshore Oil and Gas Development*, the guideline is less specific, as follows: *"Discharge via a caisson (at least 15 m below surface is recommended whenever applicable; in any case, a good dispersion of the solids on the seabed should be demonstrated)"*

3.4.2 *Other Relevant Standards and Guidelines*

Eni will also adhere to the guidelines presented in the Guidelines for Minimising the Risk of Injury to Marine Mammals from Geophysical Surveys, prepared by the Joint Nature Conservation Committee (JNCC) [1]. These guidelines (included in ***Annex C***) outline mitigation measures recommended for the oil and gas industry to reduce the risk of causing impacts to marine mammals due to the sound generated from geophysical survey sources (such as offshore seismic surveys).

It is considered that compliance with these guidelines constitutes best practice and will, in most cases, reduce the risk of deliberate injury to marine mammals to negligible levels. The recommendations from the guidelines have been incorporated into the mitigation measures in the EMP in ***Chapter 7*** of this IEE Report.

[1] Joint Nature Conservation Committee. JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys, April 2017.

4 DESCRIPTION OF PROJECT AND ALTERNATIVES

This chapter provides a general description of the physical features and activities associated with the 3D marine seismic survey in the Concession Block MD-4, Offshore Myanmar, Andaman Sea, which includes:

- Project Background;
- Project Alternatives;
- Project Location;
- Description of Project Activities;
- Project Schedule;
- Employment and Accommodation;
- Logistics and Utilities; and
- Emissions, Discharges and Waste Management.

Each of the above aspects is discussed further in this section.

4.1 PROJECT BACKGROUND

4.1.1 Concession Background

The Myanmar offshore area consists of 39 petroleum concession blocks, covering an area of about 270,000 km^2.

Block MD-4 is located in the Moattama-South Andaman Basin, approximately 240 km West of Myeik and 450 km South of Yangon. The Block covers an area of 5,900 km^2, and water depths range from 1,500 to 2,200 m.

Eni Myanmar B.V. (Eni) is planning to conduct a 3D Offshore Seismic Survey in Myanmar Offshore Block MD-4 ("the Project"). The survey is tentatively planned to start in Q4 of 2017.

4.1.2 History of Previous Oil/Gas Activities

On 26th March 2014 eni Myanmar BV in Joint Venture with PetroVietnam (eni 80% - PetroVietnam 20%) was awarded the offshore Block MD-4 in Myanmar.

The Production Sharing Contract (PSC) for Block MD-4 was signed on March 31st, 2015. Based on PSC commitments, the first activity eni Myanmar consisted of re-processing of 1,850 km of existing 2D seicmic data within Block MD-4, which took place in 2016.

4.1.3 Previous Environmental Studies

Although no feasibility studies have been conducted for the Project, an Initial Environmental Examination (IEE) study, was undertaken by AMEC Foster Wheeler for the 2D Seismic Survey in Block MD-4, and was completed in September 2015.

4.1.4 Purpose and Need for the Project

With a view to ensuring future production of oil and gas resources, ongoing investment in oil and gas exploration activities is required. As an initial stage of oil and gas exploration in Block MD-4, seismic data are proposed to be collected for the areas of interest. Seismic data provide detailed information on subsurface geology that cannot be supplied by other geological and geophysical methods. Collection of seismic data is also essential for the accurate delineation of known reserves and the evaluation of previously identified leads and prospects. The purpose of the seismic survey is to facilitate full characterization of potential hydrocarbon reservoirs identified in the survey areas. Interpreted data from the seismic survey will be used to identify the exploration well locations according to the obligations of the Concession Agreement. Once the geological structure is identified, exploration drilling can be conducted to confirm the presence of the hydrocarbons and the thickness and pressure of the reservoir.

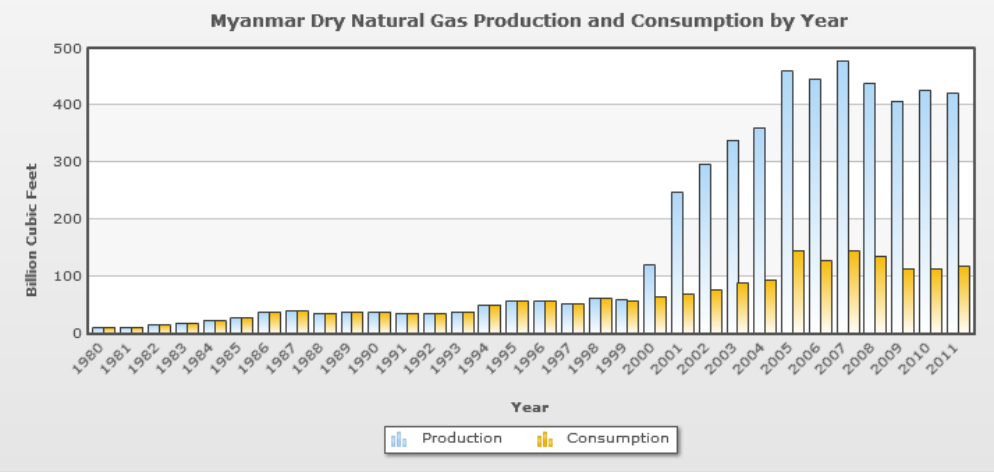
The demand for oil and gas in Myanmar is growing rapidly alongside its industrial development and growth. As of 2012, Myanmar meets less than half of its natural gas demand. Myanmar produces around 1.47 billion cubic feet of gas per day, and exports 1.2 billion cubic feet to Thailand. The 270 million cubic feet kept in Myanmar met only 48 percent of domestic demand in 2011. The government estimates domestic natural gas demand will increase to 700 million cubic feet a day in 2016, and 800 million by 2020 (1). ***Figure 4.1*** shows Myanmar's natural gas consumption and production over the past 30 years.

Similarly, the demand for crude oil is far greater than production in Myanmar. Myanmar currently produces a minimal amount of crude oil and condensates from the onshore Salin basin and offshore Yetagun field. Total liquids production has gradually increased over the past decade from 13,000 barrels per day (bbl/d) in 2,000 to 21,000 bbl/d in 2011. However, Myanmar's limited production and refining capacity are insufficient to meet domestic demand for crude oil and products, making the country a net oil importer. ***Figure 4.2*** shows Myanmar's crude oil consumption and production over the past 30 years.

Eni, as the operator of the Myanmar offshore petroleum concession, is striving to develop and produce gas from its potential gas reservoirs located within Block MD-4 in the Andaman Sea.

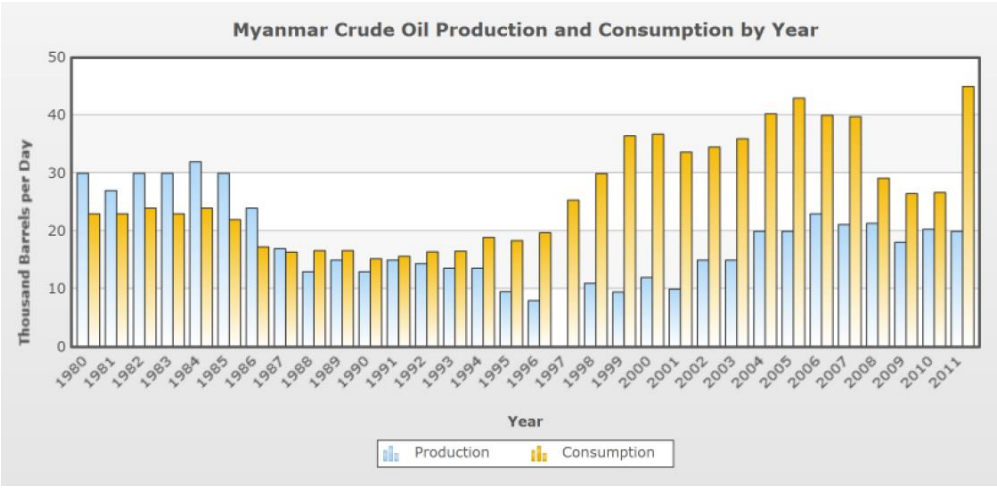
(1) http://www.reuters.com/article/2012/03/29/myanmar-energy-idUSL3E8ET0G720120329

Figure 4.1 Myanmar's Gas Consumption and Production over 30 Years



Source: United States Energy Information Administration, 2012

Figure 4.2 Myanmar's Crude Oil Consumption and Production over 30 Years



Source: United States Energy Information Administration, 2012

4.2 COMPARISON AND SELECTION OF PROJECT ALTERNATIVES

4.2.1 No Project Option

Petroleum demand in Myanmar is expected to continue rising, and therefore the no-project alternative would result in the loss of unrealized benefits, such as:

- No petroleum reserves would be extracted from this field. This would require potential future production from other energy sources such as hydropower and coal.
- No royalties would be obtained from future production and sale of the hydrocarbons produced from the field to benefit Myanmar.

The Project is therefore considered a favourable option compared to the no-project alternative.

4.2.2 Project Option

Seismic reflection survey is one of the most common methods used to define sub-seabed hydrocarbon deposits and geological structures. The acquired data from a seismic survey produce profiles of the sub-seabed geology for interpretation by geophysicists.

Past comparisons between 2D and 3D imaging have shown that 3D seismic survey poses a much lower risk to a follow up exploration or production drilling than 2D seismic survey by providing [(1)]:

- A more complete evaluation of reservoirs;
- Confident guidance for horizontal directional drilling;
- A better understanding of the nature of the prospects;
- Fewer dry holes; and
- More optimal well locations with better production and longer life.

In terms of overall project development, 3D seismic survey is likely to result in better petroleum production effectiveness due to longer production period and reducing risk of investing resources to drill a dry hole.

3D seismic surveys are thus considered to be preferred to standalone 2D seismic surveys for the proposed Project as detailed, continuous sub-seabed information is required.

3D seismic survey can provide information about the possible presence of petroleum reservoirs in Block MD-4. If sufficient oil or gas reserves are found in the future through exploration drilling, Eni would proceed with production. During production, Eni as a producer will contribute part of its revenue to the government via royalties and taxes, which will benefit local people. However, the Project should take technical, environmental, and social considerations into account, as discussed below.

4.2.2.1 Technical Considerations

The primary technical consideration is the sub-surface geology and potential prospects. The survey takes place over an area where prospects or suspected prospects are most likely to exist.

4.2.2.2 Environmental Considerations

Seismic activities related to the proposed Block MD-4 project are likely to have potentially significant impacts on the surrounding environment, including marine organisms due to noise from seismic activities. However, these impacts will occur in limited areas around the seismic survey and for a short time period (cumulatively 100 days for 3D surveys). In addition, Eni has specified suitable

(1) Cooper, NM.,2003. "The Value of 3D Seismic in Today's Exploration Environment – In Canada and Around the World." Mustagh Resources Ltd, Calgary Alberta

environmental mitigation measures, such as plans for project schedule, survey plan, waste generated, etc., as well as a Health Safety and Environment (HSE) Plan, and will strictly implement and follow these plans. Therefore, it is expected that negative impacts can be eliminated or minimized.

In addition to technical, social, and economic considerations, the location of sensitive/protected areas was also considered before the location of the survey was finalized. The project location is located far away from shores and sensitive/protected areas such as habitats of seagrass, coral reefs, dugong etc.

4.2.2.3 Social Considerations

The social considerations for offshore seismic relate mainly to the fishing areas used by local people. The Project will limit the access of fishermen to the seismic area due to the 500 m safety zone around the seismic survey vessels. Eni will ensure that the project schedule is properly communicated so that local fishermen can make alternative plans while the survey is taking place.

However, due to the location of Block MD-4 being quite far from shore, fishing activity is expected to be low.

4.3 PROJECT LOCATION

4.3.1 Concession Area

The Petroleum Concession Block MD-4 is located in the Gulf of Martaban (also known as the Gulf of Moattama), offshore Myanmar (***Figure 4.3***), approximately 240 km West of Myeik and 450 km South of Yangon. The Block covers an area of 5,900 km², and water depths range from 1,500 to 2,200 m. The corner coordinates for Block MD-4 are shown in ***Table 4.1***.

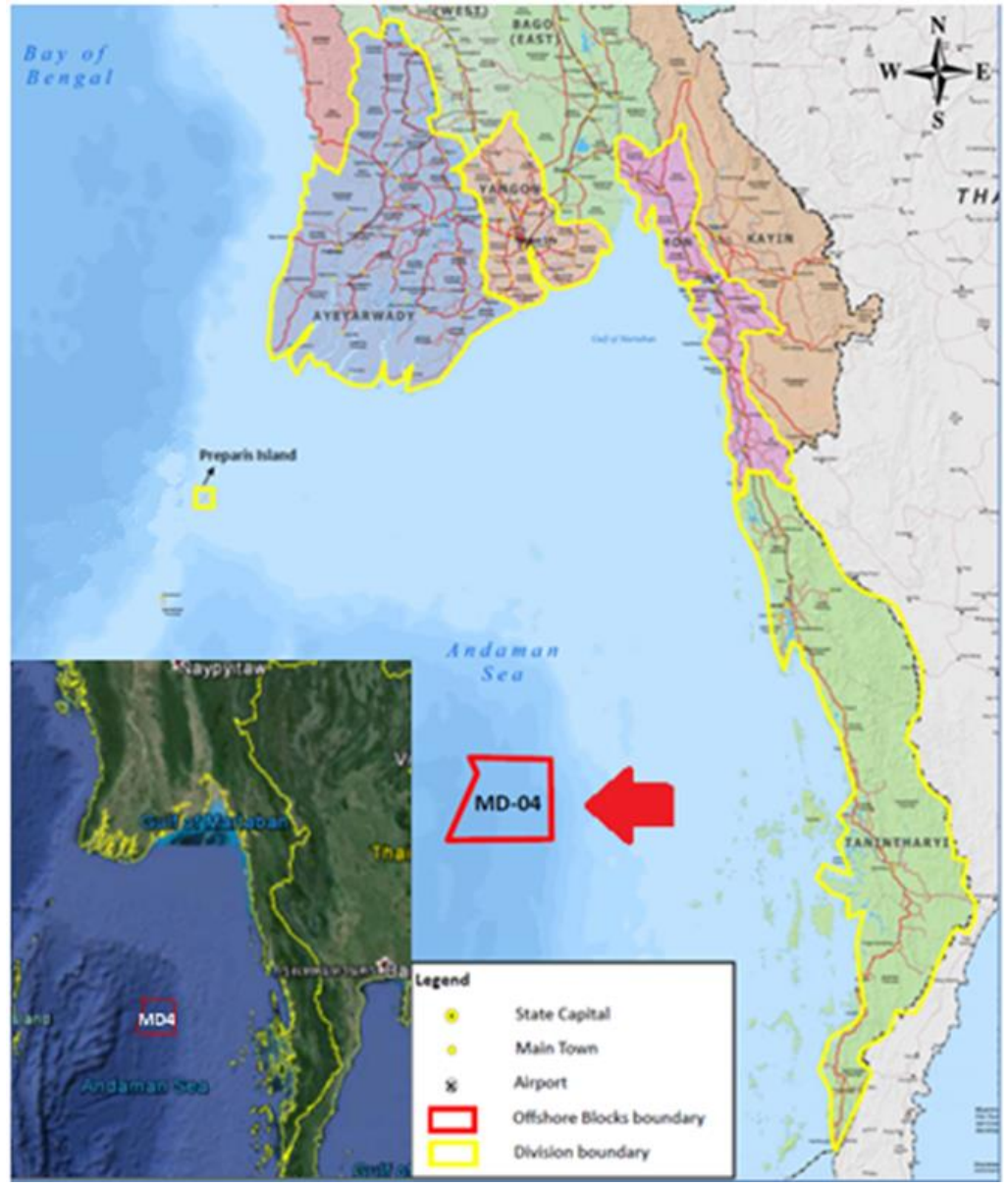
Table 4.1 Corner Coordinates for Block MD-4

Corner points	Metric Coordinates		Geographic Coordinates	
	Easting (m)	Northing (m)	Longitude (E)	Latitude (N)
A	785,614.30	1,438,498.73	13° 00′ 00″ N	95° 38′ 00″ E
B	859,796.65	1,439,366.02	13° 00′ 00″ N	96° 19′ 00″ E
C	860,757.68	1,363,691.58	12° 19′ 00″ N	96° 19′ 00″ E
D	773,681.37	1,362,745.16	12° 19′ 00″ N	95° 31′ 00″ E
E	792,964.55	1,427,720.97	12° 54′ 07″ N	95° 42′ 00″ E

Cartographic and Geodetic Parameters	
DATUM	**WGS 84**
DATUM NAME	WGS 84
PROJECTION SYSTEM/ZONE	UTM 46 N
SEMI MAJOR AXIS	66378137.000 m
1/F	298.2572236
SPHEROID	WGS84
PROJECTION	Transverse Mercator
CENTRAL MERIDIAN	93° E
LATITUDE ORIGIN	0° N

Cartographic and Geodetic Parameters	
FALSE EASTING	500.000 m.
FALSE NORTHING	0.00 m.
SCALE FACTOR	0.9996

Figure 4.3 Location of Offshore Block MD-4



Note: Not to scale
Source: Eni, 2016

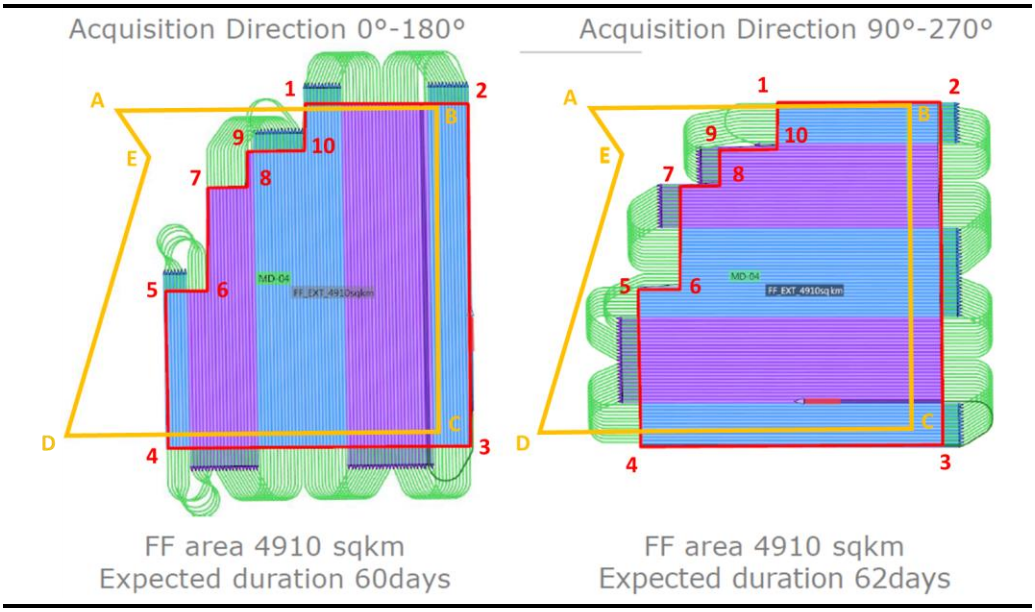
4.3.2 *Seismic Survey Area*

The 3D seismic survey will have a Shooting Direction of E-W or N-S (parameter still under evaluation) with 16 streamers configuration. The project will cover maximum area of 4,910 km². The coordinates of the acquisition Full Fold polygone for the planned 3D seismic survey are shown in ***Table 4.2.*** The survey area is shown in ***Figure 4.4***.

Table 4.2 Proposed 3D Seismic Survey Coordinates

Corner points	Easting (m)	Northing (m)
1	829,231.39	1,440,184.90
2	866,884.46	1,440,486.52
3	867,873.75	1,360,439.05
4	797,335.80	1,359,716.74
5	796,717.46	1,396,564.94
6	806,581.87	1,396,862.56
7	806,338.17	1,420,968.92
8	815,721.32	1,421,064.65
9	815,548.48	1,429,463.33
10	829,346.01	1,429,630.14

Figure 4.4 Survey Area



Source: Eni, 2016

4.4 DESCRIPTION OF PROJECT ACTIVITIES

4.4.1 Preparation Phase

4.4.1.1 Notification of Project Activities to Relevant Authorities and Stakeholders

Before beginning seismic operations, Eni will coordinate with relevant government authorities and stakeholders via a "Notice to Mariners", sent to the Myanma Oil and Gas Enterprise (MOGE), at least four weeks prior to the survey. This is to inform stakeholders of the schedule of the Project in order to allow time for them to remove their fishing gears from the survey area.

4.4.1.2 Site Survey and Site Preparation

Major obstacles, such as fish traps and other static fish gear on the seabed of the survey areas may need to be moved before the survey to avoid damaging the seismic equipment and to prevent accidents. It will be necessary therefore to conduct a preliminary reconnaissance survey of the area at least one week before data acquisition to locate these potential obstacles.

A detailed site survey will be conducted at least one week prior to the seismic survey to scout the survey lines to identify and log the location of any obstacles (including debris). This survey will be carried out by a mother vessel with standalone navigation equipment and will be supported by one to two chase vessels to clear the area of fish traps and debris in the water that could come into contact with, and damage, the streamer cables. The mother vessel will also warn off shipping traffic and fishing vessels in the area. Records will be kept of all ships and fishing vessels present in the area.

All obstructions in the survey area will be removed approximately one week before seismic data acquisition. A log will also be kept of all fish traps removed or moved.

4.4.2 Seismic Survey Phase

4.4.2.1 Seismic Data Acquisition

During a marine seismic survey, a slow moving survey vessel tows an impulse-emitting sound source (array of airguns). High energy low frequency sounds (termed shots; created by the controlled release of compressed air) are produced by the airguns and directed downwards at the seabed and underlying sub-seabed geology. These sound waves bounce off the sub-surface rock formations and return to the surface where the seismic energy is collected by an array of receivers (hydrophones). The acquired data are then recorded by onboard computers for subsequent data processing and interpretation. An illustration of the principle of a typical marine seismic survey operation is shown in ***Figure 4.5***, and an example of the layout of streamers and vessel is shown in ***Figure 4.6***.

Seismic acquisition can be carried out as 2D or 3D surveys. Although the surveys are very similar in how they are conducted, there are some differences. A summary of the key differences are highlighted in ***Table 4.3***.

Table 4.3 Differences between 2D and 3D Seismic Surveys

Feature	2D Seismic Survey	3D Seismic Survey
Size of area covered	Very wide area	Target area within a surface Area earlier investigated with a 2D survey.
Level of detail	Only the vertical and horizontal dimension of the survey area	Reliable interpretation of depth and quality of surface for every position in the survey area
Number of streamers	A 2D survey vessel tows one streamer containing hydrophones	A 3D survey vessel may tow several parallel streamers
Data provided	Vertical section (like a slice) of the formation	Three-dimensional image (like a cube)
Cost	Less expensive and reliable than 3D dataset	More expensive and reliable than 2D dataset.

As part of the planning process of the Project, a seismic survey operational plan, which comprises detailed sail lines, survey schedule and emergency response plan, will be prepared. This plan will be reported to MOGE for review and approval prior the commencement of the operation.

Figure 4.5 Schematics of Marine Seismic Survey

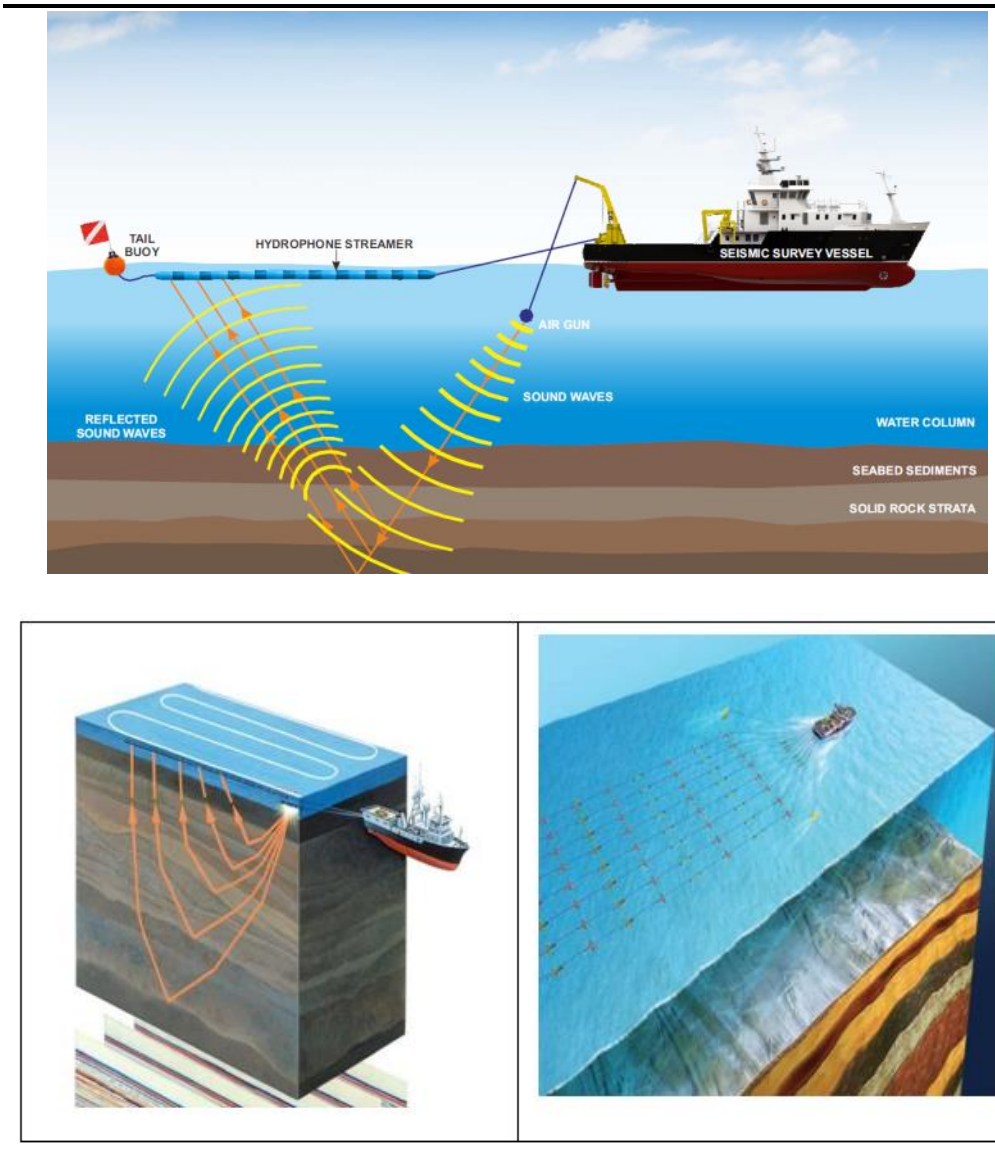
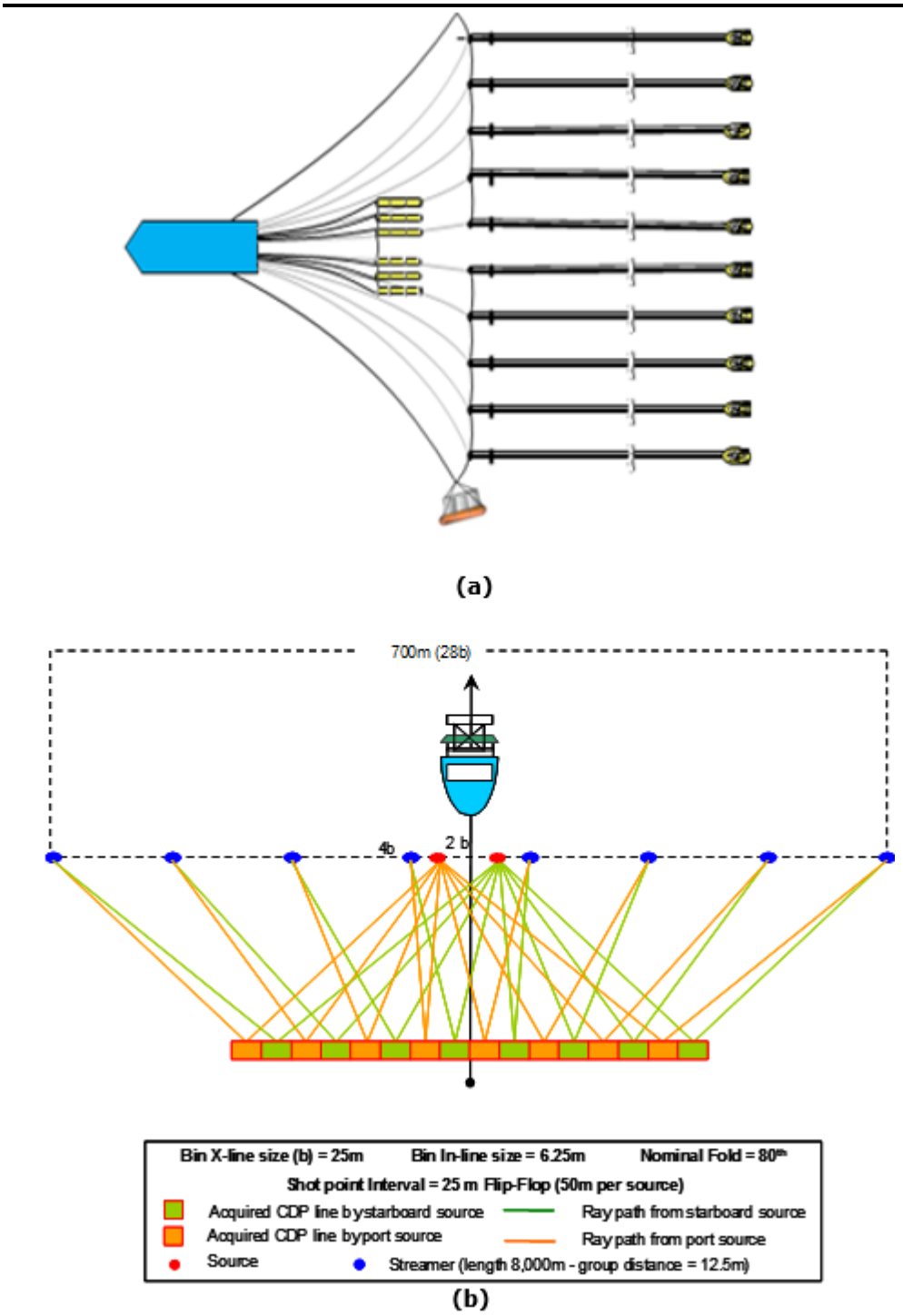


Figure 4.6 3D Seismic Survey Vessel



Survey Program

For this Project, it is proposed to use a broadband seismic technique. The receivers (hydrophones) will be encased in streamers (at least 16), with an active length of 8,000 m behind the seismic vessel, at a depth of 12 or 18 m below the sea surface. Streamers will be separated by 100 m. The source depth can be varied from 6 m to 8 m.

Specifications of the 3D seismic survey acquisition are shown in ***Table 4.4***.

Table 4.4 3D Seismic Survey Operation Parameters

Parameter	Detail
Survey area (total)	4,910 km^2
Speed of seismic survey vessel	At least 4.0 knots
Receiver	640 channel hydrophones per cable
Number of Streamers	At least 16 streamers and will be separated by 100 meters
Streamer Length	8,000 m
Streamer Depth	from 12 to 18 m
Streamer Type	Solid streamer
Sensor Type	Hydrophones
Group Interval	12.5 m
Source Type	Airgun
No. of Source Arrays	2
Array Size	15 x 14 m
Max. Output Pressure	2,000 psi (138 bar)
Total Average Volume	Approximately 4,800 in^3
Shotpoint Interval	25 or 37.5 m
Recording Length	9 seconds

Survey Vessels

The seismic survey will be performed using vessels of varying nature and function. In particular the fleet will comprise one seismic vessel (towing vessel), one support vessel and two chase vessels. Vessels will be operated 24h/7d for the entire duration of the survey and approximately 70 personnel will be involved in the survey. The seismic vessel will move at a speed of about 4.3 knots, and will follow a pre-planned set of survey lines. The vessel will utilize GPS to track the exact location of the seismic gear being towed.

At least one smaller escort vessel will accompany the seismic vessel to ensure that the water ahead is clear of obstructions such as shallow water and fishing equipment, and to ensure that other vessels do not cross over or otherwise interfere with the towed equipment. Because seismic vessels have restricted ability to manoeuvre, they have priority under international maritime law over vessels which are not similarly restricted.

The vessels will be in compliance with international legislation and will be equipped with accidental/incidental oil spill prevention and response equipment. In particular all Eni operational facilities and vessels have the required equipment (according to IPIECA standard and Eni standards) for oil spill response (TIER 1 level) and personnel trained in the use of such equipment and spill response techniques. Lights and other internationally recognised identification/warning signals will be in place, in line with international shipping regulations.

4.4.2.2 Demobilization

Upon completion of 3D seismic surveys, all seismic equipment, buoys and markers will be demobilized from the survey areas and all contracted vessels will be signed off and released. Shipping and fishing activities in the seismic area are expected to resume to normal.

4.4.2.3 Seismic Data Processing and Interpretation

Seismic data recorded on board will be transferred to a specialized processing center onshore where data will be processed using specific software. Data will be processed into 3D images, showing subsurface geological structure and stratigraphy of the targeted hydrocarbon reservoir. These images will be interpreted by a geophysicist and specialists to delineate the subsurface geological framework and structure of the surveyed area to determine the potential and viability of the hydrocarbon reservoir. Such interpretation will aid future determination of the locations of exploration wells.

4.4.2.4 Survey Equipment Specifications

4.4.2.4 (1) 3D Seismic Survey Vessel Specifications

Eni is in the tendering process for the vessel for the 3D seismic survey of the Project. For the purposes of this IEE, it is assumed that the vessel with the largest potential environmental impact will be used. Based on available fuel consumption data, the equivalent vessel that could be used for this survey with the largest potential environmental impact is the Dolphin Geophysical Sanco Sword DNV 1A1 ICE-1B vessel, which is illustrated in ***Figure 4.7***.

Figure 4.7 Sanco Sword DNV 1A1 ICE-1B

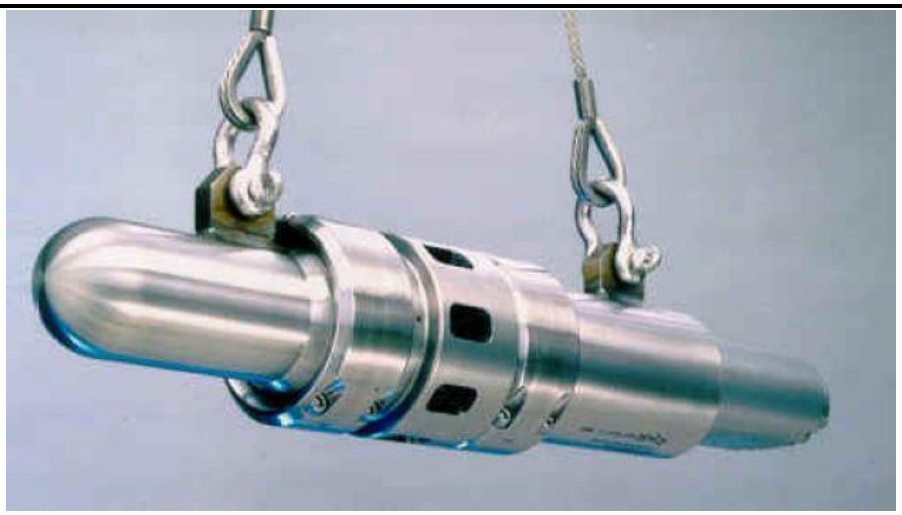
Source: Eni, 2016

4.4.2.4 (2) Airgun Array Specifications

Airguns are the standard marine seismic energy source. The seismic energy pulse is created when a bubble of compressed air is discharged into the water. An airgun array comprises a number of different sized airguns as this helps to attenuate the residue bubble pulse and enhance the signal level. As well as increasing the overall signal levels generated, the interaction of the sources results in a downward-focused beam, limiting the unwanted spread of the sound away from the target area.

The seismic survey vessel proposed for the 3D seismic survey, Sanco Sword DNV 1A1 ICE-1B, uses tuned arrays of BOLT airguns (***Figure 4.8***), which are each configured using two single airline umbilicals for sub-array deployment. The specifications of the BOLT airguns are summarized in ***Table 4.5.***

Figure 4.8 Example Bolt Airgun (for 3D Seismic Survey)



Source: Sanco Shipping AS

Table 4.5 Specifications for Bolt Airgun (for 3D Seismic Survey)

Parameter	Specification
Gun Type	Bolt Long Life up to 10,000 cu in
Pressure Release	2000PSI
Sensor Return	Yes
Compressor Capacity	3 x N&E 2200 SCFM
Nominal Source Pressure	2000PSI
Gun Controller	Distributed System with in water electronics
Timing Resolution	0.1 ms
Near Field Phones	SEG-D rev1 8058 IEEE floating point in separatedataset
Depth Indicators	AG Geophysical Products – Seismic Source Management System
Maximum Output in Array	4650 x 2
Total Air Capacity	5085 scfm
Timing Control	Gunlink 4000
Depth Range	6 m

Source: Sanco Shipping AS

4.4.2.4 (3) Streamer Specifications

The cable containing the hydrophones is called a streamer. It is towed or "streamed" behind a moving vessel. Streamers are typically 8 kilometers long. The streamer detects the very low level of reflected energy that travels from the seismic source, through the water layer, down through the earth and back up to the surface, using hydrophones, which convert the reflected pressure signals into electrical signals that are transmitted along the seismic streamer to the recording system on board the vessel.

The streamers for the Project survey will be provided with electronic cable leveling devices (adjustable fins/hydroplanes also known as 'birds'). These

devices allow the streamers to be raised/lowered in the water column to optimize their position or to avoid hazards e.g. in the event of very shallow water depth, seabed obstructions or another vessel sailing across the deployed streamer.

The streamers are stored in reels onboard the survey vessel; they are then deployed behind the survey vessel for acquisition operations. The streamers are accurately positioned/ tracked by GPS and acoustic systems. A real time digital display of the streamer footprint is available on board the seismic vessel. This allows the vessel navigators to constantly monitor the vessel and streamer position relative to other vessels and surface obstructions. The tail buoy tracks are also readily monitored using the vessel radar.

In 3D operations, groups of sail lines (or swaths) are acquired with the same orientation, usually utilizing more than one source and many streamers from the same survey vessel.

For this survey, it is proposed that multiple Sercel Sentinel Solid Streamers will be used. This type of streamer does not require liquid filling, and is covered with 3.5 mm polyurethane. Thus, it is elastic and durable in the ambient environment. The streamer has a 50 mm diameter, and is approximately 8,000 m long.

4.4.2.4 (4) Chase Vessel Specifications

Chase vessels will accompany the survey vessel during 3D seismic survey activities. One vessel, the 'mother chase vessel' hired by the seismic survey contractor, will sail approximately 500 m in front of the survey vessel. At least two chase vessels, typically local fishing boats, will sail on each side and at the back of the survey vessel at a distance of 500 m.

The key functions of the support/chase vessels are to:

- Clear fish traps on the lines ahead of the survey vessel;
- Direct recreational vessels, sail boats, fishing boats, trawlers, etc away from the survey vessel or the streamer;
- Remain as close as possible to the survey vessel to provide all necessary assistance (e.g. crew evacuation); and
- Tow the survey vessel away from dangerous waters/installations in the event of a loss of power (mother vessel).

4.4.2.4 (5) Vessel Safety Systems and Operational Controls

The survey vessels for 3D surveys will be equipped with extensive navigation, radio/satellite communication equipment as well as dual radar systems. Regular warning messages will be broadcast, advising other vessels in the area of the proposed operations. A tail buoy will be fitted to the end of each streamer and will be brightly colored and filled with a radar reflector and strobe light.

In addition, the proposed survey vessels will be equipped with the following emergency response equipment:

- Fire fighting equipment at engine room, compressor room, instrument room and accommodation, gun shack; and
- Safety equipment including Emergency Radio Beacon (Epirb), life raft, survival suites, live vests and life buoys.

Only vessels capable for the operation will be selected. Contractor personnel are suitably-trained in terms of their job responsibilities and health, safety and environment (HSE) requirements. Prior to vessel mobilization, Eni has selection criteria for the technical and HSE specifications on the survey vessel, the crew qualifications, its operational procedures and equipment. In addition, all survey operations will be conducted in accordance with the vessels standard operating procedures which detail the manner in which all operations are to be conducted:

- Safety Management: main component includes policy of organisation and responsibility, planning and operation, monitoring on operation performance, and inspection and review for improvement;
- Survey Planning; and
- Activity Record: record on role and responsibility of key personnel.

These procedures also detail the responses and actions to be taken in the event of accidental events or upset conditions. A full HSE risk analyses has been conducted for the specific operation and HSE risks identified for the proposed survey programme. The HSE risk analyses interface with the operations safety case for the vessel to ensure that operations can be conducted at a known and acceptable risk profile.

4.5 PROJECT SCHEDULE

The 3D seismic survey will be conducted in Q4 2017. The survey is expected to have a schedule consisting of five key project activities, as follows:

- Notification of project information to relevant authorities and stakeholders via MOGE;
- Kick Off Meeting;
- Vessels HSE Audit;
- Site survey and site preparation;
- Seismic data acquisition;
- Demobilization;
- Seismic data processing and interpretation.

Seismic data acquisition, which is the main activity of the seismic survey, is expected to take 100 days (based on condition of 16 streamers and survey size 4,910 km^2) . A tentative project schedule for the 3D seismic survey is presented in ***Table 4.6***.

Table 4.6 Project Schedule for 3D Seismic Survey in Block MD-4

Project Activity	Schedule
Notification of Project	One month before site survey
Vessel in port	Kick Off Meeting & HSE audits of the seismic and supply vessels
Site survey and site preparation • Conduct a survey of obstructions e.g. fish traps, etc in the survey area, and remove all obstructions as required.	At least one week before commencement of seismic survey activity
3D Seismic data acquisition in Block MD-4	Starting date: Q4 2017. The seismic survey is approximately 100 days
Demobilization	Q4 2017

4.6 EMPLOYMENT AND ACCOMMODATION

The seismic acquisition personnel will be mainly expatriate personnel specialized in offshore seismic activities. Local Myanmar fishing vessels that frequently fish in the area may be engaged as the chase vessels. A total of about 110 people, including a total of 60 for the 3D survey vessels and 50 for the support vessels, will be involved in this marine seismic survey. All crew and specialists will be accommodated on their respective vessels during the seismic survey. Crew changes of 40 people are expected to be carried out every 5-6 weeks on the survey vessel and the mother vessel.

4.7 LOGISTICS AND UTILITIES

4.7.1 Transportation

4.7.1.1 *Personnel and Material Transportation*

The survey vessels will be mobilized directly from their last locations. In case additional materials and equipment are required during the survey, they will be transported by support vessels from the support base or helicopter (See *Section 4.7.4*).

4.7.1.2 *Waste Transportation*

The seismic contractor will comply with applicable MARPOL 73/78 requirements and will transport and dispose of wastes accordingly. In addition, the contractor may use Eni's Waste Management Plan as a guideline.

Waste will be transported to dispose at authorized waste disposal facilities. Additional information on waste generation is found in *Section 4.8*.

4.7.2 Energy Use

Refuelling and resupplying during the seismic survey will be undertaken with a supply vessel to port. The survey vessel's engines will use either Marine Gas Oil (MGO) or Heavy Fuel Oil (HFO), depending on final choice of contractor and vessel. Fuel consumption rate for the survey vessels is up to a maximum of approximately 65 m^3/day for the survey vessel (according to specifications of Dolphin Geophysical Sanco Sword DNV 1A1 ICE-1B vessel), and 2 m^3/day for each of the chase vessels, based on vessels used in previous surveys.

All electrical demands for operations undertaken on the survey vessel are provided by batteries and/or diesel generators.

4.7.3 Water Use

Fresh water will be produced on board the seismic survey vessel for consumption at quantities of approximately 400 L per person per day.

4.7.4 Onshore Activities and Support Base

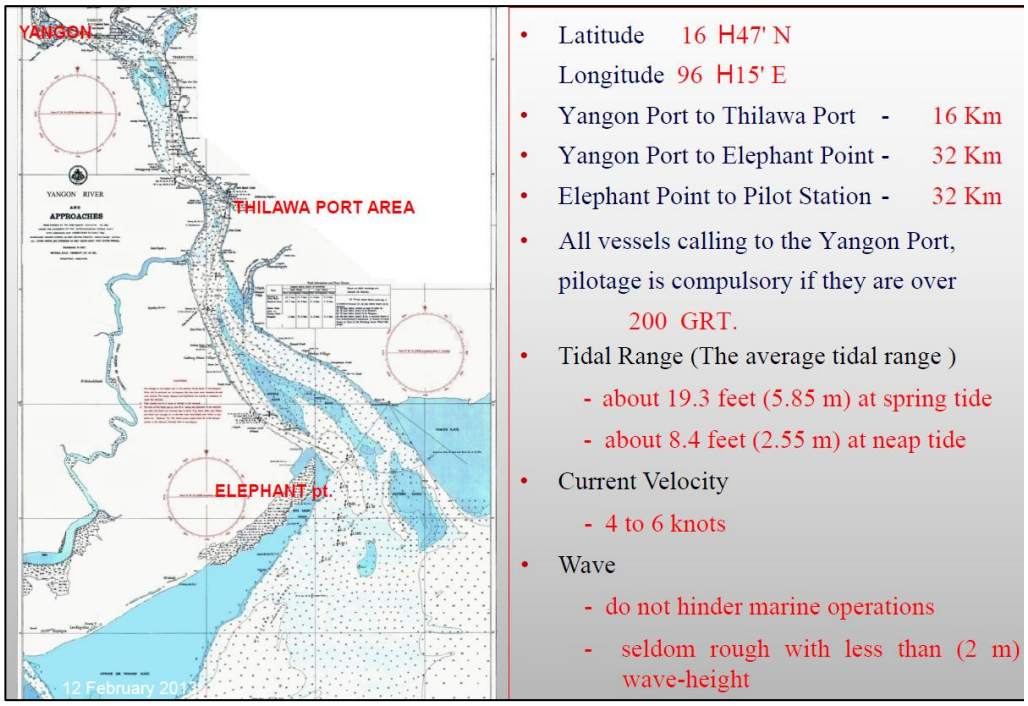
The only onshore activities required for this project are mobilization/demobilization vessels, crew transportation between shifts, as well as potential supply and transportation of additional material and equipment if required during the survey. The main Support Base for all seismic activities for this Project will be located at Yangon (***Figure 4.9***). In case of emergency, crews and survey staff will be evacuated to the nearest land as per Eni's Emergency Response Plan (***Annex B***).

During the project, employees could generate domestic waste and wastewaters. According to the planned activities during the development of the project the port will only be used for standard activities typically related to shipping activities (food and material supply, refuelling).

The vessels will sail from the Port of Yangon, located in the southern portion of Myanmar. It is assumed that no new structure will be constructed because the selected supplier will use existing and available facilities in the Port of Yangon. This information will be confirmed by selected contractors.

The Port of Yangon is situated at latitude 16°47'N and longitude 96°15'E on the Yangon River and approximately 32 km inland from the Elephant Point on the Gulf of Martaban. For all vessels calling to the Port of Yangon, pilotage is compulsory if they are over 200 GRT (Gross Register Tonnage). Navigation from the Pilot Station, which is 32 km seaward from Elephant Point, to the Yangon harbour is generally on a flood tide and has to be timed to cross both Inner Bar and Outer Bar near high tide to ensure sufficient sea depth.

Figure 4.9 Support Base Location



Source: Aung Min Han, 2013

4.8 EMISSIONS, DISCHARGES AND WASTE MANAGEMENT

It should be noted that emissions and discharge data for the proposed activity are preliminary, based on previous operation records. Assumptions, where utilized, have been made on a conservative basis.

4.8.1 Air Emissions

The principal atmospheric greenhouse gas emissions during 3D marine seismic survey operations will comprise exhaust emissions, primarily carbon dioxide (CO_2), nitrogen oxides (NO_X), methane (CH_4) with small quantities of un-burnt hydrocarbons and smoke/particulates discharged from propulsion and power generation equipment on the vessels involved in the survey.

Potential exhaust emissions from diesel engines have been estimated using Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry (API, 2009), and presented in ***Table 4.7***, assuming worst case fuel consumption of 65 m^3/day for the survey vessel (according to specifications of Dolphin Geophysical Sanco Sword DNV 1A1 ICE-1B vessel), and 2 m^3/day for each of the chase vessels, based on vessels used in previous surveys.

Table 4.7 Indicative Air Emissions by Vessels during 3D Marine Seismic Survey in Block MD-4

Source	Heat from Fuel Consumption (10^{12} J/day) (1)	No. of Vessel	Total Duration (Days)	GHG Emissions (ton CO_2e)			
				CO_2	CH_4	N_2O	Total
Emission Factor of Diesel Fuel Consumption (tonnes of diesel/ 10^{12} J)(2)				74.1	0.003	0.0006	
Global Warming Potential (CO_2e) (3)				1	21	310	
Survey Vessel	2.39	1	100	17,709.9	15.1	44.45	17,769.45
Mother Chase Vessel	0.073	1	100	540.9	0.47	1.35	542.72
Chase Vessel	0.073	2	100	1,081.9	0.92	2.72	1,085.54
Total Emissions							**19,397.71**

Note:

(1) Using Lower Heating Value from Table 3-8, page 3-20 of Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry (*API, 2009*), that is 3.67×10^{10} J/m^3 diesel consumption.

(2) Emission factor of diesel oil for mobile source based on Table 4-3, page 4-17, and Table 4-5, page 4-21 of Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry (*API, 2009*).

(3) Global warming potential (GWP) from Second Assessment Report of Intergovernmental Panel on Climate Change (IPCC), prepared in 1995 by United Nations Framework Convention on Climate Change (UNFCCC), acceptable in 2008-2012 (and currently still accepted), from Page 3-5 in the Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry (*API, 2009*).

4.8.2 Effluent Discharges

4.8.2.1 Wastewater

The principal effluents discharged to the marine environment during survey operations will comprise grey water (laundry/discharges and other wash water) and sewage (black water – human body wastes) with small quantities of drainage water (non-contaminated and contaminated areas e.g. bilge and machinery spaces) and service water/cooling water system discharge.

Generation rate of grey water from shower, wash basin, washing area, and kitchen, is calculated as 80% of water consumption (400 liter/person/day), or equal to 320 liter/person/day. Sewage generation rate is calculated as 80 liter/person/day. An estimation of grey water and sewage discharged during the survey is presented in ***Table 4.8***. Total grey water quantity is estimated to be 3,520 m^3, and total sewage quantity is estimated to be 880 m^3, for 100 operation days, for maximum crew number of 60 persons on survey vessel, and support vessel crew of approximately 20 crew members for Mother Chase vessel and 30 crew for chase vessels.

The seismic survey vessel would be expected to have an on-board sewage handling and treatment system in compliance with the requirements of MARPOL 73/78 Annex IV (*Prevention of Pollution by Sewage from Ships*; The Convention for the Prevention of Pollution from Ships, 1973 as amended by the 1978 Protocol). The vessel's compliance will be documented via a Sewage Pollution Prevention Certificate.

The seismic survey vessel would also be expected to fully comply with the requirements of MARPOL 73/78 Annex I (*Prevention of Pollution by Oil*); the vessel compliance will be documented via Oil Record Book, International Oil Pollution Prevention (IOPP) Certificate, and the installation of an oily water separator for bilge and machinery space drainage and a slop oil tank. Discharges of bilge water or drainage from machinery spaces would therefore be expected to have been treated to a specification of 15 ppm oil content or lower prior to overboard discharge. The separated slop oil will be handled for disposal by a licensed contractor (described further in *Section 4.8.3.3*).

Cooling water (typically a once through system) and surplus service water (e.g. from a potable water generation system) may also be discharged to the sea. Discharges from the service water system may contain residual chlorine (typically < 1 ppm).

Other effluents discharged during survey operations such as deck drainage (e.g. rainfall/ sea spray run-off) and effluents from deck wash down operations may contain trace quantities of lube oil, cable oil and fuel oil/ diesel.

Wastewater from support vessels will be discharged directly to sea at a distance of over 12 nautical miles from the nearest shore. Wastewater from the

survey vessel will be piped to the on-board wastewater treatment system prior to discharge. The discharge location will be at greater than 12 nautical miles from the nearest shore. These methods comply with MARPOL 73/78 requirements.

Table 4.8 Indicative Effluent Discharges from Vessels during 3D Marine Seismic Survey in Block MD-4

Sources	Total No. of Personnel Onboard	Grey Water Discharges to Sea (m^3/day)*	Sewage Discharges to Sea (m^3/day)*
Survey Vessel	60	19.2	4.8
Mother Chase Vessel	20	6.4	1.60
Chase Vessels	30	9.6	2.40
Total	**110**	**35.2**	**8.8**
Cumulative total for 100-day survey		***3,520 m^3***	***880 m^3***

* Domestic wastewater generation rate = 80% of water consumption (0.40 m^3/day)
** Approximately 0.32 m^3 per person per day
*** Approximately 0.08 m^3 per person per day

4.8.3 Waste Generation and Management

4.8.3.1 Type of Waste Generated

Wastes from the proposed project consist of non-hazardous waste and hazardous waste.

Non-hazardous waste is waste which is not harmless but presents a lower level of risk to human health and the environment. Non-hazardous waste generated during the 3D seismic survey will include the following:

- General refuge (e.g. packaging materials, paper/plastic bags and containers); and
- Food waste from the galleys on the vessels.

Hazardous Waste is as any waste which causes danger or is likely to cause danger to health or the environment by reason of their chemical activity or toxic, flammable, explosive, corrosive, or other characteristics, whether alone or when coming into contact with other wastes. Forms of hazardous waste comprise solids, sludge, liquid and containerized gas waste. Hazardous waste generated during the 3D seismic survey will include the following:

- Solvent, thinner, etc.;
- Batteries; and
- Oil contaminated materials.

4.8.3.2 *Quantity of Waste*

A seismic survey only produces small quantities of waste, similar to those generated by a commercial ship of the same size. Based on previous similar seismic surveys, the maximum quantity of non-hazardous waste generated is expected to be 1 kg/person/day, and the maximum quantity of hazardous waste generated is expected to be 0.1 kg/person/day.

A total of about 110 people, including a total of 60 for the 3D survey vessels and 50 for the support vessels, will be involved in this marine seismic survey. Based on a worst case maximum of 110 people and a seismic duration of 100 days, the maximum total quantity of waste produced for this seismic survey would be as follows:

- 110 kg/day non-hazardous waste, or total of 11 tons non-hazardous waste for the duration of the seismic survey (100 days).
- 11 kg/day hazardous waste, or total of 1.1 tons hazardous waste for the duration of the seismic survey (100 days).

4.8.3.3 *Waste Management*

Waste management on the seismic vessel will be handled by the seismic vessel contractor. Eni has a Waste Management Plan, which the contractor may use as a guideline as applicable. Eni's Waste Managent Plan is shown in ***Annex B.***

All vessels over 400 tons gross will fully comply with the requirements of MARPOL 73/78. There will be a manifest each time waste is transported to shore, including copies of records identifying type, amount of waste, and time that waste is received.

Vessels will manage wastes as follows:

General Refuse (Non-Hazardous)

General refuse will be transferred to the support base in Myeik for temporary storage, and then disposed by Yangon City Development Committee or local Township Authorities..

Biodegradable Waste (Food, Wastewater)

Food waste on all vessels will be macerated into smaller pieces (25 mm) and discharged overboard. Wastewater will be treated on site to be in line with MARPOL 73/78 requirements, and dumped at sea.

Hazardous Waste

All hazardous wastes will be stored in appropriate containers with labels. Hazardous waste storage area will be designated in accordance with their Safety Data Sheet (SDS). Hazardous wastes will be transferred to shore at Myeik, where it is temporarily stored at the Support Base (see ***Figure 4.9***). The

storage location is secure and located far from any sensitive receptors. The waste will then further be transferred for disposal at authorized waste disposal facilities, which will be described further below.

In case of leakage or spill of hazardous wastes from a container, all workers will be evacuated from that area and the assigned team will clean up the affected area with a spill kits which has been prepared on the vessels, as shown in ***Figure 4.10***. In addition, clean-up equipment will be provided on the vessel used for waste transport. If a waste spill occurs, this equipment will be used immediately to clean-up the waste spill.

Figure 4.10 Spill Kit

Licensed Waste Contractor and Authorized Waste Disposal Facilities

For the Project, Eni has contracted Golden Dowa Eco-System Myanmar Co., Ltd. (GEM) as the licenced contractor to manage its hazardous waste. GEM is a waste management company in Myanmar, with a waste disposal facility at Thilawa Special Economic Zone. GEM got EIA approval for their disposal facility at Thilawa SEZ on 30 June, 2015. The location of the waste disposal facility is shown in ***Figure 4.11***. Current and planned facilities at their waste disposal facility include the following:

- Controlled Secured Landfill (capacity 400,000 m^3);
- Sorting/stabilization facilities (24.5 m x 44 m x 10 m);
- Wastewater and leachate water treatment facility (treatment capacity 35 m^3/day);
- Office with laboratory; and
- Incinerator.

Hazardous waste is transported to the waste facility using proper packaging, fixed securely to vehicles that are appointed for logistics service, and follow

strict rules with regards to speed limits and safe driving. An overview of hazardous waste transportation is shown in ***Figure 4.12***. Hazardous waste at the disposal facility is treated as shown in ***Figure 4.13***.

Figure 4.11 Location of GEM Waste Disposal Facility

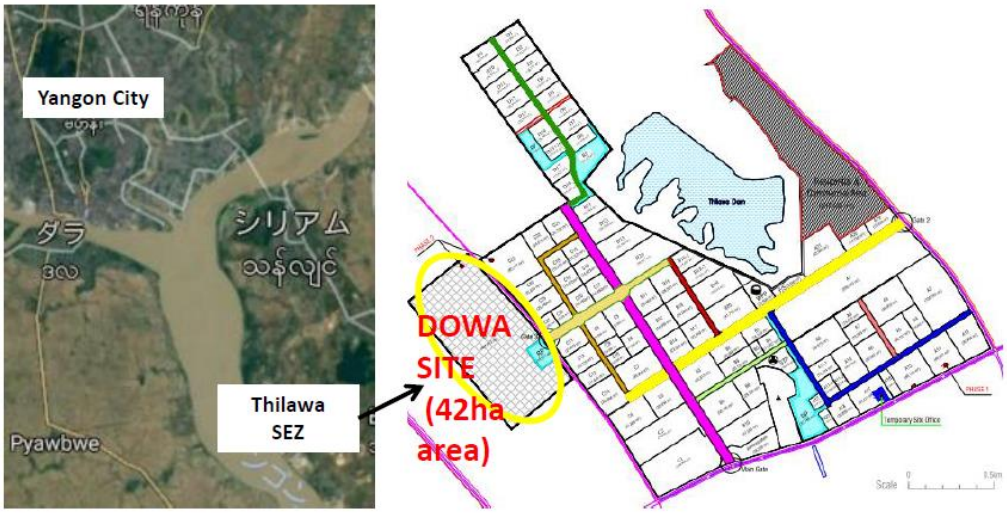
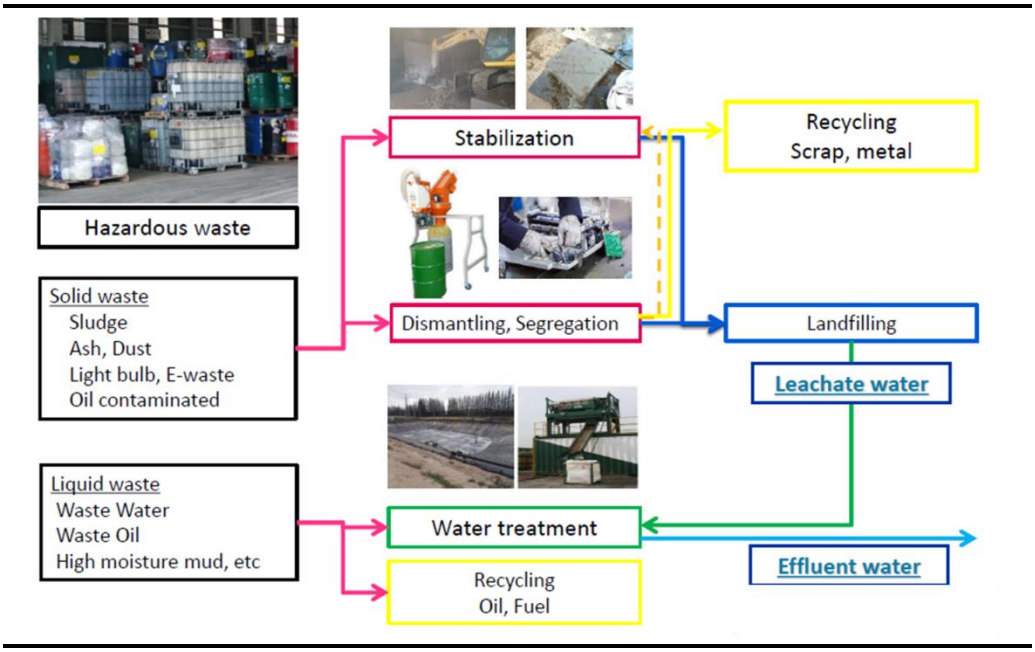


Figure 4.12 Hazardous Waste Transportation to GEM's Disposal Facility

Prevention for leakage of waste to common road, area
- Use a properly packaging (Drum, Container)
- Fix a packaged waste in cargo and car.

Prevention for car accident
- Appoint properly logistic service(Insurance, Experience, car condition)
- Limit a speed, long time driving and night driving.

Figure 4.13 Hazardous Waste Treatment at GEM's Disposal Facility



5 DESCRIPTION OF SURROUNDING ENVIRONMENT

5.1 SETTING THE STUDY LIMITS

The following section describes the environmental, social and health setting of Block MD-4 as well as the Area of Influence and Study Area for the Project (defined in *Section 5.1.1*). The information provided is based on a review of published information, supplemented with information collected from and provided by various stakeholders consulted as part of the Project, and through review of available Eni, ERM and REM in-house literature. The consultation undertaken to inform the section is discussed in ***Chapter 8*** of this IEE Report.

The purpose of this review of baseline conditions is to present an understanding of the potential environmental and social sensitivities of Block MD-4 as well as the Area of Influence for the Project to make an informed judgement on the appropriate level of impact assessment.

5.1.1 *Study Area*

The Project is located in Block MD-4, which is in the Gulf of Martaban (also known as the Gulf of Moattama), offshore of Myanmar and covers an area of 5,900 km^2. It is approximately 220 km from Dawei and 241 km from Myeik. Although the proposed 3D seismic survey will only be conducted within specific areas of Block MD-4, the area within which the exploration activities may potentially affect resource/receptor and within which potential impacts (both direct and direct) should be considered, is reffered to as the Area of Influence.

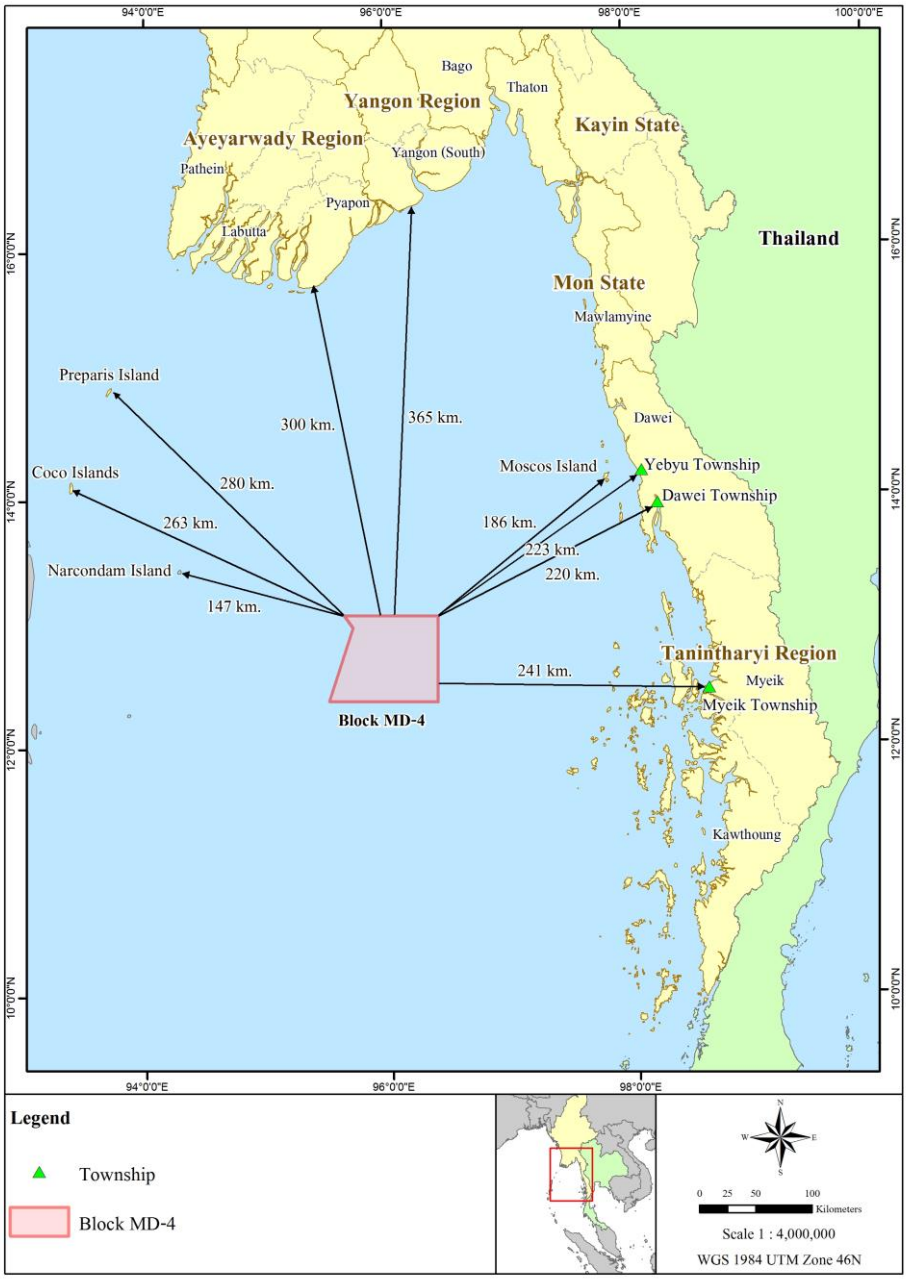
The area that needs to be studied in the ESHIA process, in order to adequately understand and characterise the Baseline, is referred to tas the Study Area. The Study Area encompasses the Area of Influence, and in some cases it may extend farther, depending on baseline data availability and/or data aggregation.

Block MD-4 is located 147 km southeast of Narcondam Island, 263 km southeast of Coco Island, and 280 km southeast of Preparis Island. Although significantly far from the Project, these islands are considered as within the Study Area for some environmental and social aspects, as specified within the relevant sections of this Chapter. The water depth throughout the block ranges from 1,000 to 2,200 m.

Similarly, an even wider area has also been examined for some socio-economic components, in particular fishery data represent a broader region where a clearly defined boundary cannot be made. With regards to fisheries, early consultations and desktop research determined that the most appropriate onshore Study Area for fisheries data was within Tanintharyi Region, as shown in ***Figure 5.1***. The Public Consultation for this project was

conducted in Dawei and Ye' Phyu Townships in onshore Tanintharyi Region. The details of this public consultation is provided in ***Chapter 8*** of this IEE Report.

Figure 5.1 Location of Block MD-4



Source: ERM (2016)

5.1.2 Scope of Study

This section describes the environmental, social and health conditions which could be affected by Project activities within Block MD-4. The following elements have been considered:

- Physical Environment (topographic conditions, climate and meteorology, geology, oceanography, seawater quality and sediment quality);
- Biological Environment (marine fishes, plankton, benthic invertebrates, deep sea squid, deep sea lobster and shrimp, seabirds, marine mammals, threatened and endangered species, sensitive ecosystems and protect areas);
- Socio-Economic Components (marine fisheries, marine transportation, submarine cables and pipelines, demographics, socio-economy, public health, archaeological resources an tourist attraction and recreational areas);
- Cultural Components; and
- Visual Components.

5.2 METHODOLOGY FOR DATA COLLECTION AND ANALYSIS

5.2.1 Data Sources

Information on environmental, social and health baseline conditions in this report are based primarily on a desktop review of existing information on the environmental and social profile of the Project Area and its proximities; it is meant to be an assessment, primarily based on information obtained from various publicly available resources and from previous studies in the Area of Interest, developed in order to provide as far as possible, a high level assessment of potentially significant environmental, social and health impacts. The following sources were used to collect the desktop data hereafter presented:

- Existing reports and studies;
- Government/ authority data;
- Internet research; and
- Collation of in-house existing data archives.

References for all sources will be presented in ***Chapter 10***.

5.3 PHYSICAL COMPONENTS

This section presents the physical components inherent the Project Study Area and includes the following desktop data:

- Geography and Oceanography;
- Climate and Meteorology;
- Geology; and
- Sediment.

Each of the above aspects are discussed in turn below.

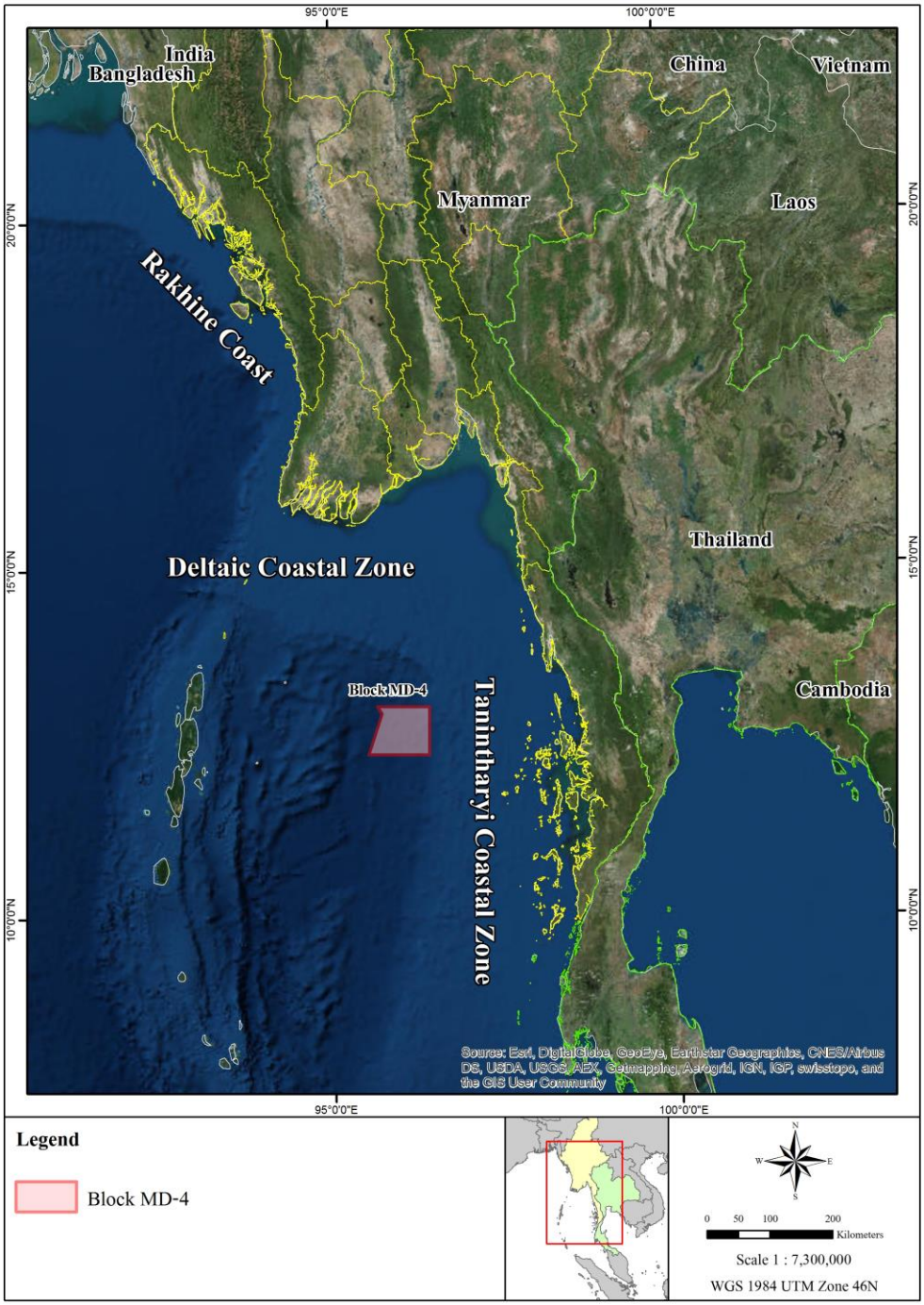
5.3.1 Geography and Oceanography

Myanmar has an area of 676,577 km² and a coastline of 2,832 km. It is located between latitudes 10° 00' and 28° 30 N' and longitudes 92°10' and 100° 10' E, with the northernmost areas lying outside the tropics. Myanmar's continental shelf covers an area of approximately 230,000 km², with a relatively wider portion in the central and southern parts. The exclusive economic zone (EEZ) is about 486,000 km².

Myanmar's coastal zone is divided into three separate sections – the Rakhine Coast, the Deltaic Coastal Zone, and the Tanintharyi Coastal Zone, as shown in ***Figure 5.2***. Block MD-4 is located offshore, approximately 300 km south of the Deltaic Coastal Zone, 241 km west of the Tanintharyi Coastal Zone, and 263 km east of the Coco Islands. Administratively, the Deltaic Coastal Zone lies within Ayeyarwady Region, Yangon Region and Mon State, the Tanintharyi Coastal Zone lies within Tanintharyi Region, and the Rakhine Coast lies in Rakhine State

The Taninthary Coastal Zone, which is the most relevant coastal zone to Block MD-4, is bounded by the Andaman Sea in the west and Thailand to the east. This coastal zone covers south of the Gulf of Martaban up to the mouth of Pakchan River, and includes Myeik Archipelago and the Andaman Sea. Myeik Archipelago extends from Mali Island to Similan Island, and contains about 800 islands in total. Coral reef and mangroves are found throughout the islands. The coastal plain is quite narrow, and gradually rises towards the east where it meets the Taninthayi Yoma mountain range.

Figure 5.2 Coastal Zones of Myanmar



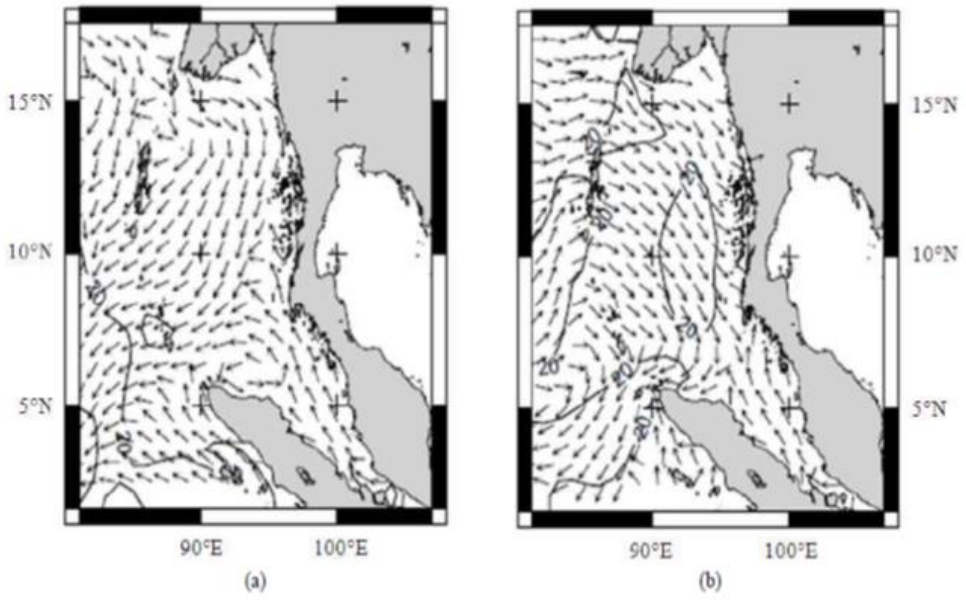
Source: ERM (2016)

5.3.1.1 *Currents and Tides*

Specific information on oceanography in the Gulf of Martaban is limited; however there is information available on the Andaman Sea, which will be presented below. The Gulf of Martaban is located in the northeast corner of the Andaman Sea, so the data is considered relevant.

In the Andaman Sea, water circulates from the north Indian Ocean, Bay of Bengal, southwards along the coast of Myanmar and Thailand, extending southwest of Phuket Island and turning to the Indian Ocean. The southern water mass circulates from Malacca Strait northwards to the southwest coast of Phuket Island, meeting with the northern water mass and moving offshore to the Indian Ocean. In the Andaman Sea, the oceanic flow changes direction twice during the year; it is cyclonic during the spring and early summer and anticyclonic the rest of the year [(1)]. ***Figure 5.3*** shows water circulation during the two monsoon seasons.

Figure 5.3 ***Surface Currents in the Andaman Sea (1985 – 2003) (a) December – February Average (NE Monsoon) and (b) June through September Average (SW Monsoon), based on HAMSOM Modeling***



Source: Rizal et al (2012) [(2)]

The Gulf of Martaban has a tide-dominated coastline, with a tidal range of four to seven meters. During spring tide, when the tidal range is around 6.6 m, the turbid zone covers an area of more than 45,000 km^2 making it one of the largest perennially turbid zones of the world's oceans. During neap tide, with tidal range of 2.98 m, the highly turbid zone coverage drops to 15,000 sq km.

(1) Limpsaichol, Undated

(2) Syamsul Rizal et al., GENERAL CIRCULATION IN THE MALACCA STRAIT AND ANDAMAN SEA: A NUMERICAL MODEL STUDY / American Journal of Environmental Science 8 (5) (2012) 479-488 , http://thescipub.com/PDF/ajessp.2012.479.488.pdf

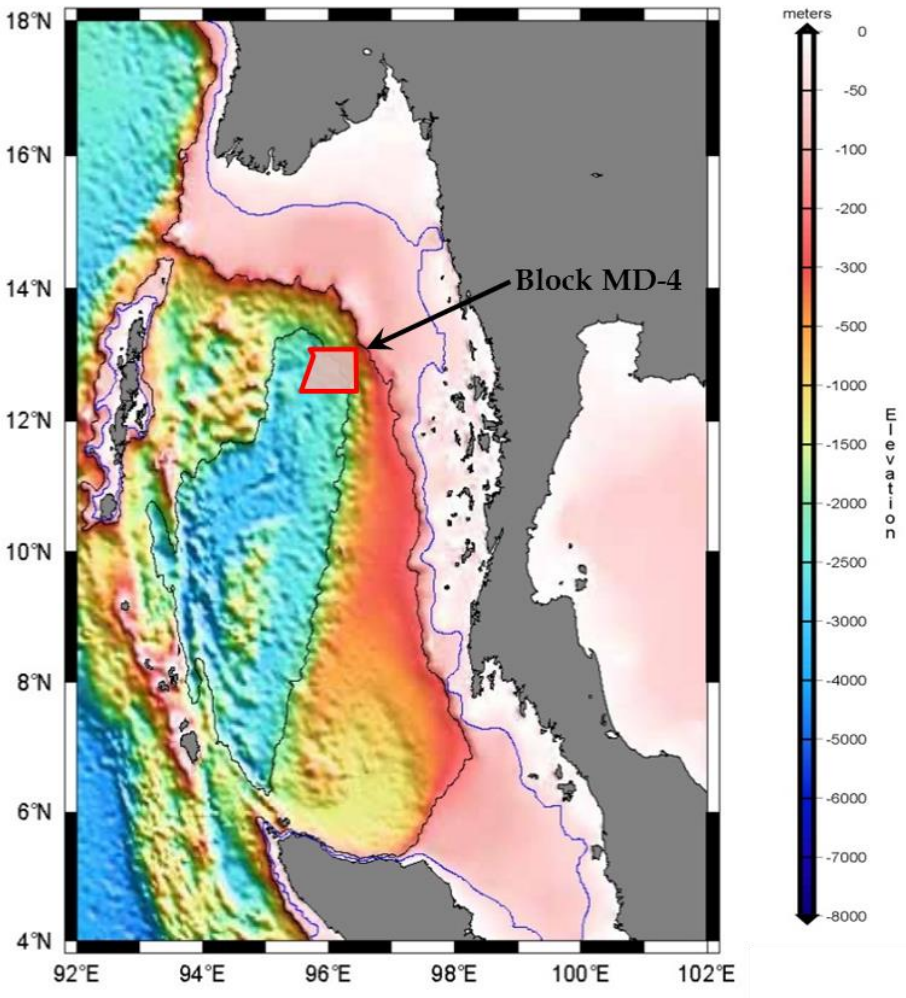
The edge of the highly turbid zone migrates back-and-forth in-sync with every tidal cycle by nearly 150 km. (1)

The tides along the Tanintharyi Region (Tenasserim coast) and along the west coast of Thailand are semidiurnal, with a small diurnal inequality in both time and height. The tides approach these coasts from the south-southwest and progress north. The mean spring ranges increase from about 3 m at the Myanmar-Thailand border to over 5.2 m at Mergui. The currents flow at an average rate of 0.4 knots, with a maximum of about 0.7 knots. Near the coast, the tidal currents will also exert great influence and will either augment or deter the non-tidal currents (2).

5.3.1.2 Bathymetry

Depths within Block MD-4 range from 1,000 m to 2,200 m.. A map of bathymetry surrounding Block MD-4 is shown in ***Figure 5.4***

Figure 5.4 Bathymetry Surrounding Block MD-4



Source: ERM (2016)

(1) http://www.eosnap.com/sediments/sediments-by-ayeyarwady-delta-and-gulf-of-martaban-myanmar-february-28th-2012/

(2) National Geospatial-Intelligence Agency, 2005

5.3.2 Climate and Meteorology

Myanmar has a tropical climate and can be divided into two climatic regions, the tropical south and the temperate north. The weather in the Block MD-4 area is primarily influenced by the Northeast (NE) Monsoon and the Southwest (SW) Monsoon, and the short transitional periods between them. (1)

The Andaman Sea's monsoon regime generates four (4) distinct seasons, which can be described as follows:

- **Winter (December to April)** - The Northeast Monsoon brings sparse rainfall, mild temperatures, and lower humidity.
- **Spring (April and May)** - This transition period between monsoons is hot with highly variable weather.
- **Summer (June to September)** - The Southwest Monsoon is characterized by cloudiness, overcast skies, frequent light rain, and interspersed with thunderstorms.
- **Autumn (October and November)** - This post-monsoon transition period is generally dry and cool.

5.3.2.1 Temperature

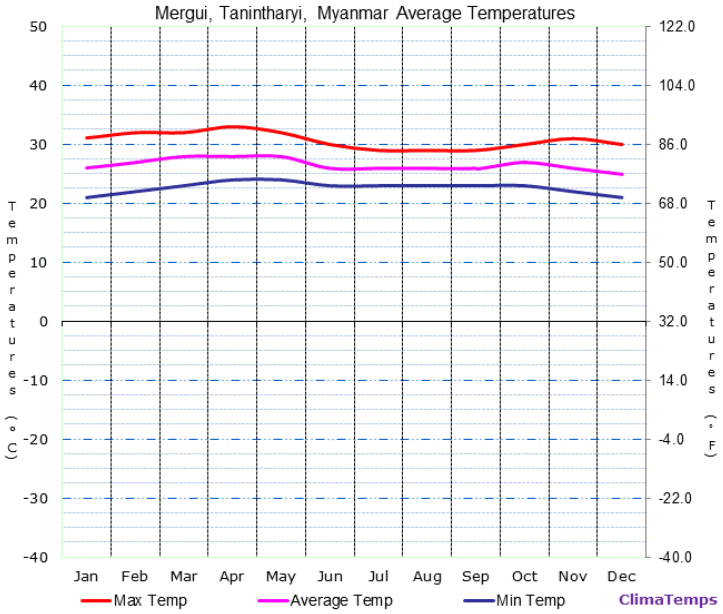
5.3.2.1 (1) Onshore Temperature in Tanintharyi Region

In the Tanintharyi Region (241 km east of Block MD-4), the average hottest temperature is 31°C, and the average lowest temperature is 23 °C. Tanintharyi has a tropical monsoonal climate with a dry season and a heavy monsoon the rest of year, with no cold season (2). Monthly average temperature for Tanintharyi Region is shown in ***Figure 5.5***.

(1) Britannica Encyclopedia, 2009

(2) http://www.tanintharyi.climatemps.com

Figure 5.5 Monthly Average Temperature for Tanintharyi Region



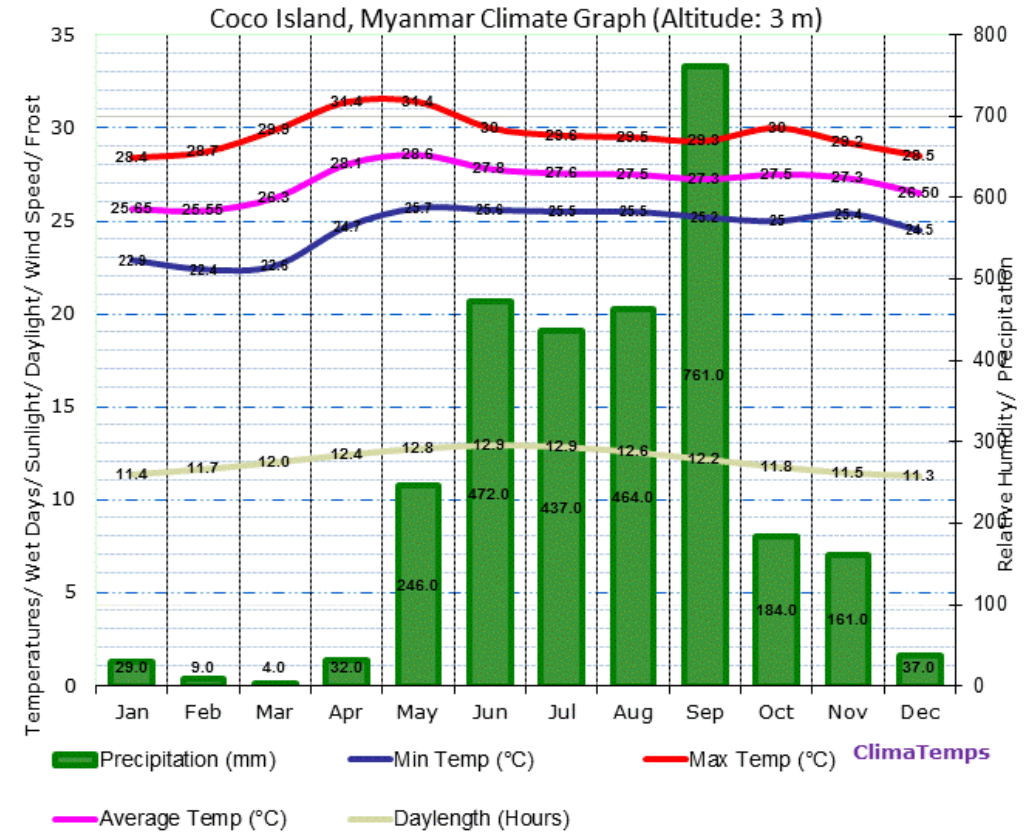
Source: http://www.tanintharyi.climatemps.com/temperatures.php

5.3.2.1 (2) Onshore Temperature on Coco Island

On Coco Island (263 km northwest of Block MD-4), the average hottest temperature is 31°C, and the average lowest temperature is 22 °C. Coco Island has a tropical monsoonal climate with a dry season and a heavy monsoon the rest of year, with no cold season [1]. Monthly average temperature for Coco Island is shown in ***Figure 5.6***.

(1) http://www.coco-island.climatemps.com/

Figure 5.6 Monthly Average Temperature for Coco Island



Source: http://www.coco-island.climatemps.com/

5.3.2.1 (3) Sea Surface Temperature in Project Area

Data from the northern Myeik archipelago (located over 241 km / 149 miles from Block MD-4) shows that the temperature is very uniform. MODIS satellite data (1) between 2002 and 2014 show that SST averages between 28 and 30 ^{0}C. During the period, the highest SST was in 2005 (33.5 ^{0}C) with the lowest in 2009 (26 ^{0}C).

5.3.2.2 Rainfall

Rainfall is highly seasonal in Myanmar; at least 75% of the precipitation occurs during the southwest monsoon. In the Deltaic Coastal Zone, the average annual rainfall is about 1,500-2,000 mm in the north, increasing to 2,500 mm in the southeast and 3,500 mm in the southwest (2). Over 90% of the rain falls between mid-May and mid-November. Annual average rainfall of Yangon is about 2,681 mm (3).

(1) Flora and Flora International. Tanintharyi Conservation Programme. Coral Diversity and Reef Resilience in the Northern Myeik Archipelago, Myanmar. TCP Report No. 3. October 2014.

(2) http://www.arcbc.org.ph/wetlands/myanmar/mmr_irrdel.htm

(3) http://www.yangon.climatemps.com/precipitation.php

Table 5.1 shows monthly rainfall data for Coco Island, with September receiving the most average rainfall (761 mm), and March receiving the least (4 mm).

Table 5.1 Monthly Average Rainfall Data for Coco Island

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Rainfall (mm)	29	9	4	32	246	472	437	464	761	184	161	37	2836

Source: http://www.coco-island.climatemps.com/precipitation.php

5.3.2.3 Tropical Cyclones

A tropical cyclone is a tropical storm with rotating winds at speeds of greater than 74 miles (119 km) per hour[1]. Myanmar is vulnerable to cyclones, which often originate in the Bay of Bengal during pre- and post-monsoon seasons from April to May and again from October to November. These cyclones can result in heavy rains, storms, and floods.

Historically, cyclone-related disasters tend to occur in this region every 3 to 4 years (2). The Arakan Coast, northwest of Block MD-4, is more likely to be struck by a cyclone during the autumn transitional season, but the Gulf of Martaban is rarely affected (3). In addition to the damages caused by high winds, storm surges generated by the cyclones in the region usually flood the densely populated Ayeyarwady river delta region lowlands and other coastal regions along the Gulf of Martaban.

Table 5.2 shows all tropical cyclones recorded within 200 km of Block MD-4 since 1945. ***Figure 5.7*** shows historical cyclone tracks in the vicinity of Block MD-4.

(1) http://www.aoml.noaa.gov/hrd/tcfaq/A1.html
(2) Asian Disaster Reduction Centre, 2003
(3) National Geospatial-Intelligence Agency, 2005

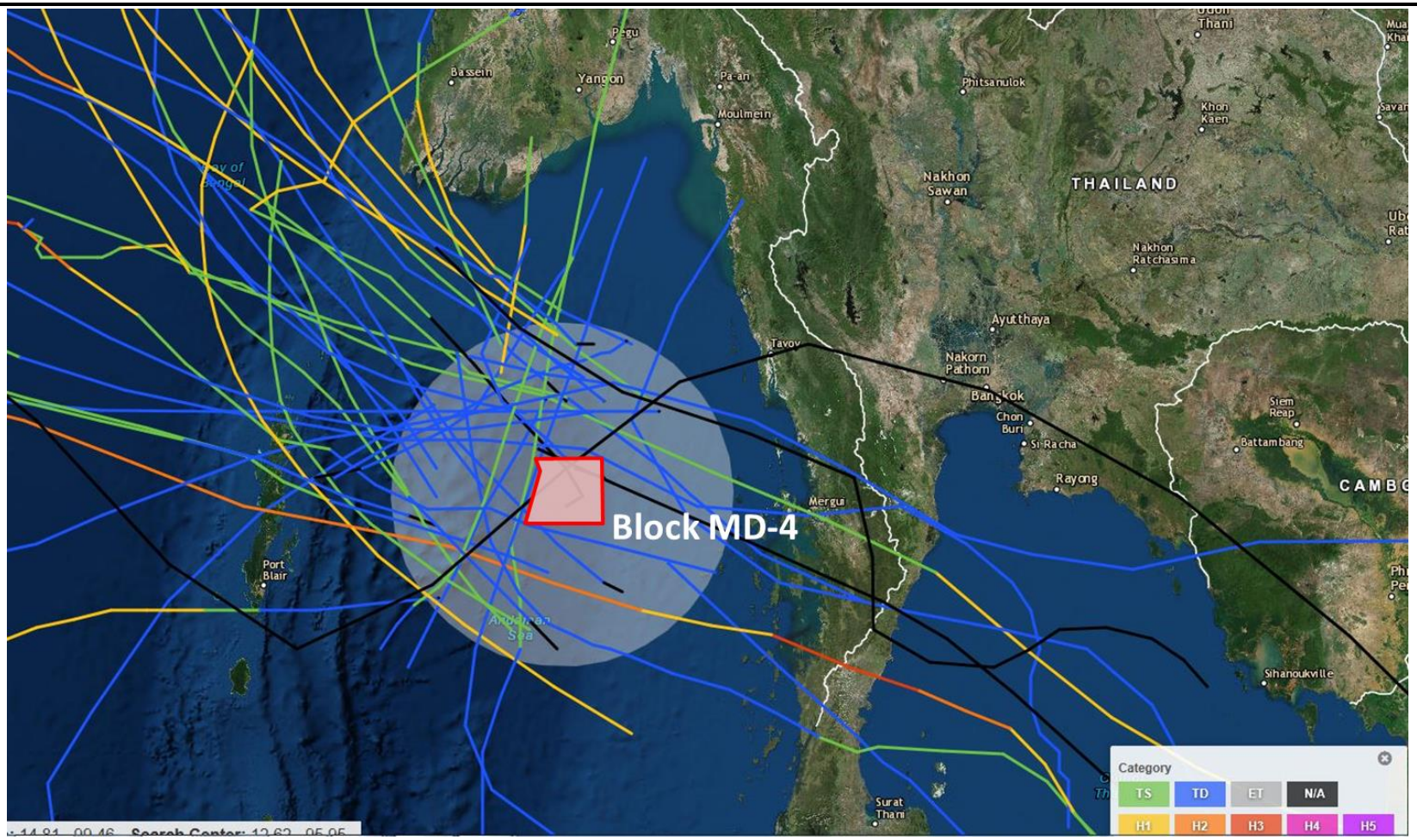
Table 5.2 Historical Cyclones within 200 km of Block MD-4 (1945 – 2015)

Storm Name	Max Saffir-Simpson	Date
TD:THIRTY 2013	TD	Nov. 01, 2013 to Nov. 21, 2013
PHAILIN 2013	TD	Oct. 7, 2003 to Oct. 14, 2013
NOT NAMED 2003	TS	Oct. 21, 2003 to Oct. 28, 2003
NOT NAMED 2002	TS	May. 9, 2002 to May. 12, 2002
NOT NAMED 1999	H5	Oct. 25, 1999 to Nov. 3, 1999
LINDA 1997	TS	Oct. 25, 1997 to Nov. 9, 1997
NOT NAMED 1996	N/A	Oct. 24, 1996 to Oct. 31, 1996
Gay 1989	TD	Oct. 31, 1989 to Nov. 10, 1989
03B 1975	TS	May. 4, 1975 to May. 8, 1975
17B:SALLY 1972	TD	Nov. 30, 1972 to Dec. 8, 1972
02B 1966	TS	May. 16, 1966 to May. 18, 1966
NOT NAMED 1965	N/A	Oct. 28, 1965 to Oct 31, 1965
14B 1964	TS	Nov. 16, 1964 to Nov. 28,1964
NOT NAMED 1964	NR	Oct. 11, 1964 to Oct. 17, 1964
NOT NAMED 1958	NR	Oct. 17, 1958 to Oct. 21, 1958
01B 1956	TS	Feb. 8, 1956 to Feb. 11, 1956
01B 1953	TD	Jan. 27, 1953 to Jan. 30, 1953
19W:VAE 1952	NR	Oct. 15, 1952 to Oct 24,1952
10B 1952	TS	Oct. 22, 1952 to Oct 23,1952
02B 1948	TS	Apr. 2, 1948 to Apr. 5,1948
16B 1947	TS	Oct. 31,1947 to Nov. 6,1947
02B 1947	TS	Apr. 17, 1947 to Apr. 19,1947

Source: National Oceanic and Atmospheric Administration, Historical Hurricane Tracks (1)
H5 - Hurricane Category 5 – Maximum Sustained Winds (MSW) >135 kts
H4 - Hurricane Category 4 – Maximum Sustained Winds (MSW) 114 – 135 kts
H3 - Hurricane Category 3 – Maximum Sustained Winds (MSW) 96 – 113 kts
H2 - Hurricane Category 2 – Maximum Sustained Winds (MSW) 83 – 95 kts
H1 - Hurricane Category 1 – Maximum Sustained Winds (MSW) 64 – 82 kts
TS/SS – Tropical/Subtropical Storm – Maximum Sustained Winds (MSW) 34 – 63 kts
TD/SD – Tropical/Subtropical Depression – Maximum Sustained Winds (MSW) <34 kts
ET - Exratropical Storm or Disturbance
NA – Unknown Type

(1) https://coast.noaa.gov/hurricanes/?redirect=301ocm, Accessed February 2017

Figure 5.7 Historical Cyclone Track within 200 km of Block MD-4 (1945 – 2015)



Source: http://www.csc.noaa.gov/hurricanes

H5 - Hurricane Category 5 – Maximum Sustained Winds (MSW) >135 kts
H4 - Hurricane Category 4 – Maximum Sustained Winds (MSW) 114 – 135 kts
H3 - Hurricane Category 3 – Maximum Sustained Winds (MSW) 96 – 113 kts
H2 - Hurricane Category 2 – Maximum Sustained Winds (MSW) 83 – 95 kts
H1 - Hurricane Category 1 – Maximum Sustained Winds (MSW) 64 – 82 kts

TS/SS – Tropical/Subtropical Storm – Maximum Sustained Winds (MSW) 34 – 63 kts
TD/SD – Tropical/Subtropical Depression – Maximum Sustained Winds (MSW) <34 kts
ET - Exratropical Storm or Disturbance
NA – Unknown Type

5.3.3 Geology

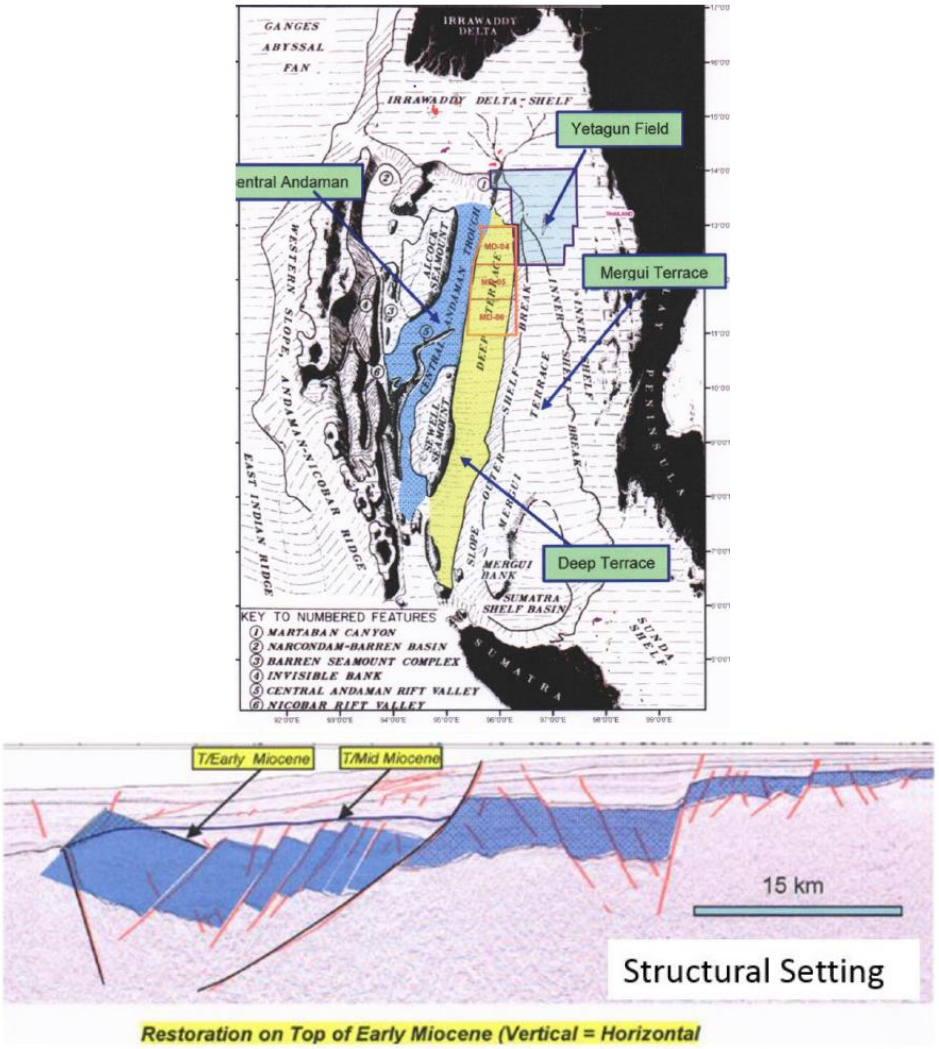
5.3.3.1 Geological Setting

MD-4 is located in the Gulf of Martaban in the Moattama/Andaman basin. This basin started its development in the Oligocene as a back-arc basin in the east –west development of the Andaman rift and was gradually overlapped since Mid Miocene by the establishment of a major dextral shear system along the Sagaing fault zone, getting almost a classic pull apart basin configuration.

Horst and graben structures developed since Upper Oligocene –Lower Miocene with the opening of the Andaman sea; the morphology of the area was dominated by a terrace area (Mergui terrace) and a main depocenter area (Deep Terrace Zagawa trough). During Middle Miocene the movement of the Sagaing fault took place and resulted in a deepening of the whole area. Since Middle Miocene the previous syn rift interval was tilted in a series of easterly dipping faulted blocks. Inversion structures developed associated with strike slip fault zone, especially along the Sagaing fault. The overall environment was probably a broad marine shelf where sediments, coming mainly from northeast of the Irrawaddy Delta, were deposited in compartmentalized grabens.

Figure 5.8 shows the geological setting for Block MD-4.

Figure 5.8 Geological Conditions for Block MD-4



Source: Eni (2015)

5.3.3.2 *Earthquakes and Tsunamis*

According to a literature review, Myanmar is seismologically unstable and vulnerable to earthquakes due to its location in the active Alpide seismotectonic belt and the young Alpine-Himalayan-Sumatran orogenic belt (1). Historic records show that at least 15 major earthquakes with magnitudes M≥7.0 RS have occurred in Myanmar in the last hundred years.

Recent earthquakes include one in April 2016 near Mawtaik on the India and Sunda (Eurasia) plates at 6.9 magnitude on the Richter scale, as well as a magnitude 6.8 earthquake that occurred on the Sagaing fault in Myanmar on November 11, 2012 (2). The Sagaing fault is a major fault in Southeast Asia between the India and Sunda (Eurasia) plates. This strike-slip fault (side-to-side motion) is part of a broad zone of deformation that includes the India-Asia collision zone to the north and extension of the Andaman Sea to the south. The November 11 earthquake and its four aftershocks (with

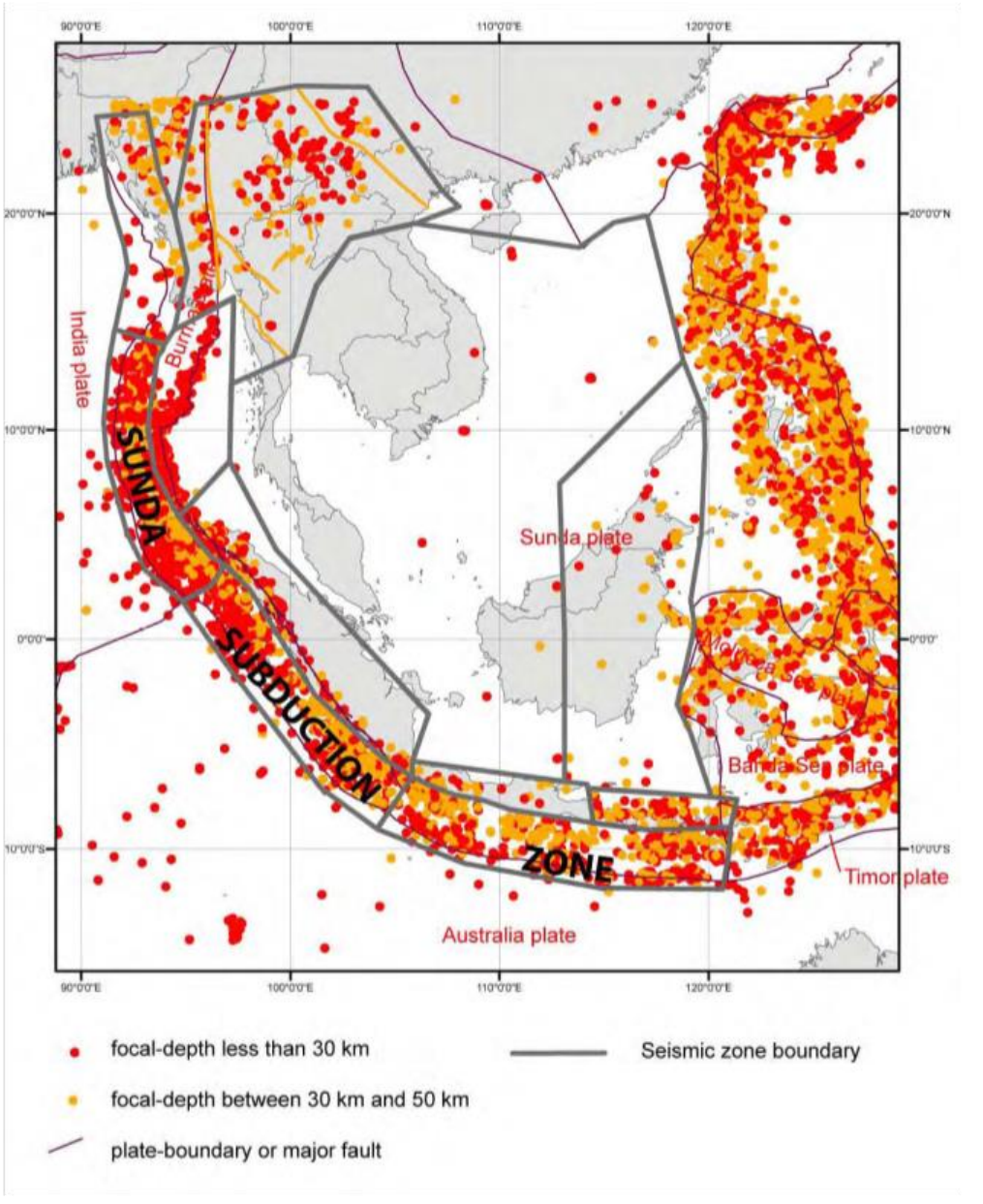
(1) Theilen and Pararas-Carayannis (2009) Op cit.

(2) http://www.earthobservatory.sg/news/strong-quake-myanmar#.U4wB1ncxXmQ, Accessed May 2014

magnitudes ranging from M-5 to M-5.8) occurred north of the city of Mandalay, along a stretch of the Sagaing fault. A map of earthquakes in the SE Asian region is shown in ***Figure 5.9*** and a historical earthquake map of Myanmar is shown in ***Figure 5.10***.

Tsunamis have been recorded in Myanmar coastal areas. The recent 2004 tsunami generated by the Sumatra earthquake caused moderate damage to the Rakhine Coast, Ayeyarwady Delta and the Tanintharyi Coast with more than 60 lives and hundreds of boats lost (1).

Figure 5.9 ***Map of Earthquakes with Shallow-Focus Epicentre for Period 1965-2005***

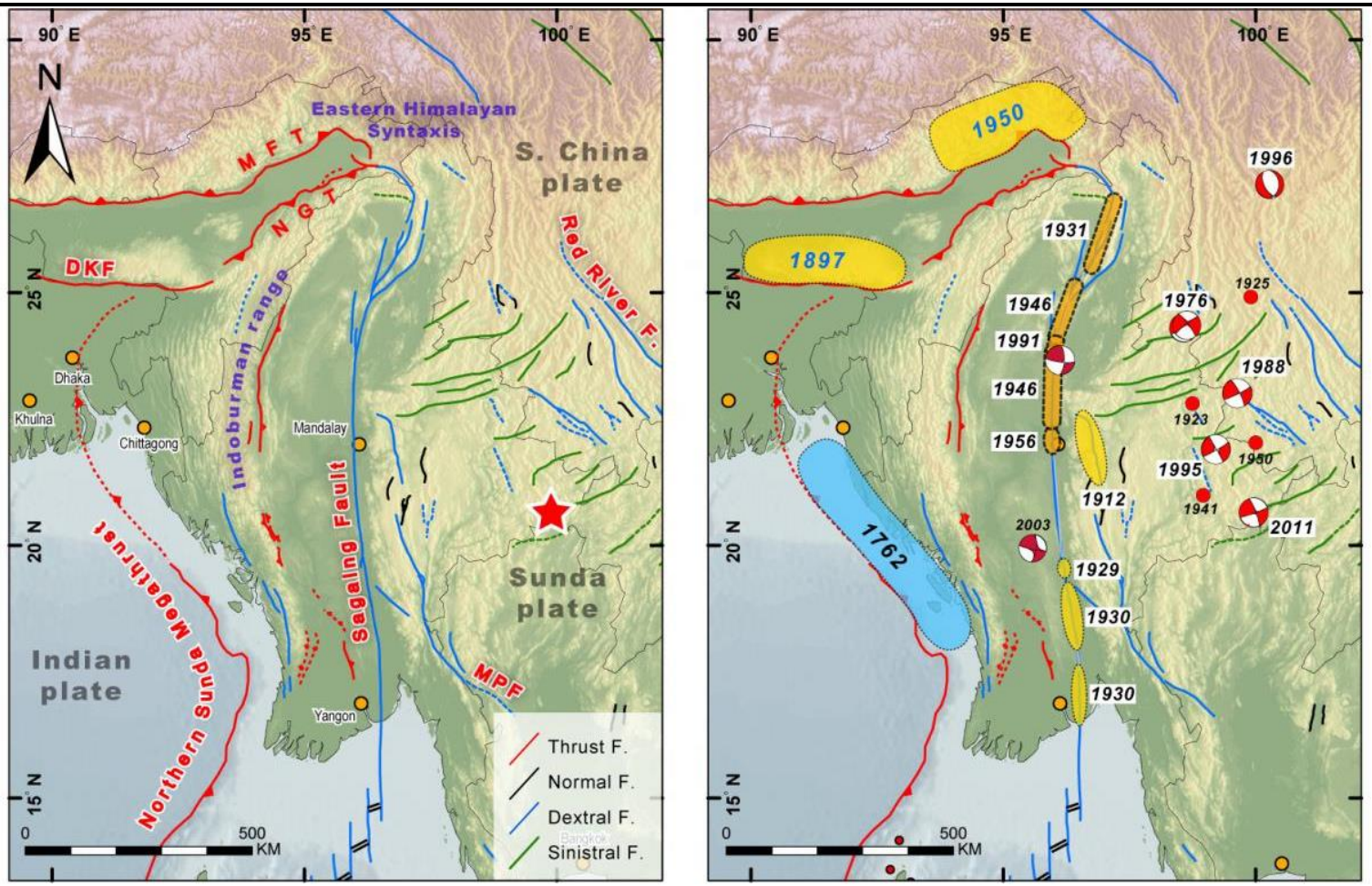


Source: USGS (2)

(1) Union of Myanmar (2009), Op cit.

(2) http://www.usgs.gov/

Figure 5.10 Neotectonic Map of Myanmar



Source: http://www.earthobservatory.sg/news/strong-quake-myanmar#.U4wB1ncxXmQ , Accessed October 2016.

Note: The coloured patches show estimated rupture patches of older earthquakes, while the "beach-ball" symbols show earthquakes recorded by seismometers in modern times. The "beach ball" represents a focal mechanism, which shows an estimate of motion along the earthquake fault.
Left - Main tectonical features around the Sagaiing fault
Right - Major earthquake since the 18th century

5.3.4 *Sediment*

Sediments from the Ayeyarwady River, consisting of silty clay, discharge into the Andaman Basin, with an annual load of about 265 10^6 metric tons. The eastern and inner Ayeyarwady delta-shelf accumulates 90% of this sediment at a rate of 200 cm/100 years.

More specific to the project area, sediments from the Salween Sittaung and Yangon rivers empty into the Gulf of Martaban. According to the National Institute of Oceanography, studies of the sediment texture, depth of the water, etc., indicate that the sea floor in the Gulf of Martaban, the surrounding coastal areas and estuaries are covered with silty clays and subject to constant settling and resuspension due to tidal forces. The shallowness (less than 30 meters deep) of the gulf allows the tidal currents mix the waters and bring the resuspended material to the surface (1).

Beyond a depth of 30 m (outside the Gulf of Martaban, and including Block MD-4), the situation changes drastically. The gradient of the sea floor increases sharply and because of deeper waters the tidal forces are unable to resuspend and bring the sediments to the surface. Also, tidal forces become weak with increasing distance from the shore. This may account for the sudden change in color from brown sediments to dark blue ocean water in the image, rather than the sediments gradually dispersing out into the Andaman Sea.

5.4 *BIOLOGICAL COMPONENTS*

This section describes the biological environment of the Study Area. The discussion is limited to the biological components of the environment likely to be present in the Study Area and potentially affected by the Project activities, as follows:

- Marine Fishes, Squid and Sharks;
- Plankton;
- Benthos, Deep Sea Squid, Lobster and Shrimp;
- Seabirds;
- Marine Mammals;
- Marine Turtles;
- Sensitive Ecosystems; and
- Protected Areas.

Where appropriate, discussion of the above will focus on the main sensitivities present in the Project area, particularly with regards to species that have an IUCN Red List Category of "Near Threatened (NT)", "Vulnerable (VU)", "Endangered (EN)", or Critically Endangered (CR)"[2].

(1) http://www.eosnap.com/sediments/sediments-by-ayeyarwady-delta-and-gulf-of-martaban-myanmar-february-28th-2012/

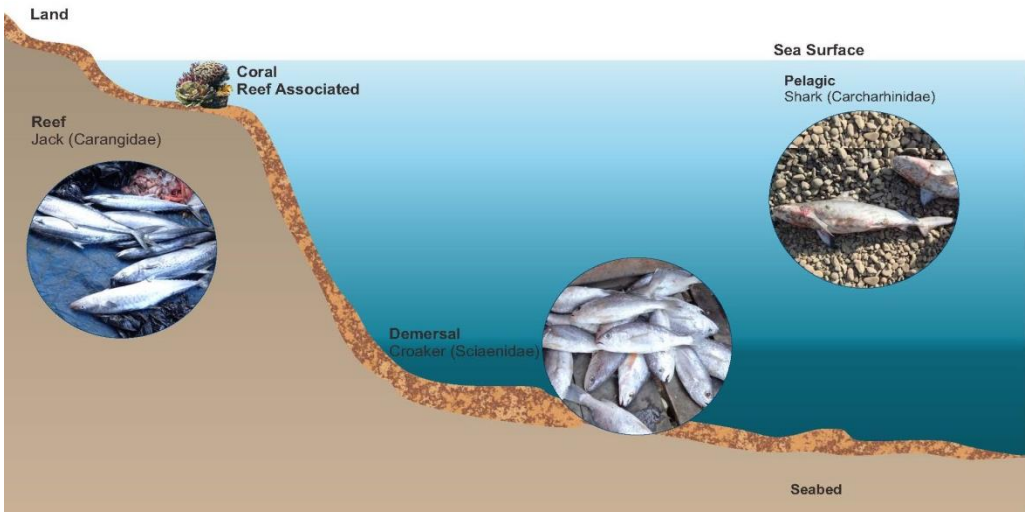
2 http://www.iucnredlist.org/technical-documents/categories-and-criteria

5.4.1 Marine Fishes, Squid, and Sharks

5.4.1.1 Fishes

Fish communities that may be present in the Area of Interest range from coastal or reef associated species, such as grouper and snapper, to demersal (bottom living) and pelagic (open water) species and may occupy a range of habitats (***Figure 5.11***).

Figure 5.11 Fish Types in Myanmar Waters



Source: ERM

Pelagic species inhabit open water areas and generally undertake large migrations between feeding grounds and spawning areas throughout the year. The family Clupeidae (herring and anchovies) and Scombridae (mackerel and tuna) are likely to be present in portions of Block MD-4. This family is known to be sensitive to underwater sound generation as they are classified as "hearing specialists". This means that they have the ability to hear underwater sound as they have a connection between their swim bladder and their hearing apparatus and they can thus be sensitive to pressure changes (i.e. underwater sounds).

Demersal species are associated with the seabed. They generally feed on the invertebrates and other organisms living with the seabed. Demersal species such as snapper and croaker are known to be caught in Mon State and could be present in Block MD-4 (1).

Coastal or reef species are range restricted species and generally inhabit rocky, coral or coastal areas for the majority of the life, using these areas as both feeding and spawning grounds. In coastal areas, seagrass and mangrove habitats serve as areas of enhanced biological productivity and nursery areas for juvenile fishes. Rocky shores and coral reefs are also expected to be areas supporting fish aggregations, site-attached species and serve as nursery areas.

(1) Foundation for Ecological Recovery (FER). Abundance of Parlain Natural Resources and Communities.

These nursery areas lie outside the Study Area. Any potential coral habitat is over 147 km from the 3D seismic survey area, and therefore range restricted reef species are unlikely to be in the vicinity of the 3D seismic survey areas.

In 2004, South East Asian Fisheries Development Center (SEAFDEC) conducted a joint research survey on pelagic fisheries resources in Myanmar. The results from this survey indicated that many commercially important species, such as Swordfish (*Xiphias gladius*), Yellowfin Tuna (*Thunnus albacares*), Striped marlin (*Tetrapturus audax*) and Sainfish (*Istiophorus platypus*) inhabit Myanmar offshore waters. Bigeye Thresher (*Alopias pelagicus*), Whit-tipped shark *(Carcharhinus longimanus*), Escolar, Pelagic stingray (*Dasyatis sp*:), Common dolphin (*Coryphaena bipinnulata*) and Snake mackerel (*Gympylus surpens*) were also found as by-catch in this survey.

Similar results were also found in 2007, when "The Collaborative Marine Fishery Resources Survey in Myanmar Water" was jointly conducted by scientists from SEAFDEC and Myanmar. From these survey results, Swordfish were found to be the most dominant species in Myanmar offshore waters, and can be considered as one of the key commercial fishes for offshore fisheries (***Table 5.3***).

Table 5.3 Species-Wise Catch of Big Pelagic Fish

Operation No.	Catch						
	Thresher Shark	Sword Fish	Sail Fish	Ray	Lancet	Other	Total
1	0	1	0	0	0	1	2
2	2	5	0	1	1	0	9
3	4	6	0	2	1	0	13
4	2	1	1	0	0	0	4
5	4	0	1	2	0	0	7
6	1	3	0	0	0	0	4
Total Catch	13	16	2	5	2	1	39
CPUE (1000 hook)	3.82	4.7	0.59	1.47	0.59	0.29	11.47

Source: SEAFDEC (March 2007 in National paper prepared for the FAO/SEAFDEC workshop on "Assessment and Management of the Offshore Resources of South Asia"). Retrieved from http://www.apfic.org/uploads/smartsection/360_offshore_myanmar.pdf

Whale Sharks (*Rhincodon typus*) are known to inhabit the Bay of Bengal and have been sighted along the Myanmar coast. Whale sharks are known to occur in the waters of the Bay of Bengal from December to March in the north (Bangladesh) and November to May in the south (Thailand). In Myanmar, whale shark is a protected species under the "*Notification for control of endangered fish species*".

5.4.1.2 *Deep Sea Squid*

During SEAFDEC's 2004 joint research survey in Myanmar, the purpleback flying squid, *Sthenoteuthis aualaniensis* was the only squid species found in Myanmar waters. The flying squids (1) of the family *Ommastrephidae* (Sub-order *Oegopsida*) account for about 65% of the world's commercial cephalopods (2), which totaled about 2.6 million in 1991 (3).

5.4.1.3 *Sharks*

Southern Myanmar has a known shark fishing industry, with landing sitesidentified at the following ports: Sittway on the Rakhine Coast, Haing-Gyi on the Ayayawady Delta Coast and Myeik on the Taninthayi Coast.(4). Myeik, the port closest to Block MD-4, is located approximately 240km to the east the block. Sharks are captured as target species of shark-longline and also as by catch from trawling.

According to the order number 2/2004 issued by the Department of Fisheries on 2 May 2004, it is not permitted to conduct shark fishing operation in the protected areas starting from "Ross" island (12° 13' N, 98° 05.2' E) to "Lampi" island (10° 48' N, 98° 16.1' E) (5), as will be discussed later in *Section 5.4.8* and shown in ***Figure 5.21.***

5.4.1.4 *Summary of IUCN Red List Classification for Species found in Project Area*

Table 5.4 shows a list of fish, squid, and sharks that are found within 50 km of the Project Area that have an IUCN Red List Category of "Near Threatened (NT)" or higher. This list is based on data obtained from the Integrated Biodiversity Assessment Tool (IBAT), for species observed within 50 km of the Project Area, obtained on April 13th, 2017. These species are considered to be the most sensitive to any environmental impacts from the Project.

Table 5.4 IUCN Red List for Fish, Squid, and Sharks found within the Project Area

Taxonomic group	Species	Common name	IUCN Red List Category
Fishes	*Alopias pelagicus*	Pelagic Thresher	VU
Fishes	*Alopias superciliosus*	Bigeye Thresher Shark	VU
Fishes	*Alopias vulpinus*	Common Thresher Shark	VU
Fishes	*Carcharhinus falciformis*	Silky Shark	NT
Fishes	*Carcharhinus longimanus*	Oceanic Whitetip Shark	VU
Fishes	*Carcharodon carcharias*	Great White Shark	VU
Fishes	*Himantura leoparda*	Leopard Whipray	VU

(1) Roper et.al., 1984
(2) Brunetti, 1990
(3) FAO, 1993
(4) Status and trends of sharks fisheries in South East Asia 2004, Myanmar Shark Fisheries Fact Sheet Citation, Outcomes from the Study on Shark Fisheries in Southeast Asia: Myanmar http://firms.fao.org/firms/fishery/363/en
(5) FAO, 2004

Taxonomic group	Species	Common name	IUCN Red List Category
Fishes	*Isurus oxyrinchus*	Shortfin Mako	VU
Fishes	*Isurus paucus*	Longfin Mako	VU
Fishes	*Kajikia audax*	Striped Marlin	NT
Fishes	*Prionace glauca*	Blue Shark	NT
Fishes	*Pseudocarcharias kamoharai*	Crocodile Shark	NT
Fishes	*Rhincodon typus*	Whale Shark	EN
Fishes	*Scomberomorus commerson*	Narrow-barred Spanish Mackerel	NT

5.4.2 *Plankton*

Plankton are tiny organisms that travel along the ocean currents. The two main categories of plankton are zooplankton and phytoplankton. Phytoplankton are plants, and they obtain their energy through the conversion of sunlight in photosynthesis and pull nutrients from the water around them. Zooplankton are animals that generally feed upon other plankton, including phytoplankton and zooplankton, along with bacteria and various types of particulate plant matter.

Phytoplankton are primary food producers in the sea and through photosynthesis, they produce food for zooplanktons which are then consumed by organisms higher up in the food chain (Spencer, 1975 (1)).

5.4.2.5 *Zooplankton*

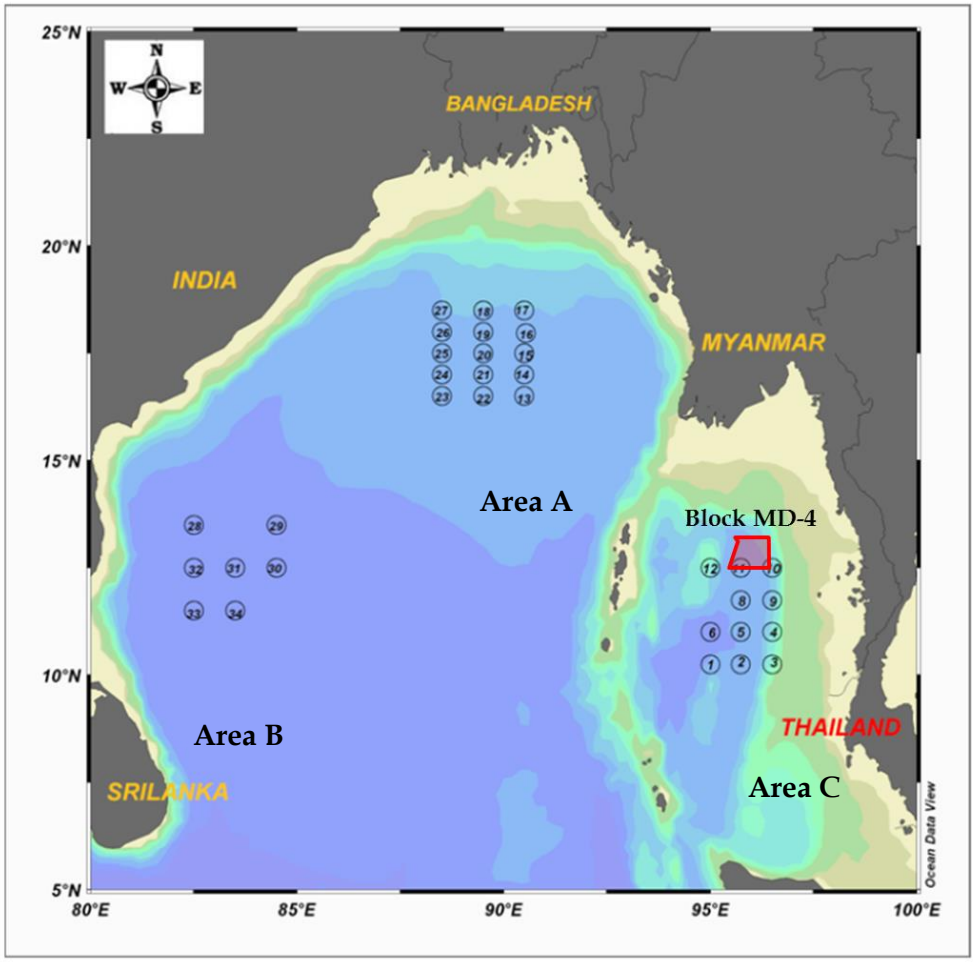
In 2007, the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) conducted a 58-day collaborative survey to determine the composition, abundance and distribution of phytoplankton and zooplankton in several areas of the Bay of Bengal (2). One of the areas of the study ("Area C") was located within the Gulf of Martaban, and relatively near to Block MD-4, as shown in ***Figure 5.12***.

In general, the zooplankton community in Area C was found to consist of 147 species and 87 genera. The study area in the Gulf of Martaban indicated rich abundance of zooplankton groups, but lower abundance of crab larvae, planktonic shrimps, and larvaceans. Results of the study are shown in ***Figure 5.13.*** As shown in the figure, total zooplankton abundance ranged fom 207 to 298 individuals per m^3 in Block MD-4, which can be considered quite high in comparison to the other areas of the study.

(1) Spencer, C.P. 1975. The micronutrient elements. **In:** Riley, J. P. and G. Skirrow. (eds.). Chemical Oceanography. Vol.II 2nd edition. Academic Press Inc., London. p. 245-300.

(2) The Ecosystem-Based Management Fishery in the Bay of Bengal, BIMSTEC, Department of Fisheries, (DOF) Ministry of Agriculture and Cooperatives, Thailand September, 2008. "Composition, Abundance and Distribution of Zooplankton in the Bay of Bengal" Issarapon Jitlang, Sunan Pattarajinda, Ramananda Mishra and Ladda Wongrat, 2008.

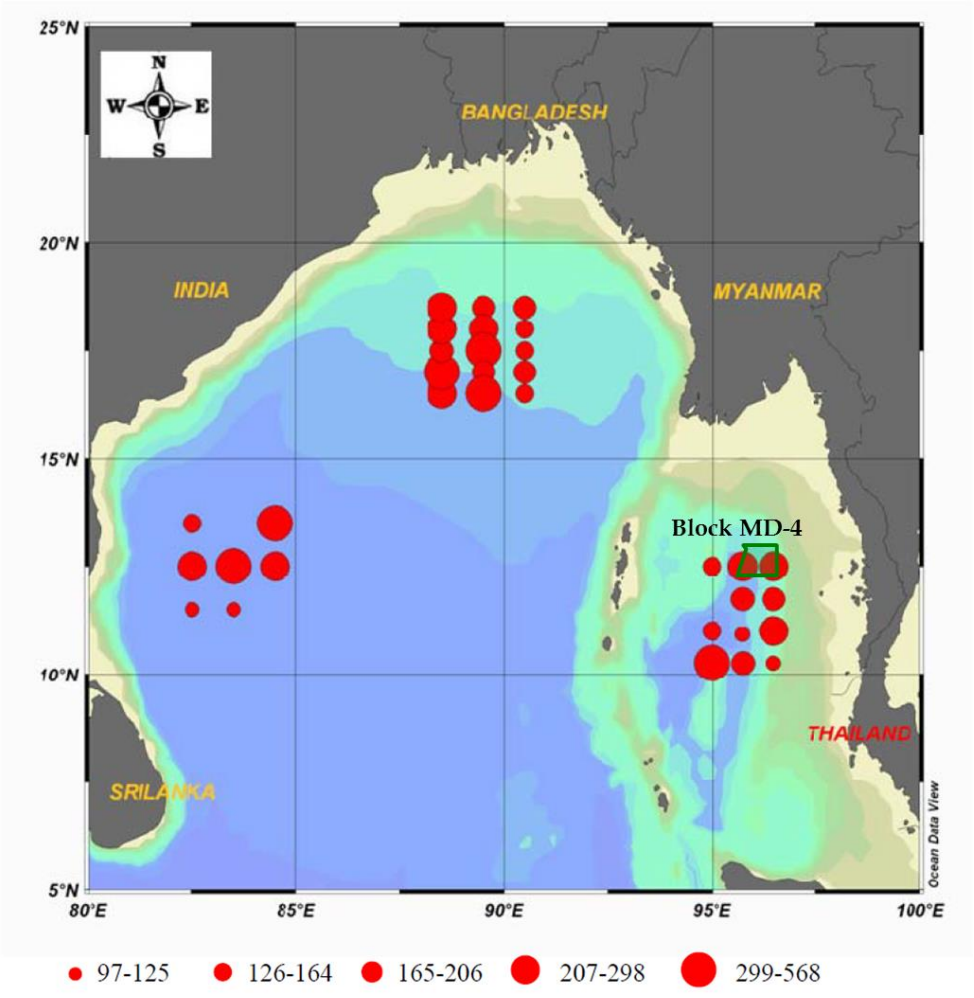
Figure 5.12 Sampling Stations for Zooplankton in the Bay of Bengal



Source: Jitlang et al, 2008 (1)

(1) The Ecosystem-Based Management Fishery in the Bay of Bengal, BIMSTEC, Department of Fisheries, (DOF) Ministry of Agriculture and Cooperatives, Thailand September, 2008. "Composition, Abundance and Distribution of Zooplankton in the Bay of Bengal" Issarapon Jitlang, Sunan Pattarajinda, Ramananda Mishra and Ladda Wongrat, 2008.

Figure 5.13 Distribution and Abundance of Total Zooplankton (individuals/m³)



Source: Jitlang et al, 2008 (1)

5.4.2.6 *Phytoplankton*

In November 2007, species composition, abundance and distribution of phytoplankton were studied from water samples collected at surface layer of 24 stations in 3 areas (north, west and east) in the Bay of Bengal (2). A total of 135 phytoplankton species belonging to 2 species of cyanobacteria, 78 species of diatoms, 53 species of dinoflagellates and 1 species of silicoflagellate were identified. The sampling stations are shown in ***Figure 5.14***.

Cell densities of phytoplankton in Area C were in the range of 117- 11,178 cells/L. High percentage of abundance of dominant species were observed with low densities in some stations in the Area C, and on the contrary, very low percentage of abundance of *Chaetoceros compressus* which was present as a

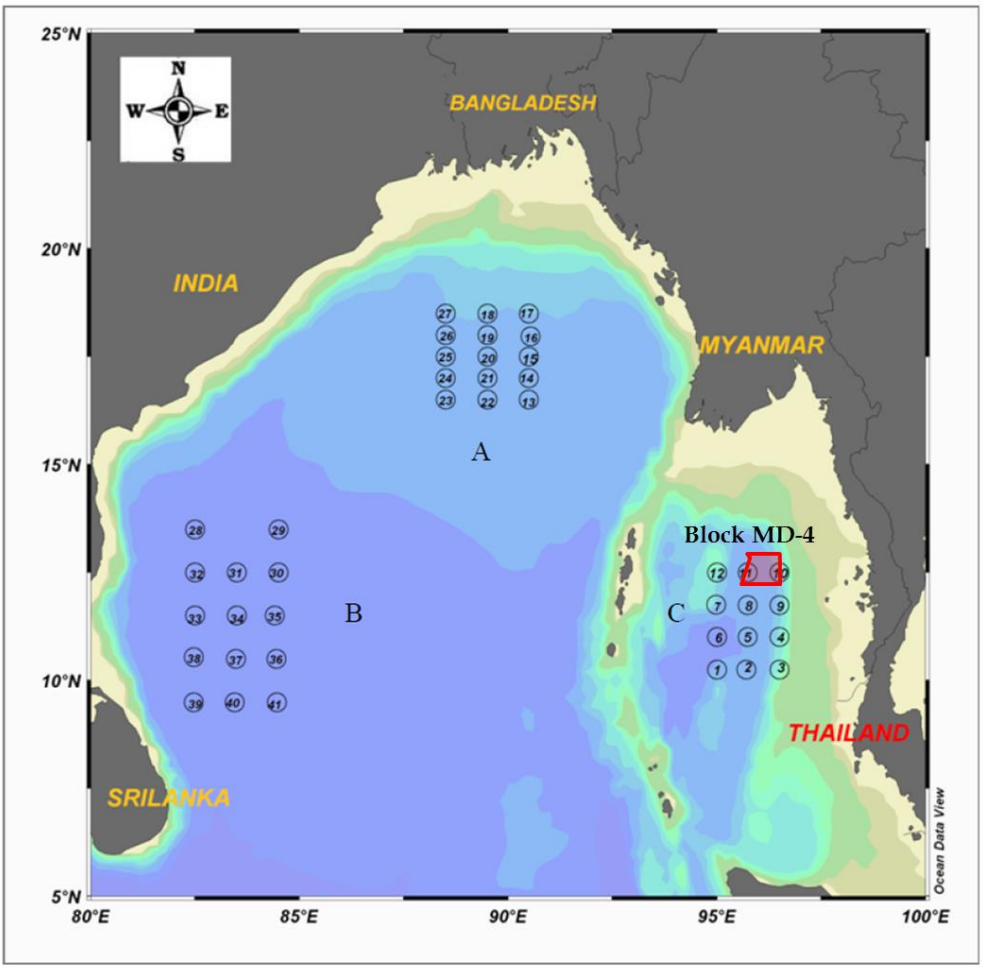
(1) The Ecosystem-Based Management Fishery in the Bay of Bengal, BIMSTEC, Department of Fisheries, (DOF) Ministry of Agriculture and Cooperatives, Thailand September, 2008. "Composition, Abundance and Distribution of Zooplankton in the Bay of Bengal" Issarapon Jitlang, Sunan Pattarajinda, Ramananda Mishra and Ladda Wongrat, 2008.

(2) The Ecosystem-Based Management Fishery in the Bay of Bengal, BIMSTEC, Department of Fisheries, (DOF) Ministry of Agriculture and Cooperatives, Thailand September, 2008. "Species Composition, Abundance and Distribution of Phytoplankton in the Bay of Bengal", Sopana Booonyapiwat, Md. Nasiruddin Sada, Jay Kishore Mandal and Manas Kumar Sinha. 2008.

dominant specie was found from high total phytoplankton density. Results of the survey are shown in ***Figure 5.15*** and ***Figure 5.16***.

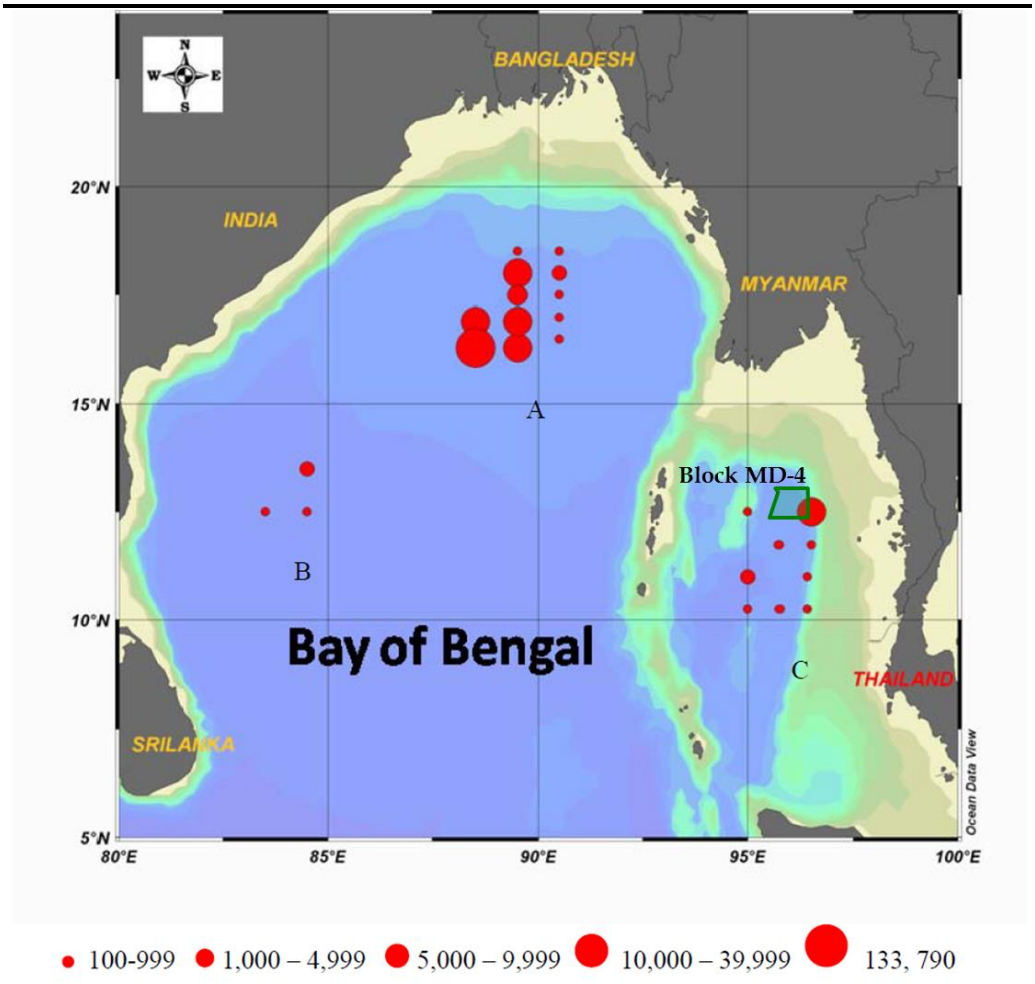
Overall, the study showed that the Andaman Sea, including in the Project Area, is productive with high phytoplankton densities.

Figure 5.14 ***Sampling Stations of Phytoplankton in the Bay of Bengal***



Source: Boonyapiwat et al, 2008 [2]

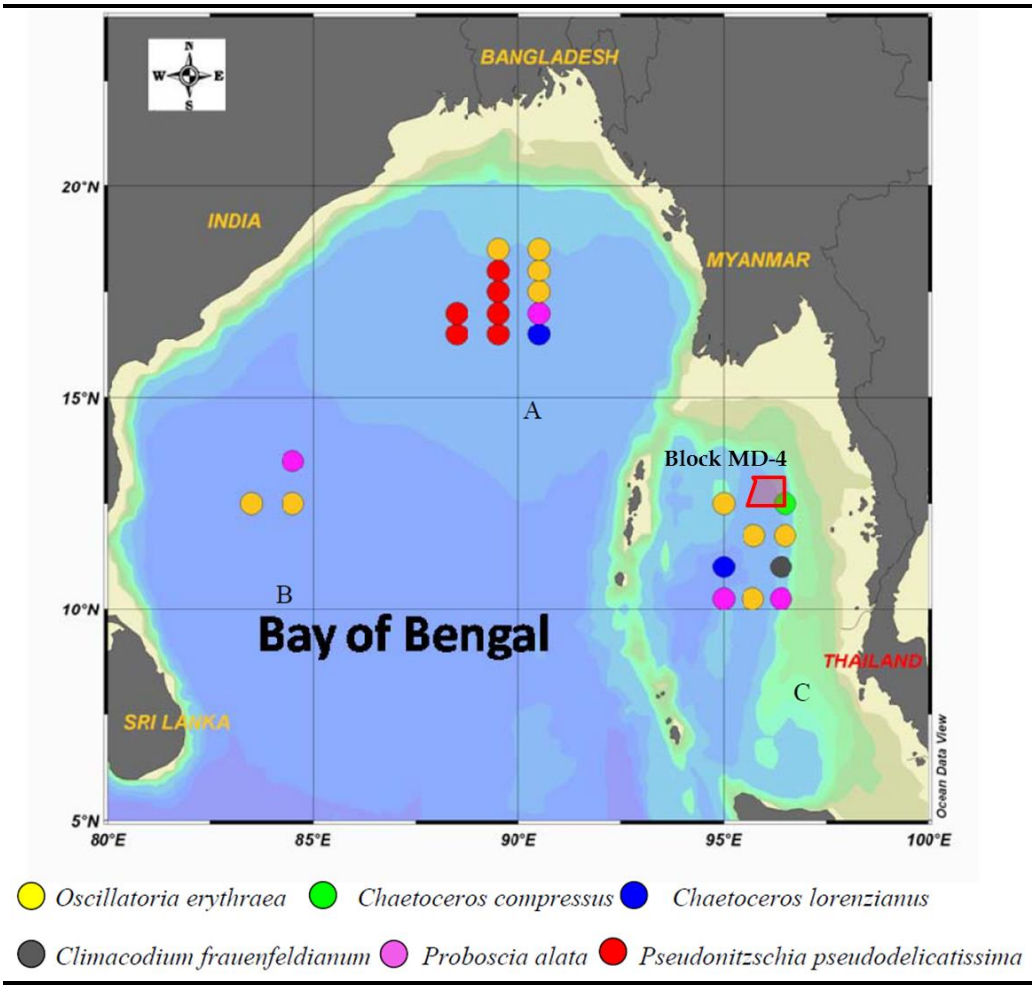
Figure 5.15 Phytoplankton Density (cells/liter) in the Surface Layer



Source: Boonyapiwat et al, 2008 (1)

(1) The Ecosystem-Based Management Fishery in the Bay of Bengal, BIMSTEC, Department of Fisheries, (DOF) Ministry of Agriculture and Cooperatives, Thailand September, 2008. "Species Composition, Abundance and Distribution of Phytoplankton in the Bay of Bengal", Sopana Booonyapiwat, Md. Nasiruddin Sada, Jay Kishore Mandal and Manas Kumar Sinha. 2008.

Figure 5.16 Dominant Phytoplankton Species in the Bay of Bengal



Source: Boonyapiwat et al, 2008 (1)
Note: Dominanace determined in terms of percentage of abundance at each station within the Area.

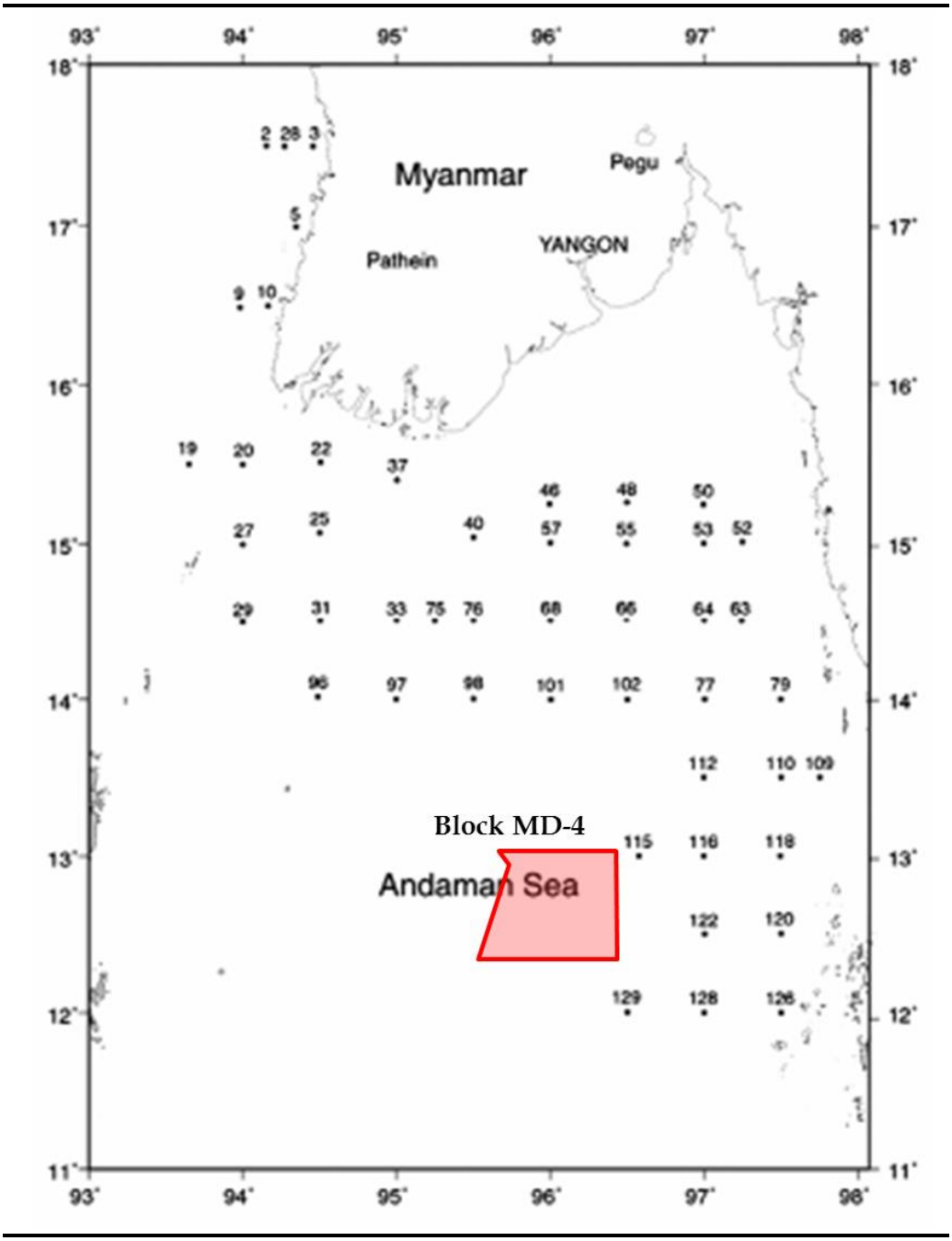
5.4.3 Benthos, Deep Sea Lobster and Deep Sea Shrimp

5.4.3.1 Benthos

A study on benthic macroinvertebrate community structure and distribution in the Gulf of Martaban was conducted in June 2012 (1). ***Figure 5.17*** shows the locations of the field survey. Benthic composition was found to vary by depth, with forams abundant in shallow region (20-50 m), polychaete abundant at all depths, and crustaceans found numerous taxa at depths of 20-50 m and 51-100 m, but fewer taxa in the 201-1000 m depth zone. Average abundance of macrofauna taxa in different depth zones is shown in ***Table 5.5***.

(1) Ansari, Z.A., Ramila Furtado, Shahin Badesab, Pratik Mehta, Swe Thwin. Benthic macroinvertebrate community structure and distribution in the Ayeyarwady contintental shelf, Andaman Sea. Indian Journal of Geo Marine Sciences, Vol. 41(3), June 2012, pp. 272-278.

Figure 5.17 Location of Stations for Benthos Sampling



Source: Ansari et al, 2012 (1)

Table 5.5 Average Abundance of Macrofauna Taxa (no./m²) in Different Depth Zones

Table 1—Average abundance of marcofauna taxa (No./ m^2) in different depth zone.

Depth (m)	20-50	51-100	101-200	201-1000
Faunal groups				
Foraminiferans	985	134	32	9
Hydrozoans	0	4	12	0
Anthozoans	18	3	0	0
Nemertines	13	5	16	0
Nematodes	0	3	0	8
Echiuroids	3	3	0	0
Polychaetes	274	424	508	102
Ostracods	25	13	32	0
Harpacticoids	60	66	135	17
Cumaceans	0	7	4	0
Tanaidacean	10	4	12	0
Isopods	13	24	4	6
Amphipods	161	138	146	9
Macrurans	63	23	0	0
Anomurans	1	1	0	0
Brachyurans	11	12	0	9
Stomatopods	4	2	0	0
Gastropods	4	22	8	3
Pelecypods	23	40	8	11
Ophiuroids	21	23	0	14
Echinoids	0	1	0	0
Crinoids	1	2	0	0
Holothuroids	1	2	0	0
Fish larvae	7	4	8	0
Amphioxus	11	0	0	0
Flat worms	1	1	0	0
Miscellaneous	20	17	0	3

Source: Ansari et al, 2012 (1)

5.4.3.2 *Deep Sea Lobster and Deep Sea Shrimp*

During SEAFDEC's 2004 joint research survey in Myanmar, deep sea lobster, *Puerullus sewelii*, penaeid shrimp of the genus *Aristeus*, and pandalid shrimp of the genus *Heterocarpus* were reported off the continental shelf of Tanintharyi Region. It was estimated that the biomass of demersal stocks inhabiting the continental slope off Tanintharyi coast (between 200 – 500 meters) was about 9,000 tonnes, of which deep sea lobster accounted for one quarter of the biomass. However, no lobster fishery has developed yet in Myanmar.

5.4.4 *Seabirds*

5.4.4.1 *Seabirds Overview*

Myanmar's important areas for seabirds/shorebirds are the Ayeyarwady Delta, Central Tarnintharyi Coast and northern Mergui Archipelago, and Moscos Islands Wildlife Sanctuary (2).

Offshore seabirds in Myanmar waters include terns, gulls, storm petrels, Jaegers (also known as Skuas), tropicbirds, boobies, noddies and frigatebirds.

(1) Ansari, Z.A., Ramila Furtado, Shahin Badesab, Pratik Mehta, Swe Thwin. Benthic macroinvertebrate community structure and distribution in the Ayeyarwady contintental shelf, Andaman Sea. Indian Journal of Geo Marine Sciences, Vol. 41(3), June 2012, pp. 272-278.

(2) IUCN, 1989

Seabird species tend be highly migratory, far ranging and widely distributed away from breeding areas. Offshore Myanmar waters, including Block MD-4, are used by seabirds for foraging and loafing (resting). The seabird species of Myanmar, according to Avibase and Birdlife International, are listed ***Table 5.6.***

The Gulf of Martaban has the most extensive intertidal mudflats in Myanmar, and among the most extensive in SE Asia. During various counts during 2008-2012, an estimated 150,000 waterbirds, mostly waders and egrets, were recorded in the Gulf. ***Table 5.7*** summarizes the most important waterbird numbers (Clark & Zöckler).

5.4.4.2 Narcondam Hornbill

This Narcondam Hornbill (*Rhyticeros narcondami*) is listed as endangered in the *IUCN Red List of Threatened Species*, and protected under Schedule I of India's Wild Life (Protection) Act of 1972, although it is not protected by Myanmar legislation. It is suspected that it has a very small population, which is restricted only to Narconam Island, a small (6.8 km^2) island east of the Andaman Islands, located 147 km norththwest of Block MD-4. The entire population (estimate of about 200 birds) is restricted to the island of Narcondam. Since 2009 it has had a Conservation status of endangered (Hussain, 1991) (1). Its population appears to be stable despite some degree of hunting and habitat degradation. The Narcondam Island Wildlife Sanctuary is currently monitoring the bird. An expedition to Narcondam Island by Raman et al (2013) (2) found an average hornbill density of 167 individuals/km^2.

(1) Hussain, SA (1991). "Some urgent considerations for the conservation of Narcondam Island". Newsletter for Birdwatchers. 31 (5&6): 6.

(2) Raman, T. R. Shankar; Mudappa, Divya; Khan, Tasneem; Mistry, Umeed; Saxena, Ajai; Varma, Kalyan; Ekka, Naveen; Lenin, Janaki; Whitaker, Romulus (2013). "An expedition to Narcondam: observations of marine and terrestrial fauna including the island-endemic hornbill" (PDF). Current Science. 105 (3): 346–350.

Table 5.6 Seabird Species in Myanmar

Family		Species	
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
Hydrobatidae	Storm-petrels	*Oceanodroma monorhis*	Swinhoe's Storm Petrel
		Oceanites oceanicus	Wilson's Storm-Petrel
		Fregetta tropica	Black-bellied Storm-Petrel
Phaethontidae	Tropicbirds	*Phaethon lepturus*	White-tailed Tropicbird
		Phaethon aethereus	Red-billed Tropicbird
Sulidae	Gannets and boobies	*Sula leucogaster*	Brown Booby
		Fregata andrewsi	Christmas Island Frigatebird
		Stercorarius pomarinus	Pomarine Jaeger
		Stercorarius parasiticus	Parasitic Jaeger
Laridae	Gulls and terns	*Anous stolidus*	Brown Noddy
		Larus vegae	East Siberian Gull
		Larus ichthyaetus	Great Black-headed Gull
		Larus ridibundus	Black-headed Gull
		Chlidonias hybrida	Whiskered Tern
		Chlidonias leucopterus	White-winged Tern
		Gelochelidon nilotica	Gull-billed Tern
		Hydroprogne caspia	Caspian Tern
		Sterna hirundo	Common Tern
		Onychoprion anaethetus	Bridled Tern
		Sterna sumatrana	Black-naped Tern
		Sterna dougallii	Roseate Tern
		Onychoprion fuscatus	Sooty Tern
		Thalasseus bergii	Great Crested Tern
		Thalasseus bengalensis	Lesser Crested Tern
		Sternula albifrons	Little Tern
		Larus argentatus	Herring Gull
		Larus cachinnans	Yellow-legged Gull
		Larus brunnicephalus	Brown-headed Gull
		Sterna aurantia	River Tern
		Sterna acuticauda	Black-bellied Tern
Spheniscidae	Penguins	*Chlidonias leucopterus*	White-winged Tern
Gaviidae	Loons	*Anous stolidus*	Brown Noddy
Diomedeidae	Albatrosses	*Rynchops albicollis*	Indian Skimmer
Pelecanidae	Pelicans	*Pelecanus onocrotalus*	Great White Pelican
		Pelecanus philippensis	Spot-billed Pelican

Family		Species	
Scientific Name	Common Name	Scientific Name	Common Name
Phalacrocoracidae	Cormorants	*Phalacrocorax niger*	Little Cormorant
		Phalacrocorax fuscicollis	Indian Cormorant
		Phalacrocorax carbo	Great Cormorant
Stercorariidae	Skuas and jaegers	*Stercorarius pomarinus*	Pomarine Jaeger
Procellariidae	Petrels and shearwaters		
Pelecanoididae	Diving-petrels		
Fregatidae	Frigatebirds		
Alcidae	Auks		

Source: Avibase, Bird Life International (1)

Table 5.7 Seabird Counts in the Gulf of Martaban, 2008-2012

Species	IUCN Status	2008	2009	2010	2011	2012	Estimated Average Annual Total (2008-2012)
Spoon-billed Sandpiper	CR	48	(75)	199			140-220
Little Cormorant				40			40-100
Bar-headed Goose				1			1
Ruddy Shelduck		950	118	24			1,200
Common Shelduck			1				
Northern Pintail		80					150
Eurasian Wigeon			284				300
Northern Shoveler							
Garganey							
Tufted Duck							
Lesser Whistling Duck				2,400			2,400
Grey Heron		4	203	20			200-400
Purple Heron				11			40
Great Egret		3	285	120			300-600
Intermediate Egret			10	370			400-800
Little Egret		5	150	140			150-300
Indian Pond Heron		13	11	140			150-300
Painted Stork		140			4	4	150

(1) http://avibase.bsc-eoc.org/avibase.jsp?lang=EN

Species	IUCN Status	2008	2009	2010	2011	2012	Estimated Average Annual Total (2008-2012)
Asian Openbill			2				10
Black-headed Ibis	VU		133	6			150-300
Glossy Ibis						80	80
Little Heron				3			10
Night Heron			6	30			200
Pied Avocet			1				-
Red-Wattled Lapwing		6	1				-
Grey Plover		9	224	220			250-500
Pacific Golden Plover		1,013	7,726	250			8,000-10,000
Greater Sandplover		1,320	418	1,102			1,000-1,500
Lesser Sandplover		8,963	18,032	13,850			25,000-40,000
Kentish Plover		2,504	8,131	7,193			10000-20,000
Little Ringed Plover		348	606	8			800-2,000
Common Ringed Plover		1	12	1	1		1
Common Snipe		12					
Eurasian Curlew	NT	965	2,141	770			2,200-4,000
Whimbrel		1,597	969	140			1,500-2,500
Long-billed Dowitcher			42				40
Black-tailed Godwit	NT	252	3,405				3,500-5,000
Bar-tailed Godwit		136	227				250-400
Northern Greenshank		372	1,776	90			2,000-3,500
Marsh Sandpiper		70	149	40			150-300
Common Sandpiper		211	43	152			300-400
Common Redshank		1,958	4,617	640			4,500-8,000
Spotted Redshank			1,312	190			1,400-2,000
Terek Sandpiper		317	316	1			320-500
Nordmann's Greenshank	EN	2	7	1	1		7-20
Wood Sandpiper		12	11	6			20
Green Sandpiper		3	3	1			10

Species	IUCN Status	2008	2009	2010	2011	2012	Estimated Average Annual Total (2008-2012)
Great Knot	VU		458				500-1,000
Red Knot		3	18	2			20-40
Broad-billed Sandpiper		1734	1,224	2,121		4000	4,000-5,000
Curlew Sandpiper		2,323	6,762	5,728			7,000-12,000
Red-necked Stint		4,245	6,353	4,801			7,000-12,000
Dunlin			2	2		1	2
Long-toed Stint			4			80	150
Temminck's Stint		8	23	8			40-100
Sanderling		12	12				20-40
Ruff			33	6			50-100
Ruddy Turnstone		17	29				30-60
Pallas' s Gull		2,473	521	405			2,500-3,000
Brown-headed Gull		43	667	250			1,000-2,500
Gull-billed Tern			125	15			120-250
Little Tern			68	120			250-400
Common Tern							50
Greater Crested Tern							
Lesser Crested Tern							
Caspian Tern		25	56	15			60-80
Whiskered Tern		715	7,345	615	4,000	4,000	7,500-15,000
White-winged Tern			2,815	225		3,000	3,000-5,000
Black Tern				10			10
Small Pratincole		145	123				120-250

Source: Zockler, 2013 (1)

(1) Zockler C., Delany S., & Barber J. 2013. Sustainable Coastal Zone Management in Myanmar. Retrieved from http://www.lighthouse-foundation.org/fileadmin/LHF/PDF/Myanmar_-_Scoping_Paper_Myanmar_Coastal_Zone_Management_211113_96dpi.pdf,

5.4.4.3 *Summary of IUCN Red List Classification for Species found in Project Area*

Table 5.8 shows a list of birds that are found within 50 km of the Project Area that have an IUCN Red List Category of "Near Threatened (NT)" or higher. This list is based on data obtained from the Integrated Biodiversity Assessment Tool (IBAT), for species observed within 50 km of the Project Area, obtained on April 13th, 2017. These species are considered to be the most sensitive to any environmental impacts from the Project. Although the Narcondam Hornbill has not been found within 50 km of the Project Area as per this IBAT data, it is still presumed that it has significance presence on Narcondam Island and therefore may occasionally be present in the Project Area.

Table 5.8 IUCN Red List for Birds found within 50 km of the Project Area

Taxonomic group	Species	Common name	IUCN Red List Category
Birds	*Hydrobates monorhis*	Swinhoe's Storm-petrel	NT

5.4.5 *Marine Mammals*

Two major groups of marine mammals occur in the waters of the Union of Myanmar; namely sirenians and cetaceans. These are discussed further below. Two marine mammals, the Irrawaddy dolphin (*Orcaella brevirostris*) and dugong (*Dugong dugon*), have been protected under the Myanmar Protection of Wildlife and Conservation of Natural Areas Law since 1994 under the category "completely protected".

5.4.5.4 *Whales and Dolphins*

The International Union for the Conservation of Nature (IUCN)-listed threatened cetacean species in Myanmar include the blue whale (*Balaenoptera musculus*) (Endangered), fin whale (*Balaenoptera physalus*) (Endangered) and sperm whale (*Physeter macrocephalus*) (Vulnerable). The blue whale and the fin whale are also listed as endangered species recognized as of prime importance to the region and deserving special attention under the ASEAN Agreement on the Conservation of Nature and Natural Resources (1). Other common species such as humpback whale (*Megaptera novaeangliae*) and bryde's whale (*Balaenoptera edeni*) are known to occur in offshore waters in Myanmar; however, these are not listed as vulnerable on the IUCN Red List.

Larger cetacean species have been recorded in offshore deeper waters which would be in line with their typical life histories. As Block MD-4 is located offshore, it is assumed that cetacean species may occasionally pass within or close by the block.

The Irrawaddy Dolphin is found in the Mekong, Ganga, Brahmaputra and Ayeyarwady rivers. There is currently insufficient data to accurately assess the

(1) ASEAN Agreement on the Conservation of Nature and Natural Resources. Kuala Lumpur, 9 July 1985

population status in Myanmar. IUCN estimates a population of 58-72 specimens in the Ayeyarwady River (1). Research in Myanmar conducted by the Wildlife Conservation Society and supported by WDCS has shown promising results, with Irrawaddy dolphin habitat identified and protected by the Department of Fisheries along a 46 mi (74 km) stretch of the Ayeyarwady River and surveys conducted in the Mergui (Myeik) Archipelago.

Historically, whales and dolphins have been hunted for food and used in the production of various products. Currently whales and dolphins are categorized as protected species in *Appendix I* and *II* of Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES) in response to concerns about the potential for international trade in live specimens to adversely affect wild populations, of which Myanmar is a member country.

5.4.5.5 Dugongs

The Dugong (*Dugong dugong*) is a large, herbivorous, exclusively marine mammal and is the only extant (living) member of the family Dugonidae. It is one of the only four extent species of the order Sirenia.

The Dugong is listed as vulnerable to extinction by the IUCN Red List of Threatened Species (2), on the Convention on the Conservation of Migratory Species of Wild Animal (Bonn Convention), and on *Appendix 1* of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

Dugongs are rare and are mostly found west of the Ayeyarwady Delta and further north of the main coastline. Occurrence of dugong at some islands of Myeik Archipelago such as Sular Island, La Ngan Island, Bo Lut Island and War Kyunn Island, as well as waters in the Rakhine Coast, has been reported by local communities. (3)

5.4.5.6 Summary of IUCN Red List Classification for Species found in Project Area

Table 5.9 shows a list of mammals that are found within 50 km of the Project Area that have an IUCN Red List Category of "Near Threatened (NT)" or higher. This list is based on data obtained from the Integrated Biodiversity Assessment Tool (IBAT), for species observed within 50 km of the Project Area, obtained on April 13th, 2017. These species are considered to be the most sensitive to any environmental impacts from the Project.

(1) IUCN, 2011
(2) IUCN, 2013
(3) Ilangakoon and Tun, 2007

Table 5.9 IUCN Red List for Mammals found within 50 km of the Project Area

Taxonomic group	Species	Common name	IUCN Red List Category
Mammals	*Balaenoptera musculus*	Blue Whale	EN
Mammals	*Physeter macrocephalus*	Sperm Whale	VU

5.4.6 Marine Turtles

Five (5) of the world's seven (7) marine turtle species are regularly seen nesting and foraging in the coast of Myanmar. These include the Hawksbill (*Eretmochelys imbricata*), Green (*Chelonia mydas*), Loggerhead (*Caretta caretta*), Olive Ridley (*Lepidochelys aolivacea*), and Leatherback (*Dermochelys coriacea*) as shown in ***Table 5.10***. However, Loggerhead and Leatherback turtles are assumed to be almost extinct in Myanmar waters (1). All except for the Green Turtle have been observed near the Project Area, as will be discussed shortly.

All marine turtle species share similar life cycle characteristics, which include migration from foraging areas to mating (inter-nesting) and nesting areas (2). In general, mature adult turtles (approximately 30 to 50 years old) undertake the migration from their coastal shallow benthic foraging areas to shallow water inter-nesting areas waters near nesting beaches every two to eight years. On arrival, turtles mate and females may nest multiple times at about two week intervals before returning to foraging areas. Eggs hatch after 8 to 10 weeks of incubation with hatchings dispersing into the open ocean surface waters where they forage for the next 5 to 20 years.

Currently in Myanmar, Department of Fisheries (DOF) has counted at least 35 nesting sites in areas along the coastal regions of Myanmar (3). Among them, six are closely conserved through monitoring and surveillance of turtles landing sites, clutches and magnitude of hatchling enable to return to the sea. As the closest turtle nesting site is over 170km from Block MD-4 (as shown in ***Figure 5.18***), these sites are not expected to be affected by the Project.

Four (4) of Myanmar's turtle species are classified as endangered or critically endangered according to the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species, and one (1) is classified as vulnerable. Threats from humans include capture as food source, harvesting for production of ornamental items, egg collection, by-catch in fishing operations, destruction of nesting sites, and pollution. The population of marine turtles in this region has declined sharply and the number of females returning to nesting sites has fallen. Moreover, weak law enforcement, land utilization, climate change and pollution have caused a decline in the number of marine turtles. The exact population of marine turtles nesting along Myanmar's coast is unknown.

(1) http://www.ioseaturtles.org/pom_detail.php?id=61

(2) Miller JD 1997. Reproduction in sea turtles, In: Lutz, P, and Musick, JA (eds), The Biology of Sea Turtles, pp. 51-82, Boca Raton, CRC Press Inc

(3) Pyi Taw, 2009

The Department of Fisheries (DOF) of Myanmar is responsible for marine turtle conservation and management. At present, Myanmar is cooperating and collaborating with many institutions, namely ASEAN-SEAFDEC as well as the IOSEA Marine Turtle Memorandum of Understanding. As marine turtles are recognized as one of the most endangered species in the world, DOF is planning to set up a new unit exclusively for Marine Turtle Conservation and Management.

New regulations issued in 2005 by the Ministry of Fisheries prohibit the eating of turtle meat and eggs. The regulations also require that turtles caught as by catch in fishing nets be released, and trawlers must be equipped with devices to minimize the risk of turtle capture [(1)].

Turtle distribution in Myanmar is shown in ***Figure 5.18***.

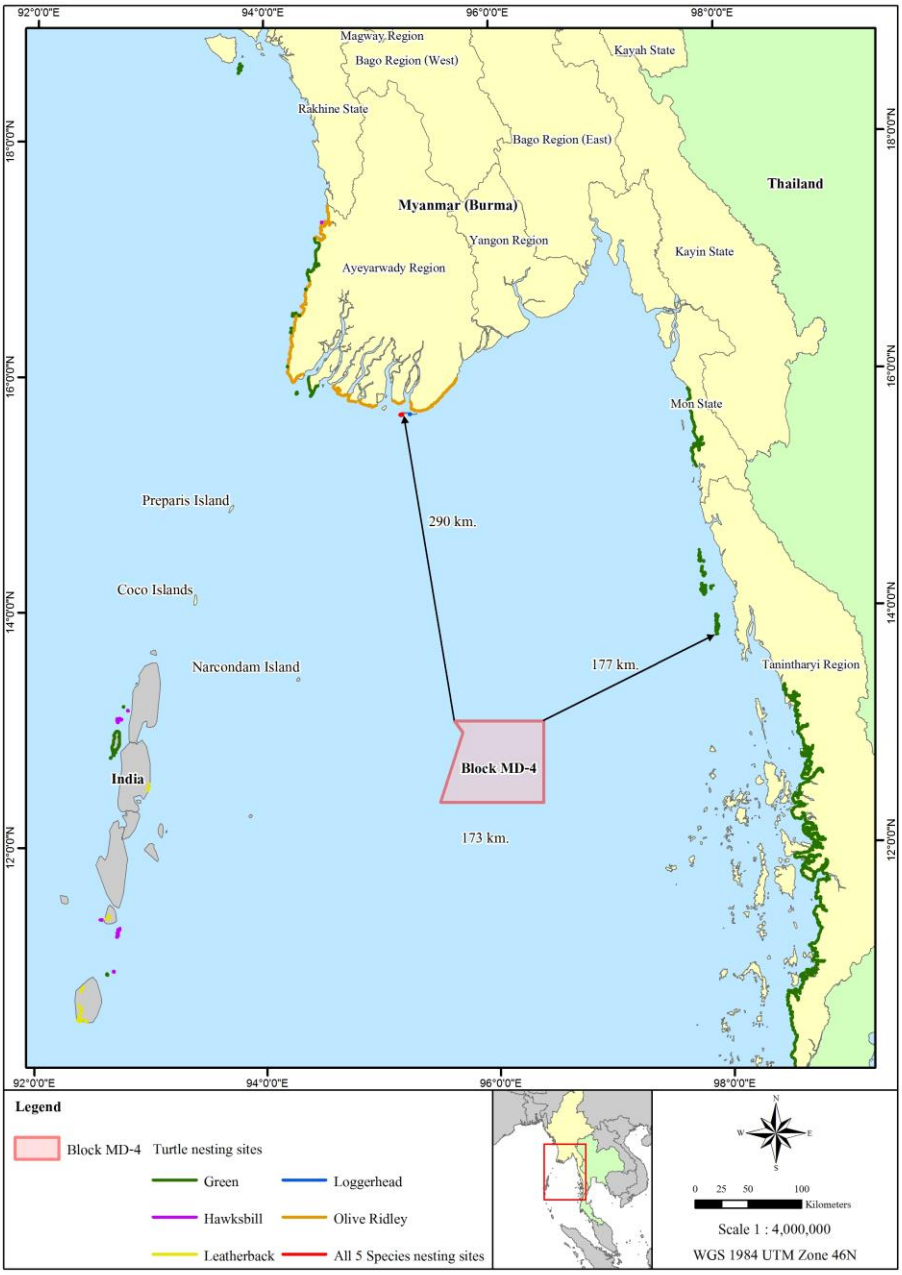
Table 5.10 Distribution of Marine Turtles in Andaman Sea

Locations	Species				
	Leatherback (*Dermochelys coriacea*)	**Hawksbill (*Eretmochelys imbricata*)**	**Loggerhead (*Caretta Caretta*)**	**Green (*Chelonia mydas*)**	**Olive Ridely (*Lepidochelys olivacea*)**
Myanmar	Ayeyarwady Region, Taninthayi Region and Yangon Region	Ayeyarwady Region, Rakhine State, Taninthayi Region and Yangon Region (Coco Island)	Rakhine State	Ayeyarwady Region, Rakhine State, Mon State, Taninthayi Region and Yangon Region (Coco Island)	Ayeyarwady Region, Rakhine State, Mon State, Taninthayi Region and Yangon Region (Coco Island)
IUCN Status[(1)]	Vulnerable	Critically Endangered	Endangered	Endangered	Vulnerable

Source: [(1)] IUCN (2014) The IUCN Red List of Threatened Species Version 3.1 (latest version) http://bim.aseanbiodiversity.org/mmchm/index.php?option=com_content&view=article&id=21&Itemid=27

(1) Hamann et al, 2006

Figure 5.18 Turtle Distribution in Myanmar according to UNEP-WCMC Database



Source: Zockler (2013) (1), modified by ERM (2017)

(1) Zockler C., Delany S., & Barber J. 2013. Sustainable Coastal Zone Management in Myanmar. Retrieved from http://www.lighthouse-foundation.org/fileadmin/LHF/PDF/Myanmar_-_Scoping_Paper_Myanmar_Coastal_Zone_Management_211113_96dpi.pdf,

5.4.6.7 *Summary of IUCN Red List Classification for Species found in Project Area*

Table 5.11 shows a list of turtles that are found within 50 km of the Project Area that have an IUCN Red List Category of "Near Threatened (NT)" or higher. This list is based on data obtained from the Integrated Biodiversity Assessment Tool (IBAT), for species observed within 50 km of the Project Area, obtained on April 13th, 2017. These species are considered to be the most sensitive to any environmental impacts from the Project.

Table 5.11 IUCN Red List for Turtles found within 50 km of the Project Area

Taxonomic group	Species	Common name	IUCN Red List Category
Reptiles	*Caretta caretta*	Loggerhead Turtle	VU
Reptiles	*Dermochelys coriacea*	Leatherback	VU
Reptiles	*Eretmochelys imbricata*	Hawksbill Turtle	CR
Reptiles	*Lepidochelys olivacea*	Olive Ridley	VU

5.4.7 *Sensitive Ecosystems*

Myanmar's three coastal regions (the Rakhine coastal region, the Ayeyarwady region and the Tanintharyi coastal region) contain large numbers of estuaries and islands, some of which contain sensitive ecosystems. These are discussed further in this section.

5.4.7.1 *Coral Reefs*

Myanmar's coastal areas contain both hard and soft corals. Burke et al (2002) indicates that at least 65 coral species in 31 genera have been catalogued in Myanmar's reefs, although some studies have estimated over 500 hard coral species within Myanmar (1),(2). According to UNEP (2004), coral reefs in Myanmar represent 0.66% of the world's reefs, covering an area of 1,870 km^2. 56% of Myanmar's reefs are threatened. (3) The main threats to Myanmar's corals are storms, coral bleaching, diving, fishing gear, blast fishing, dredging, and land-based pollutants.

There are coral reef formations on the Coco, Preparis, and Narcondam islands (Pe, 2004) (4), which are located 263, 280, and 147 km from Block MD-4, respectively. The coral reefs on these islands have only been minimally surveyed (5). The nearest coral reef to the Project is at Narcondam Island, approximately 147 km to the southwest of Block MD-4 as shown in ***Figure***

(1) Zau Lunn, Undated. Status and challenges of coral reef monitoring in Myanmar, Flora International (FFI)

(2) U. Soe-Htun and Tint Swe (2014). Training on Socioeconomic Monitoring (SocMon) Methodology for Evaluation of Socioeconomics and Marine Resources Utilization at Selected Coastal Communities in Myanmar

(3) Burke et al, 2002

(4) Pe. 2004. National Report of Myanmar, On the Sustainable Management of the Bay of Bengal Large Marine Ecosystem (BOBLME) GCP/RAS/179/WBG. Prepared by Myint Pe (National Consultant).

(5) WRI,2002

5.19. A study on Narcondam Island by Raman et al (2013) (1) found that coral growth was common on rock substrate, and prolific and dense in the northeast and southern locations. The reefs included a mixture of common hard and soft corals and sponges. Hard coral distribution was more abundant at depths of 5–25 m, while soft coral (especially fan and whip coral) was more abundant along deeper ridges (20–50 m) that were prone to stronger currents. Barrel sponges *Xestospongia sp.* appeared prolific in the reefs and many large, healthy individuals were observed between 12 and 50 m depth (2).

UNEP satellite analyses show that coral reefs (usually fringing or patch reefs in Myanmar) occur along the coast of Mon State and Tanintharyi Region. The Myeik Archipelago in Tanintharyi Region, located 155 km to the southeast of Block MD-4, is diverse in coral with 518 species recorded by the Marine Science Department of the University of Mawlamyine (3).

5.4.7.2 Mangrove Resources

Mangrove forests are important as habitats for many wildlife and fisheries, as they provide nursery areas for fish and crustacean species, and are a natural form of protection against winds, storms or floods. Mangroves along Myanmar coasts are of value to the local population, particularly as fire wood and charcoal for kitchen, timber for construction and fisheries.

There are at least 29 documented species of mangroves in Myanmar, hosting 69 species of fish, 13 species of shrimp, 4 species of crab and 9 species of other shellfish. *Rhizophora, Sonneratia, Avicennia, Bruguiera* and *Xylocarpus spp* are dominant species in Myanmar. Predominant species in the Rakhine and Tanintharyi coastal mangroves are *Rhizophora mucronata* and *Rhizophora apiculata*. Predominant species in the Ayeyarwady delta mangroves are *Heritiera fomes* (4). There are 2 species of mangrove regarded as Critically Endangered species (*Crinum asiaricum* and *Sonneratia griffithii*), 6 regarded as Endangered (*Acanthus volubilis*, *Avicennia alba*, *Lumnitzera littorea*, *Xylocarpus granatum*, *Bruguiera cylindrical*, and *Heritiera fomes*), 1 regarded as Vulnerable (*Diospyros embryopteris*), and 7 regarded as Near Threatened (*Phoneix plaudosa*, *Scaevola taccada*, *Aegialitis rotundifolia*, *Pandanas tectorius*, *Aegialitis rotundifolia*, *Ceriops decandra*, and *Brownlowia tersa*) (5).

Mangrove occurrence in the three (3) Myanmar coastal zones are shown in ***Table 5.12***. As Block MD-4 is located far offshore from coastal mainland and islands, there are no mangroves in the Project area. The closest mangrove plantation is located approximately 246 km from Block MD-4; mangroves will therefore not be affected by the Project.

(1) Raman, T. R. Shankar; Mudappa, Divya; Khan, Tasneem; Mistry, Umeed; Saxena, Ajai; Varma, Kalyan; Ekka, Naveen; Lenin, Janaki; Whitaker, Romulus (2013). "An expedition to Narcondam: observations of marine and terrestrial fauna including the island-endemic hornbill" (PDF). Current Science. 105 (3): 346–350.

(2) CURRENT SCIENCE, VOL. 105, NO. 346 3, 10 AUGUST 2013

(3) Zau Lunn. Status and challenges of coral reef monitoring in Myanmar. Flora and Fauna International

(4) Mangrove Service Network, 2006

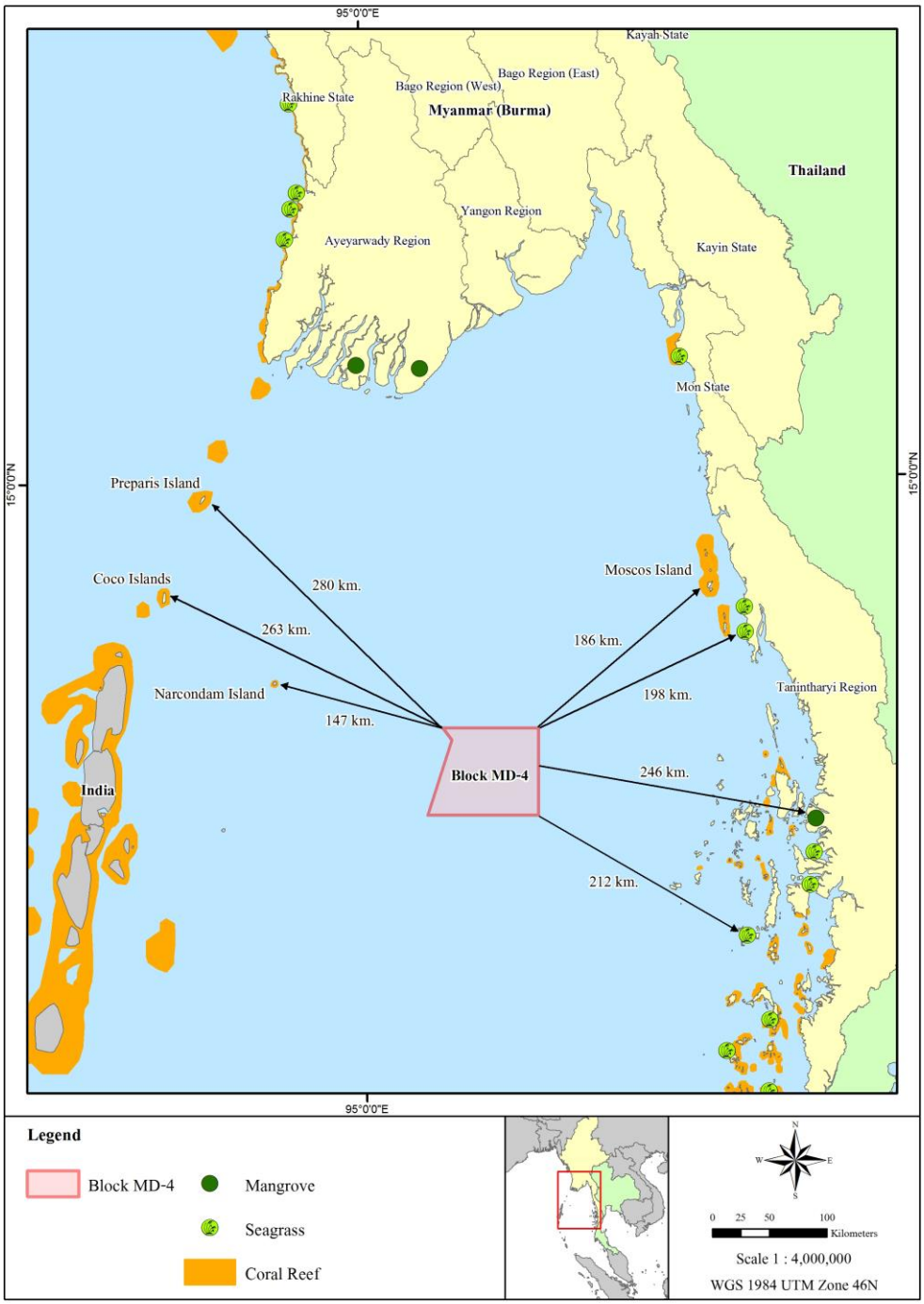
(5) Retrieved form IUCN (2014) version 3.1

Table 5.12 Mangrove Forest Areas in Myanmar

State/ Region	Area		Remark
	(km^2)	(ha)	
Rakkhine State	647.77	64,777	Coastal
Ayeyarwady Region	1,773.3	177,328	Coastal and delta
Tanintahryi Region	1,400.8	140,081	Coastal
Total	**3,821.86**	**382,186**	

Source: Mangrove Service Network (MSN) (2006). Retrieved from http://mangroveactionproject.org/files/map-asia/MSNrestorationprogressreport.pdf

Figure 5.19 Map of Sensitive Areas near Block MD-4



Source: FAO (1), Soe-Htun et al (2001), Myanmar Information Management Unit (2012), World Resources Institute (2002), modified by ERM (2017)

(1) http://www.fao.org/docrep/004/ad497e/ad497e05.htm, Accessed June 2014

5.4.7.3 *Seagrass*

Seagrasses are unique as they are the only truly marine flowering plants. Seagrass beds form complex physical structures and are a highly productive ecosystem. They provide habitat for fish and marine invertebrates, and perform important physical functions of filtering coastal waters, dissipating wave energy and anchoring sediments. Seagrasses often occur in proximity to, and are ecologically linked with, coral reefs, mangroves and other marine habitats. Seagrasses are the primary feeding ground for dugongs and green turtles.

Seagrass usually grow in relatively shallow waters, and form a key feeding, breeding, and nursery ground for many species of fish, turtles, lobsters, and dugong (1). The Myanmar fishermen call the seagrasses "Leik Sar Phat Myet", meaning grass for the turtles (2). This in itself explains the importance of these seagrasses as food for the marine turtles. Seagrass also improve water quality, and their root-like stems stabilize the sea bottom. (3)

Based on data from U. Soe-Htun and Tint Swe (2013) (4), Myanmar has 10 species of seagrass belonging to 5 genera from 2 families. These are *Cymodocea rotundata*, *C. serrulata, Halodule pinifolia, H.uninervis, Syringodium isotoefolium, Enhalus acoroides, Halophila beccarii, H.decipiens, H. ovalis,* and *Thalassia hemprichii*. Of these, *Cymodocea rotundata, C.serrulata* and *Enhalus acoroides* are dominant in the seagrass beds. Most of these seagrass species are found in Rakhine and Tanintharyi coastal areas. Seagrass are normally absent from the Ayeyarwady Delta and the Gulf of Martaban coastal regions due to turbid water by enormous sediment discharge of the two big rivers, Ayeyarwady and Than Lwin, except for the euryhaline species, *Halophila beccarii*.

There is no seagrass in close proximity of Block MD-4, due to its location far offshore from coastal mainland or islands. The nearest seagrass is approximately 198 km in the northeast of Block MD-4, and therefore seagrass will not be affected by the Block MD-4 Project.

(1) World Bank, 2006

(2) http://www.myanmar-image.com/enchantingmyanmar/enchantingmyanmar3-2/wherethesea.htm

(3) World Bank, 2006

(4) U. Soe-Htun and Tint Swe. 2013. Training on Socioeconomic Monitoring (SocMon) Methodology for Evaluation of Socioeconomics and Marine Resources Utilization at Selected Coastal Communities in Myanmar; Session 2: The Current Status of Myanmar Marine Environments with Particular Reference to Fisheries in Mon Coastal Waters. Retrieved from http://www.boblme.org/documentRepository/Session%202%20Overview%20of%20Current%20Status%20of%20Myanmar%20Marine%20Environments_U_Soe_Htun_(10.1.14).pdf,

5.4.8 Protected Areas

A total of 43 protected areas have been established or proposed in Myanmar, and are shown in ***Figure 5.20.***

There are 4 marine protected areas (MPA): Lampi Island, Mainmahla Kyun, Moscos islands, and Thamihla Kyun. Of these, one (1) is designated as marine national park and three (3) are wildlife sanctuaries. Ross Island is a "Shark Protected Area", where shark fishing is prohibited.

All of these protected areas are located far from the project, over 132 km from Block MD-4, and are not expected to experience any impact or influence from the project operations. The proximity of these protected areas to Block MD-4 are presented in ***Figure 5.21.***

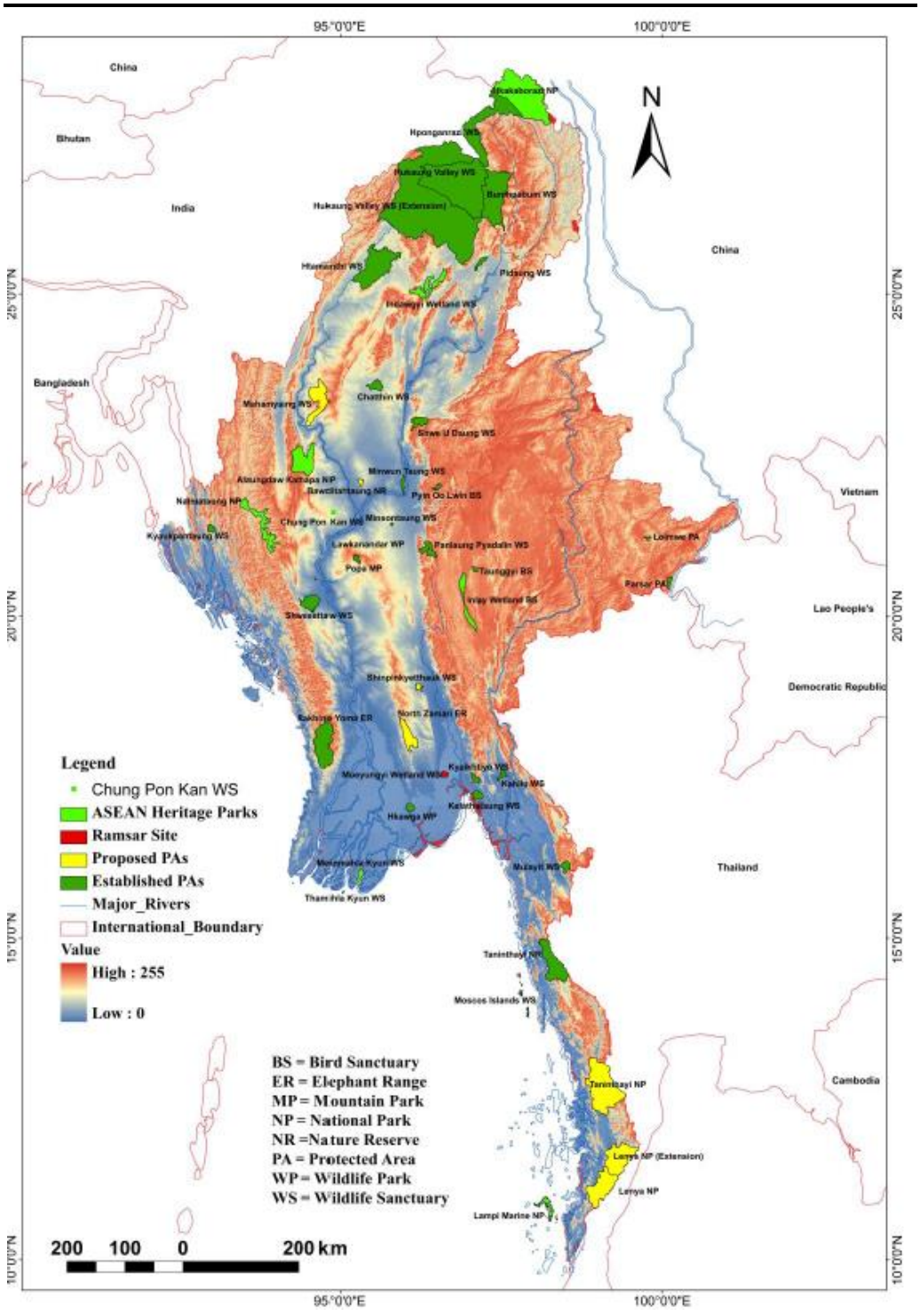
The nearest protected areas to the Project are shown in ***Table 5.13***.

Table 5.13 Protected Areas near the Project

No	Name	National Designation	Year Established	Location and Coordinates	Area (km²)	Distance to Project (Km)	Key Species Protected
1	Lampi Islands N.P	National Park	1996	Taninthayi Region, Boke Pyin Township, 10°50'N, 98°12'E	205	Coral Reefs, Mouse Deer and Salon Ethnic Groups	Lampi Islands N.P
2	Mainmahla Kyun W.S	Wildlife Sanctuary	1993	Ayeyarwaddy Region, Bogale Township, 15°58'N, 95°17'E	137	Mangrove, Salt-water Crocodiles, Birds Spp.	Mainmahla Kyun W.S
3	Moscos Island W.S	Wildlife Sanctuary	1927	Taninthayi Region, Yebyu and Launglon Townships, 14°04'N, 97°50'E	49	Barking Deer, Sambar Deer, Swiftlets	Moscos Island W.S
4	Thamihla Kyun W.S	Wildlife Sanctuary	1970	Ayeyarwaddy Region, Ngaputaw Township, 15°51'N, 94°16'E	0.88	Olive Ridley, Green Turtle, Logger Head Turtle, Leatherback, Hawksbill Turtle	Thamihla Kyun W.S

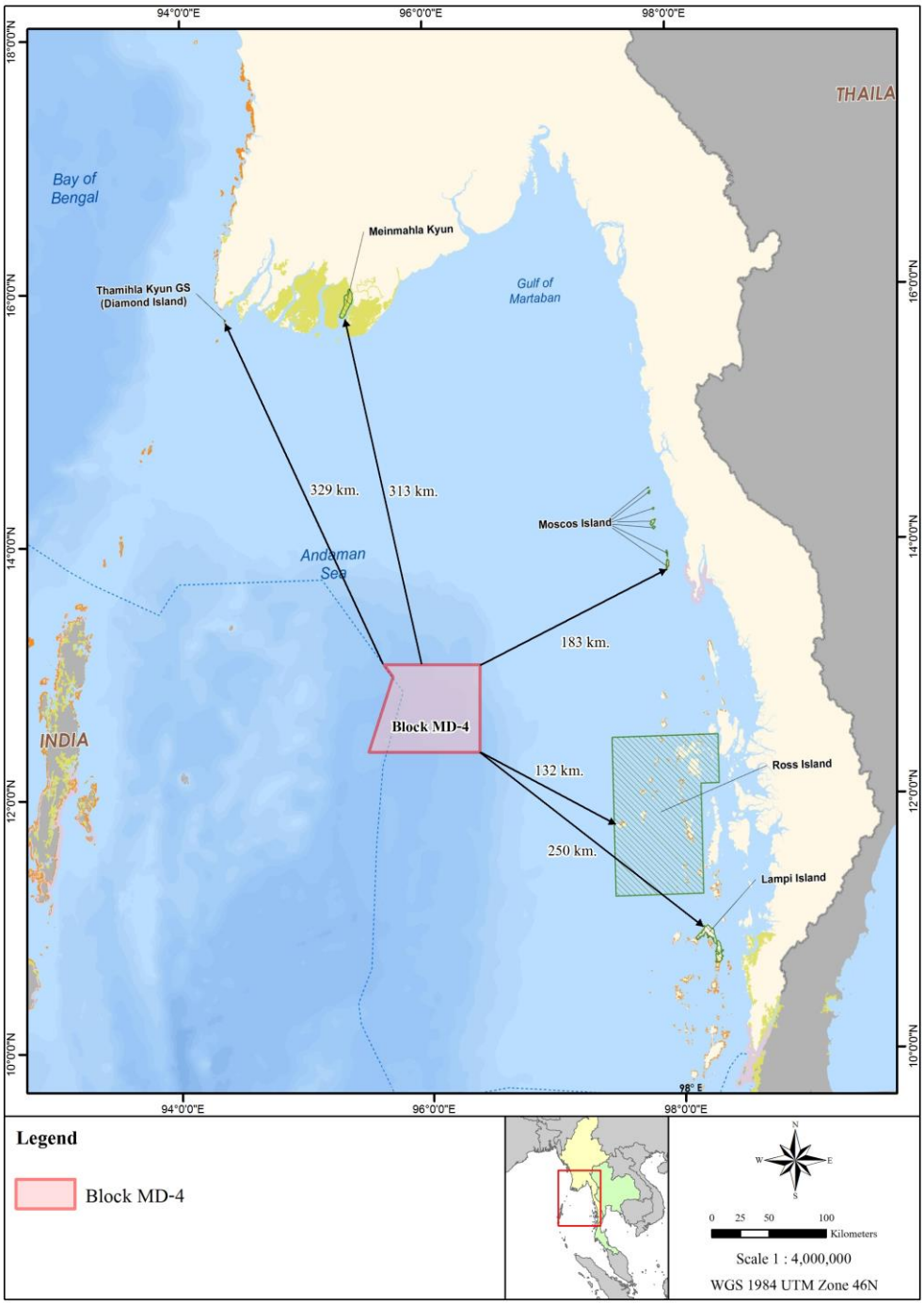
Source: Myanmar Protected Areas: Context, Current Status and Challenges, 2011

Figure 5.20 Protected Areas and ASEAN Heritage Parks in Myanmar



Source: Fifth National Report to the United Nations Convention on Biological Diversity, Ministry of Environmental Convention and Forestry, March 2014

Figure 5.21 Marine Protected Areas near the Project



Source: http://boblme.reefbase.org

5.5 SOCIO-ECONOMIC COMPONENTS

This section describes the human use values of the Study Area. The discussion is limited to the components of the human use to be present in the Study Area and potentially affected by the Project activities, as follows:

- Introduction and Areas of Interest
- Administrative Structure and Demographics
- Overview of Socio-Economy
- Marine Fisheries;
- Shipping andNavigation;
- Regional Oil and Gas Exploration;
- Public Health; and
- Tourist Attraction and Recreational Areas

5.5.1 *Introduction and Study Area*

Given the offshore nature of this Project and the absence of any associated onshore activities, an appropriate baseline understanding of local fishing activities in and around Block MD-4 is vital to the assessment of social impacts, if any, on local communities.

Initial consultation with regional authorities during the scoping process of the IEE Study indicated that fishers potentially active within Block MD-4 were most likely to come from Tanintharyi Region. Therefore this region forms the social Study Area.

5.5.2 *Administrative Structure and Demographics*

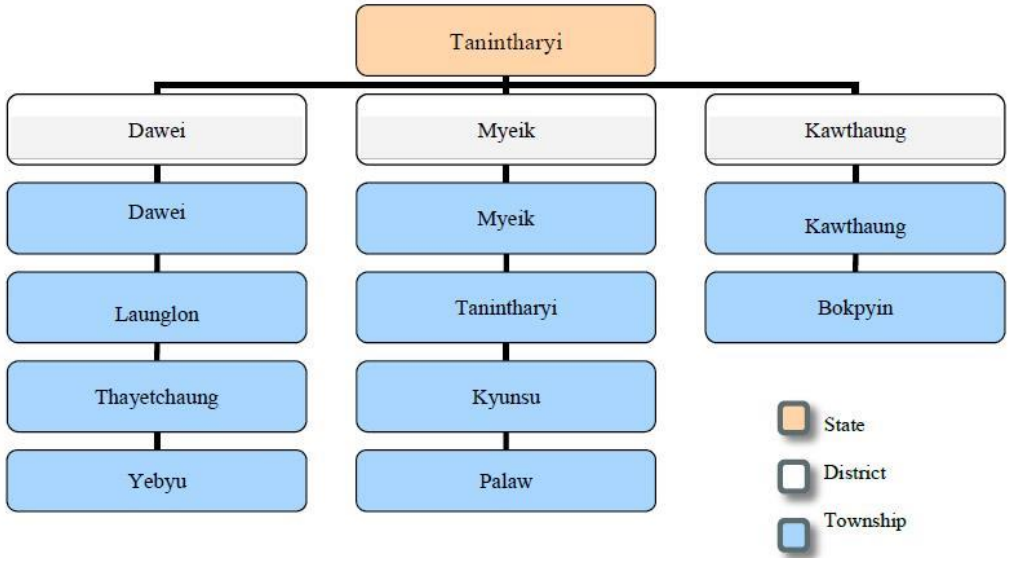
5.5.2.1 *Administrative Structure*

Located in south-eastern Myanmar, Tanintharyi Region is bounded by Mon State to the north, Thailand to the east and south, and the Andaman Sea to the west. Previously known as Tenasserim Division before being reclassified as a Region, Tanintharyi is a long and narrow strip of land which covers over 43,328 km^2 of territory, with its capital as Dawei.

The capital of Tanintharyi Region is Dawei, previously known as Tavoy, while the town of Myeik is an almost equally significant economic, political and social hub. The region is divided into three districts, 10 townships, 83 wards, 264 village tracts and 1,250 villages [(1)]. The administrative structure of Tanintharyi Region is provided in ***Figure 5.22***.

(1) http://www.unicef.org/myanmar/Tanintharyi_Region_Profile_Final.pdf

Figure 5.22 Administrative Divisions of Tanintharyi Region



Source: UNHCR Tanintharyi Region Profile (2014) (1)

5.5.2.2 Demographics

Estimation and classification of Myanmar's population is difficult due to the absence of reliable data and the complex ethnic identity. Current population estimates vary widely, from 48 million to over 60 million people, comprising as many as 135 different ethnic groups. While the country's population density is among the lowest in South East Asia, this masks a wide variation with two-thirds of the population living in rural areas and the larger urban populations concentrated in Yangon and Mandalay.[2]

Censuses were taken regularly in Myanmar during the British administration of the country from 1872 until 1941. After independence, with support from United Nations Population Fund (UNFPA), Population and Housing Censuses were conducted in 1973 and 1983. The next census was the *2014 Population and Housing Census*, which was undertaken by the Ministry of Immigration and Population with technical support from UNFPA. [3]

According to the *2014 Population and Housing Census*, the total population of Myanmar is 51.48 million (of which 51.8 percent is female and 48.2 percent male) with 76.1 persons per km^2. The reported life expectancy of the total population of Myanmar is 64.7 (60.2 years for males and 69.3 years for females) and the literacy rate for the total population is 89.5 percent.[4]

Tanintharyi Region

(1) data.unhcr.org/thailand/download.php?id=221

[2] http://www.themimu.info/country-overview

[3] http://myanmar.unfpa.org

[4] http://www.themimu.info/census-data

A broad demographic overview of Tanintharyi Region is summarized in ***Table 5.14***.

Table 5.14 Broad Demographic Overview of Tanintharyi Region

Attribute	Tanintharyi Region
Total Population	1,408,401
Area	43,328 km²
Population Density (persons per km²)	32.5
Population between 0-14 years	478,027
Sex Ratio	1,010 females per 1,000 males
Rural Population %	76%
Urban Population %	24%

Source: Census data by MIMU, 2015

The total population for Tanintharyi Region as per the MIMU 2014 report is 1,408,401. Out of the total population, 700,619 were males and 707,782 were females. The total population of Tanintharyi Region represents 2.7% of the total population of Myanmar and ranks 12th in terms of total population in other states and regions in the country. The population density of Tanintharyi Region in March 2014 was 32.5 persons per km², which is lower than the Union level population density of 76 persons km² and means it is among the sparsely populated States/Regions in the country (1). The region has 24% urban population and 76% rural population.

Tanintharyi Region is sparsely populated due to its mountainous terrain with the majority of the population living either near the coast or along the rivers and tributaries.

Tanintharyi is not the home to a dominant minority ethnic group, which is the basis for its classification as a Region, unlike Mon, Kayin and Kayah States (2). The majority of residents in Tanintharyi are believed to be members of the Bamar ethnic group, although some self-identify as members of sub-groups such as the Dawei/Tavoyan people. Likewise, while almost all in Tanintharyi speak Myanmar language, there are various local dialects, including some which differ quite dramatically from the people elsewhere in the country. Buddhism is the dominant religion in Tanintharyi, although Islam and Christianity are also observed, the latter primarily in Karen communities.

Dawei district is moderately populated compared to the other three districts and has a Male to Female ratio of 94, which is less positive as compared to Myeik and Kawthoung districts. Kaleinaung is the sub-township of Yebyu township.

(1) http://www.dop.gov.mm/moip/

(2) Following the introduction of a new Constitution in 2008, territories and divisions in Myanmar were separated into seven Regions and seven States. The purpose was to separate Regions, populated primarily by ethnic Bamars, from States, inhabited by a dominant ethnic minority, such as the Karen, Mon, or Karenni.

5.5.3 Overview of Socio-Economy

Myanmar is an agricultural country, and the agriculture sector is the back bone of its economy. The Agriculture sector contributes 32% (2009-2010) of the GDP; 17.5% of the total export earnings, and employs 61.2% of the labor force (1). The fishery and livestock sectors are considered as the most important after the agriculture sector to fulfill the requirement of the Myanmar population and to provide the availability of food, as well as providing employment to a large number of fishery and livestock communities and rural dwellers. Livestock and fisheries sectors contributed 7.6% to national G.D.P in 2009-2010 fiscal year in Myanmar (2).

There is no resident population in the project area, which is 220 km from the nearest mainland coast (Block MD-4 to Launglon township, , Tanintharyi state), and 147 km from the nearest island, which is uninhabited (Narcondam Island). The quality of life issues addressed can pertain only to populations in nearby coastal communities and the general population of Myanmar. People along the coast generally live in small villages.

The fishery sector is the most important sector in the Ayeyarwady Delta after the agriculture sector. The fishery sector maintains a high per capita consumption of about 43 kg/year according to the statistics of year 2008-2009.

General socio-economic data from the World Bank for all of Myanmar is shown in ***Table 5.15.***

Tanintharyi Region

The communities within Tanintharyi Region closest to the project area include Dawei, Launglon, Thayetchaung, and Yebyu. Thanintharyi Region has an average household expenditure of 0.6 US$/day/ household, which is relatively high for Myanmar, but still considerably below the international poverty line. The population in the Region relies heavily on fishing (80 percent reported to be involved in some way). Aquaculture has potential to be a significant source of income and employment for people living in this division (3).

As with elsewhere in southeast Myanmar, subsistence agriculture, both permanent and shifting, is the primary livelihood in the predominantly rural Tanintharyi Region although the mountainous terrain limits cultivation in northern townships.

A prominent and controversial driver of the Tanintharyi economy are the vast rubber and palm oil plantations, most of which are in the lowland south and are often connected to their own processing plants. The relative absence of conflict in Tanintharyi Region, combined with its vast but sparsely populated

(1) FAO 2011, http://coin.fao.org/cms/world/myanmar/CountryInformation.html

(2) FAO, http://coin.fao.org/cms/world/myanmar/CountryInformation.html

(3) FAO, 2003

territory, allowed these plantations to emerge earlier than in neighboring states.

Mining has also emerged as a significant industry, since Tanintharyi is a resource-rich region and supplies up to two-thirds of Myanmar's tin and tungsten. In fact, there is a significant number of mines and plantations throughout the region, many of which are owned by foreign corporations. It is believed that Tanintharyi's stability opened it to foreign investment.

Table 5.15 World Bank Socio-Economic Data for Myanmar

	2010	2011	2012	2013	2014	2015
People						
Life expectancy at birth, total (years)	64.92	65.18	65.43	65.65	65.86	..
Fertility rate, total (births per woman)	2.39	2.33	2.28	2.24	2.20	..
Adolescent fertility rate (births per 1,000 women ages 15-19)	18.58	18.11	17.64	17.18	16.71	16.25
Mortality rate, under-5 (per 1,000 live births)	59.3	57.2	55.3	53.5	51.7	50.0
Immunization, measles (% of children ages 12-23 months)	88	88	84	86	86	86
Primary completion rate, total (% of relevant age group)	84.35	..	..	..	85.07	..
Prevalence of HIV, total (% of population ages 15-49)	0.8	0.8	0.8	0.8	0.8	0.8
Environment						
Forest area (% of land area)	48.64	47.80	46.97	46.14	45.30	44.47
Agricultural land (% of land area)	19.17	19.22	19.21	19.27	19.36	..
Annual freshwater withdrawals, total (% of internal resources)	..	..	..	..	3.31	..
Improved water source (% of population with access)	78.1	79.2	80.3	80.4	80.5	80.6
Improved sanitation facilities (% of population with access)	76.6	78	79.4	79.5	79.5	79.6
Energy use (kg of oil equivalent per capita)	269.95	273.82	297.09	312.76	..	..
CO_2 emissions (metric tons per capita)	0.24	0.27	0.25	0.24	..	..
Electric power consumption (kWh per capita)	121.59	151.02	152.65	164.47	..	..
Economy						
GDP growth (annual %)	9.63	5.59	7.33	8.43	7.99	7.29
Inflation, GDP deflator (annual %)	100.00	110.25	113.71	118.68	123.64	128.51
Agriculture, value added (% of GDP)	36.85	32.50	30.59	29.53	27.83	26.75
Industry, value added (% of GDP)	26.47	31.29	32.37	32.36	34.49	34.54
Services, etc., value added (% of GDP)	36.68	36.21	37.04	38.10	37.68	38.71
Exports of goods and services (% of GDP)	0.11	0.10	11.50	19.64	20.09	20.78
Imports of goods and services (% of GDP)	0.07	0.10	10.89	18.95	22.17	26.54
States and Markets						
Military expenditure (% of GDP)			3.71	3.81	3.58	3.50
Mobile cellular subscriptions (per 100 people)	1.14	2.38	7.06	12.83	54.04	76.67
Internet users (per 100 people)	0.25	0.98	1.44	1.8	11.52	21.8

	2010	2011	2012	2013	2014	2015
Global Links						
Net barter terms of trade index (2000 = 100)	109.83	106.87	113.20	112.27	112.55	111.92
External debt stocks, total (DOD, current US$) (millions)	8,216,712,000	8,191,699,000	7,840,286,000	7,251,180,000	6,266,049,000	6,401,183,000
Total debt service (% of exports of goods, services and income)	0.05	0.02	9.68	0.54	0.46	0.54

Source: World Bank (2016)
http://ddp-ext.worldbank.org,
http://data.worldbank.org/country/myanmar

5.5.4 Marine Fisheries

5.5.4.1 Fishing Grounds and Administration

Myanmar is endowed with considerable fisheries potential in its marine waters. The fishery sector is the fourth largest contributor to Myanmar's GDP, 9.1% in 2005-2006 and 7.6% in 2006-2007. Fish consumed per capita was 44 kg/capita in 2005-2006 and 44 kg in 2006-2007.

Myanmar's continental shelf is between 0 and 200 m deep, covers an area of approximately 230,000 square kilometers, and is relatively wider in the central and southern parts. The exclusive economic zone (EEZ) extends 200 nautical miles offshore, and the total marine fisheries including the exclusive economic zone is about 486,000 km^2.

The DoF has established a legal framework with strategies and policies for sustainable development and management of marine fisheries. These include licensing, prescription of exploitable species, designation of environmental friendly fishing gears and methods and the imposition of closed areas and seasons.

A mechanism for the management of the fisheries resources is the Monitoring, Control and Surveillance (MCS) programmer for fishery management. This programmer aims at providing effective and efficient scientific data for fish stock evaluation and management of fisheries in Myanmar. It also aims at providing the basis of effective monitoring and control of fisheries enforcement activities in order to ensure that only authorised or licence holding fishing vessels operate within the designated areas in the EEZ. Some of the key management measures implemented for the control of fishing activities are discussed below (1):

- *Surveillance of fishing activities*: government departments such as the Myanmar Navy, Myanmar Coastal Guard, DoF, Myanmar Customs Department and Myanmar Police Force are involved in the monitoring and surveillance of fishing activities. Of these, the Myanmar Navy is responsible for the coordination of surveillance efforts.

(1) Myanmar Aquaculture and Inland Fisheries, FAO, 2003 and 2006

- *Closed fishing areas*: as part of the management of fishing activities, commercial fishing vessels such as trawlers and purse seiners are prohibited from fishing less than 10 nautical miles from the shore which are nearshore waters that can be used as nursery grounds for juveniles of fish and shrimp. In addition to this, restricted fishing areas have been identified, protected and managed to ensure survival of the juveniles of commercially important fish species. These areas, comprising two (2) fishing grounds in Rakhine State, four (4) in Ayeyarwady Region, two (2) in Mon Sate and Tanintharyi Region each, are declared as closed fishing areas for three (3) months from June to August) annually. However, enforcement of these closed areas can be a challenge.

- *Licensing and Management Zones:* through the system of annual licensing, two (2) fishing zones have been identified by DoF on the basis of specific fishing gear, classes of fishing vessels and ownership. These fishing zones are designed to allow equitable allocation of resources and reducing conflicts between traditional and commercial fishers. Fishing Zone I is designated for coastal fisheries and extends from the shoreline to 10 nautical miles (11.5 miles). Fishing Zone II extends from the outer limit of Fishing Zone I to the EEZ limit.

- *Controls on size and power of fishing vessels:* any change in tonnage or engine power of fishing vessels or construction of fishing vessels requires permission from the Director General of DoF and approval from the respective authority.

- *Registration of Fishers:* any new individual entering the industry is required to be registered and anybody working and living on a fishing vessel must have a fishers' registration card.

- *Three months prohibition on fishing:* Fishing is banned in coastal areas for three months during the rainy season under Government directives. Fishing in these areas is banned for the conservation of species, and coincides with the spawning season of fish. However, this ban is not enforced and subsistence fishing continues.

The Department of Fisheries (DOF) has instituted two fishing zones - inshore and offshore, which offer protection to fisheries resources as follows:

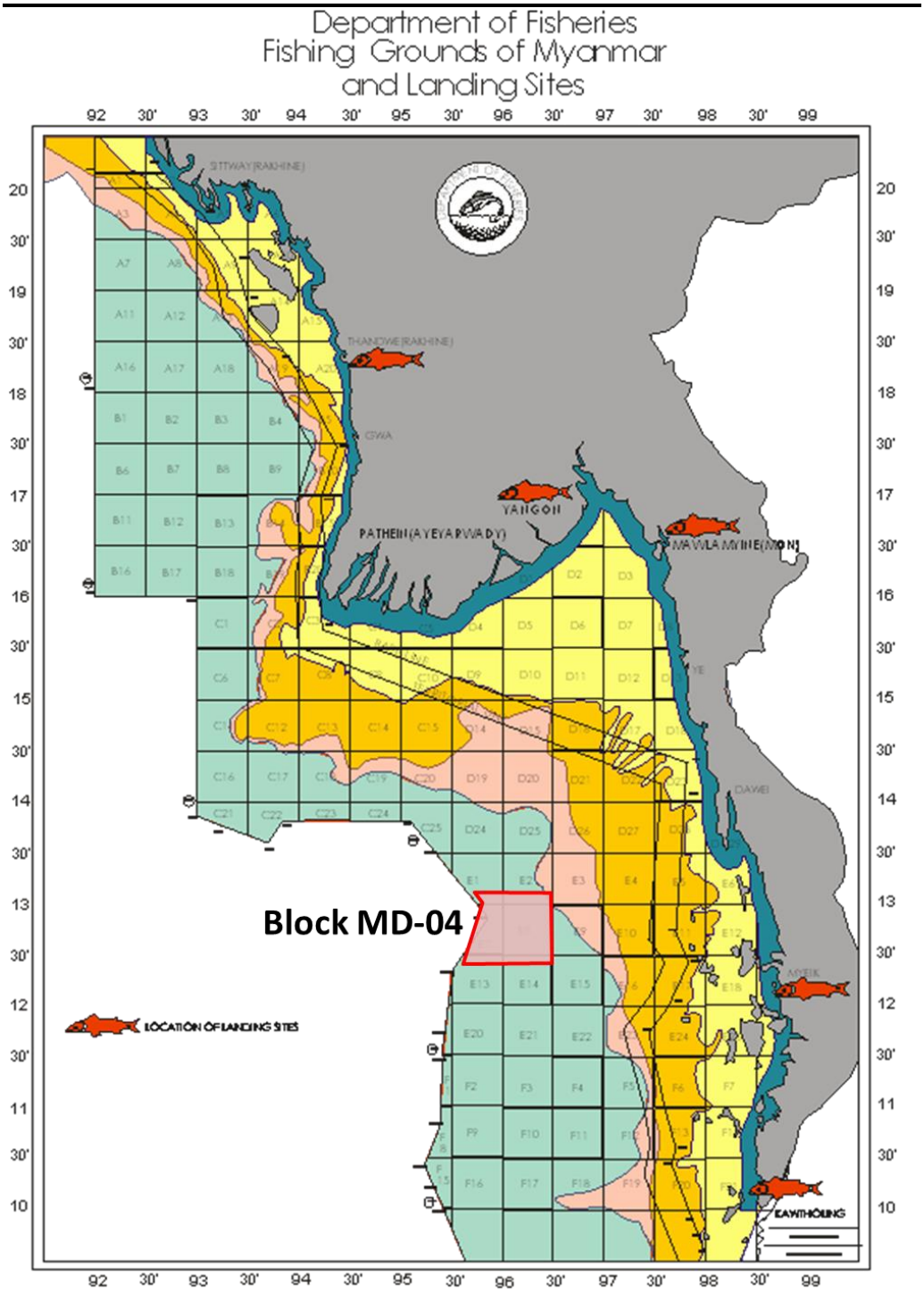
- **Inshore fisheries** – this includes fishing grounds from lowest tide level, up to about 48 feet (15 m) depth, which generally is from five to ten nautical miles from the coast. Small boats of less than 30 feet and 12 HP, including traditional boats, are used in this zone.
- **Offshore fisheries** – this includes the fishing grounds from the demarcation line of inshore fisheries out to the edge of the EEZ. Vessels over thirty-feet and/or engine power more than 12 HP are used in offshore fisheries. Large-scale fishing such as bottom trawling, purse seining, surrounding, drift netting and long lining are common in offshore fishing. In order to properly administer and monitor

fisheries activities, the DOF has divided Myanmar's offshore fisheries into 140 grid blocks of 30x30 nautical miles each. Using these grid blocks, 4 fishing areas are identified as follows (***Figure 5.23*** and ***Figure 5.24***):

- Rakhine Fishing Area - Includes grounds A1 to A20, B1 to B10. Total 30 grounds.
- Ayeyarwady Fishing Area - Includes grounds B11 to B20, C1 to C25 and D1, D4, D5, D9, D10, D14, D15, D19, D20. Total 44 grounds.
- Mon Fishing Area - Includes grounds D2, D3, D6, D7, D8, D11, D12, D13, D16, D17, D18, D21, D22, D23. Total 14 grounds.
- Tanintharyi Fishing Area - Includes grounds D24 to D29, E1 to E25, F1 to F21. Total 52 grounds.

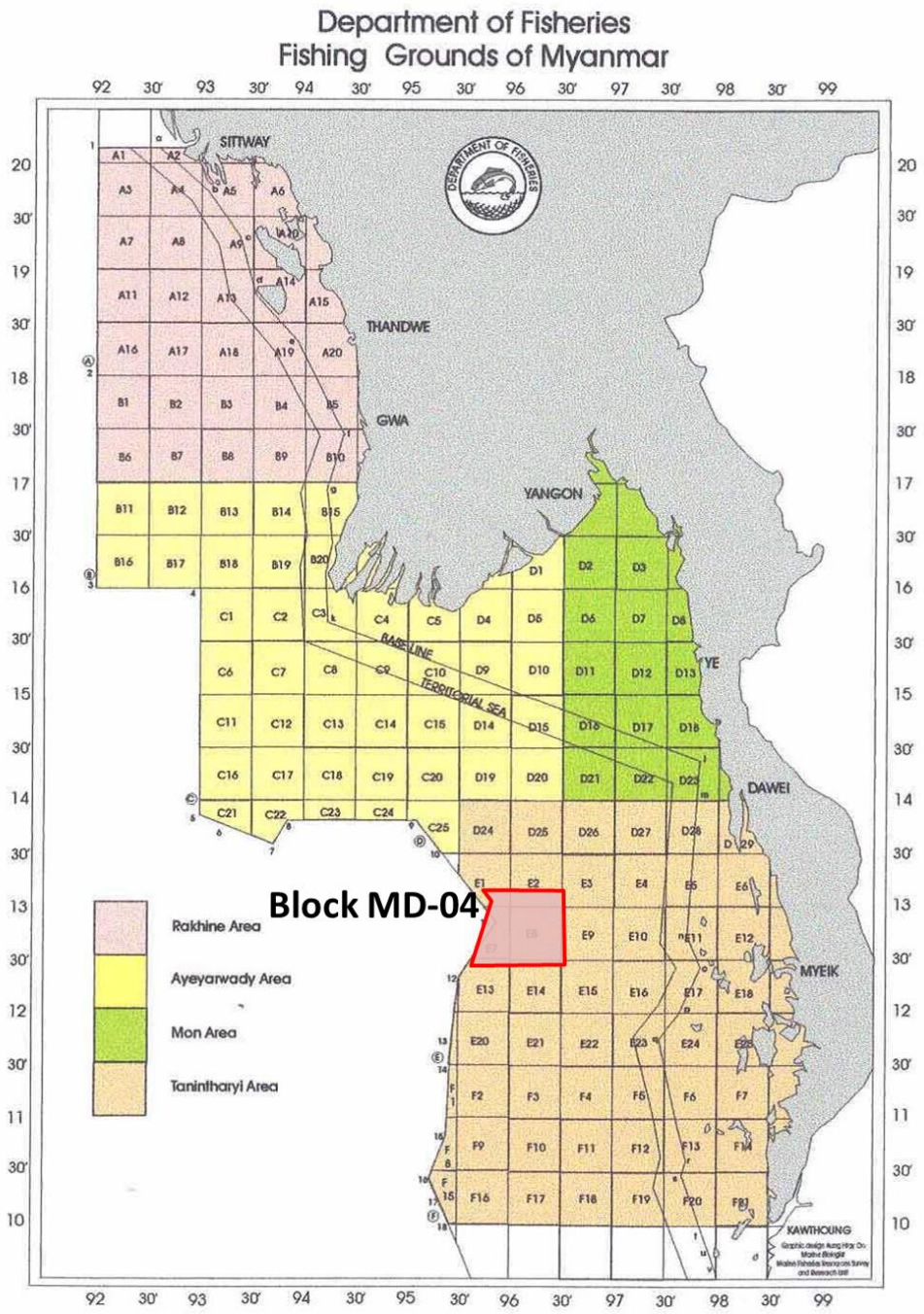
Block MD-4 is located within the Tanintharyi Fishing Area. In addition to offshore fisheries, there are likely fishing activities on the islands closest to Block MD-4 (Coco Islands, Narcondam Island, and Preparis Island), but little documented information is available. According to discussion with local regional offices, only fishery groups from Tanintharyi Region are located within Block MD-4.

Figure 5.23 Fishing Grounds and Landing Sites in Myanmar



Source: Department of Fisheries (2003), modified by ERM (2017)

Figure 5.24 Myanmar Coastal Zone and Designation of Fishing Grounds in Myanmar Sea



Source: Department of Fisheries (2011) (1), modified by ERM (2017)

(1) http://map.seafdec.org/workshop/workshop-07-09-09-2011/WP/paper/WP10_Status%20and%20potential%20of%20TUNA%20resources%20in%20Myanmar(%20Final%20).pdf

5.5.4.2 *Marine Catch*

There are approximately 770 finfish species identified in Myanmar. Among these, 470 species are of marine species including 67 commercially important pelagic species. Several species remain to be identified.

In terms of biomass, it has been estimated that there is close to 1.0 million mt of pelagic fish and about 0.75 million mt of demersal fish, while the total annual maximum sustainable yield (MSY) is about 1.04 million mt (The Department of Fisheries (DOF) of the Ministry of Livestock and Fisheries, 2011). ***Figure 5.25*** shows the composition of marine fish landings in Myanmar.

The volume from marine fisheries increased from 0.863 million MT in 1996-97 to 4.150 million MT in 2010-2011, as shown in ***Table 5.16.*** As shown in ***Table 5.17,*** more than 50% of fishery production is from marine fisheries, in comparison with the aquaculture and inland fishery production of Myanmar.

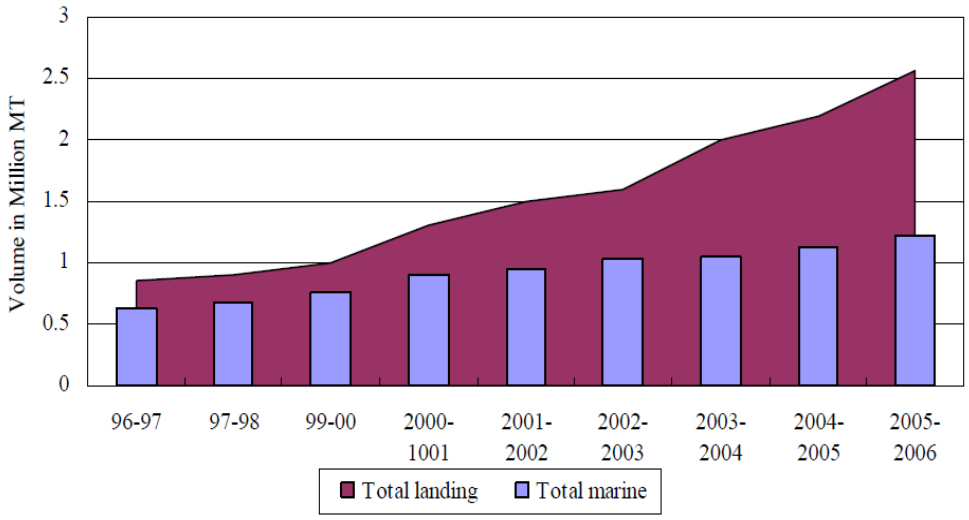
The Food and Agricultural Organization of the United Nation (FAO) suggests that data quality is a concern for some major marine capture producers. Marine catches in Myanmar have increased markedly and continuously in the last 20 years. However, the fact that reported capture production did not decline significantly or continued to increase when natural disasters occurred (e.g. the tsunami of December 2004 and Cyclone Nargis in May 2008) made FAO concerned about the reliability of their official statistics. [1]

For Myanmar, recent findings by FAO have shown that official statistics were based on target levels rather than on real data collection. FAO is in contact with the Myanmar's Department of Fisheries to run a pilot project to improve data collection in one region (with a view to extending this to the whole country), and to revise together the official capture production figures for the last 10–15 years.

According to FAO (2016), there was 1.46 MT of marine capture production in Myanmar in 2014, which is 8.8% than the previous year and 64.4% more than the average tonnes of marine capture production from 2003 to 2012.

[1] http://www.fao.org/3/a-i5555e.pdf

Figure 5.25 Composition of Marine Fish Landing in Myanmar



Source: Department of Fisheries (2007), as cited in Maung Soe (2008) (1)

Table 5.16 Fisheries Production in Myanmar in 1996-1997 to 2010-2011

Fiscal Year	Marine Fishery Landing by Sector (Million MT)
1996-1997	0.863
1997-1998	0.913
1998-1999	1.011
1999-2000	1.196
2000-2001	1.310
2001-2002	1.474
2002-2003	1.596
2003-2004	1.987
2004-2005	2.217
2005-2006	2.581
2006-2007	2.840
2007-2008	3.168
2008-2009	3.545
2009-2010	3.914
2010-2011	4.150

Source: FAO- Fisheries and Aquaculture Information and Statistics Service (2014) (2)

(1) http://www.ide.go.jp/English/Publish/Download/Vrf/pdf/433.pdf

(2) http://www.fao.org/docrep/004/ad497e/ad497e05.htm

Table 5.17 Type of Fishery Production in Myanmar in 2007-2008 to 2011-2012

Year	Total (Million MT)	Aquaculture (Million MT)	Inland Fishery (Million MT)	Marine fishery (Million MT)
2007-2008	3.19	0.69 (22%)	0.82 (25%)	1.70 (53%)
2008-2009	3.50	0.80 (23%)	0.90 (26%)	1.80 (51%)
2009-2010	3.92	0.86 (22%)	1.00 (25%)	2.10 (53%)
2010-2011	4.16	0.83 (20%)	1.16 (28%)	2.17 (52%)
2011-2012	4.48	0.90 (20%)	1.24 (27%)	2.35 (52%)

Source: Department of Fisheries (2012) (1)

5.5.4.3 *Fishing Gears*

Various types of fishing gear are used to exploit the marine species found in Myanmar waters. The number and type of offshore fishing vessels recorded in Myanmar during 2009-2010 is shown in ***Table 5.18***. Vessels and fishing gear statistics for inshore and offshore fisheries in Myanmar are shown in ***Table 5.19***. Examples of the types of offshore fishing vessels typically found in Myanmar are shown in ***Figure 5.26***.

Table 5.18 Number of National Offshore Fishing Vessels in Myanmar (2009-2010)

No	Type of Gear	Number of Vessels
1	Trawl	895
2	Purse seine	163
3	Stow net (Set Bag Net)	458
4	Drift Net (Gill net)	148
5	Long Line	3
6	Squid Cast Net	35
7	Fish Trap	112

Source: Department of Fisheries (2011) (2)

(1) http://www.fao.org

(2) http://map.seafdec.org/workshop/workshop-07-09-09-2011/WP/paper/WP10_Status%20and%20potential%20of%20TUNA%20resources%20in%20Myanmar(%20Final%20).pdf

Table 5.19 Numbers of Fishing Vessels and Fishing Gears for Inshore and Offshore Fisheries

Year	Number of Particulars			
	Fishing Vessel (Offshore)	Fishing Vessel (Inshore)	Fishing Gear (One set of net)	Total
1990-1991	874	6,032	6,032	12,938
1995-1996	1,694	11,615	14,561	27,870
2000-2001	1,987	26,099	25,590	53,676
2001-2002	1,999	28,240	27,622	57,861
2002-2003	2,309	30,420	29,394	62,123
2003-2004	2,121	29,861	29,685	61,667
2004-2005	2,150	30,863	30,078	63,091
2005-2006	2,022	30,460	31,397	63,879
2006-2007	1,983	30,414	31,704	64,101
2007-2008	1,876	23,874	19,633	45,383

Note: Non-mechanized fishing vessels are included in the fishing vessel (in-shore).
Source: Department of Fisheries (2009)

Figure 5.26 Examples of Offshore Fishing Vessels in Myanmar

Source: Maung Aye & Ko Ko (2013) (1)

(1) Maung Aye, K., Ko Ko, W., "Trawl Fishery Management Myanmar, APFIC Regional Expert Workshop on Topical Trawl Fishery Management, 30 September – 4 October 2013, Phuket, Thailand

5.5.4.4 *Seasonality of Fishing*

Dry Season (November to April): Previous discussions with locals fishermen in the region has suggested that November to April is the best season for fishing in terms of weather condition. Due to the better weather conditions, fishing boats are able to travel greater distances from shore in a safer manner during this dry winter season. Fishing takes place during this period in shallow-water, across the continental slope and in deep-water.

Rainy Season (May to October): Fishing during the rainy season is noted to be difficult for offshore fishing especially in offshore waters due to poor weather conditions. From June to August 2015, only 50% of the offshore fishing vessels were allowed by the DoF to go fishing. The closed period and also percentage of vessels allowed to fish are reported to vary between years.

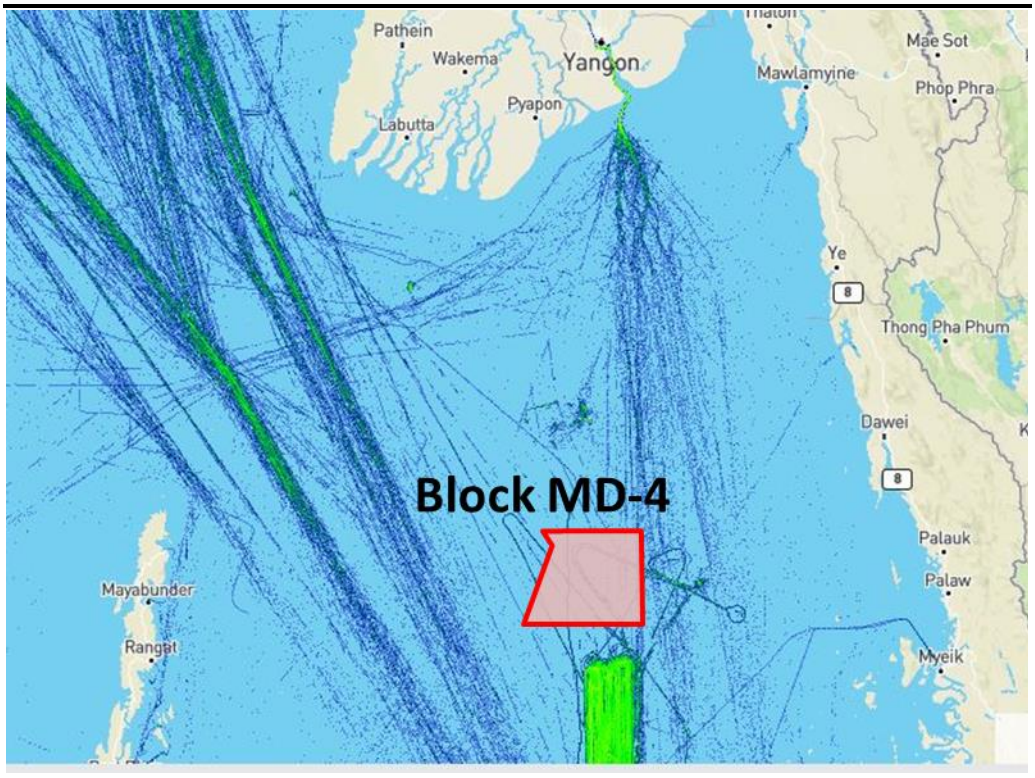
For inshore fishing by small boats, the best period of fishing in terms of catch value is reported to be from April to October and the exact window appears to be varied across villages.

5.5.5 *Shipping and Navigation*

The Gulf of Martaban has limited shipping activity with only one main shipping lane from Yangon heading to the Straits of Malacca in the south. ***Figure 5.27*** shows an overview of vessel traffic passing through and nearby Block MD-4. Block MD-4 is located within this shipping route, therefore, there is potential for interactions with shipping traffic to occur.

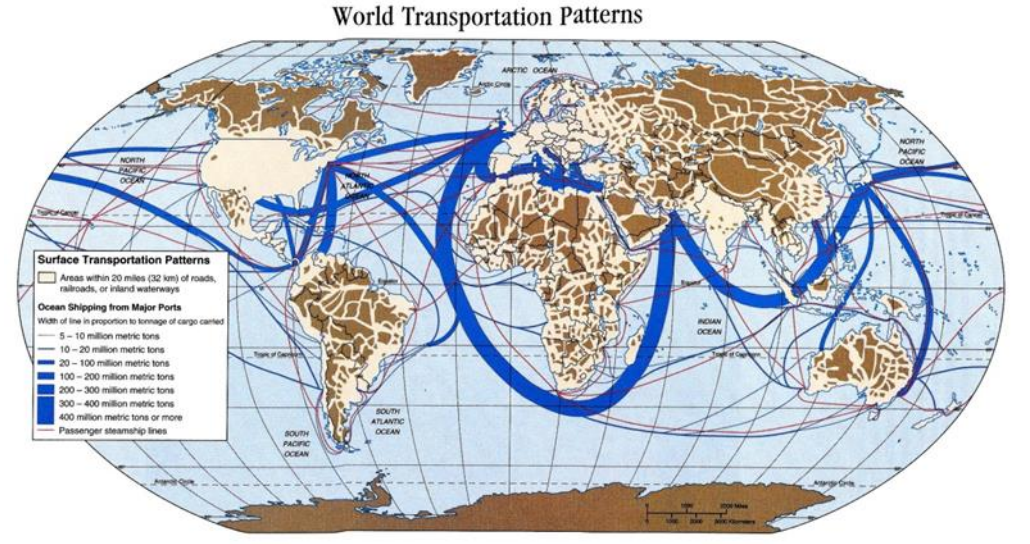
International sea routes for trading around the world are shown in ***Figure 5.28***. At the present time, transportation between Pacific Ocean and the Middle East region are mainly via three existing routes: Malacca Route, Sunda Route, and Lombok Route, as shown in ***Figure 5.29***. There are more than 500,000 ships of all sizes passing through these three routes every year. Block MD-4 is far from these international routes, thus marine traffic is expected to be low. However, there exists the potential for oil tanker routes to be established near Block MD-4. Potential oil tanker lanes from the major oil tanker lane to Malacca Strait to Yangon are shown in ***Figure 5.30***.

Figure 5.27 Vessel Traffic nearby Block MD-4



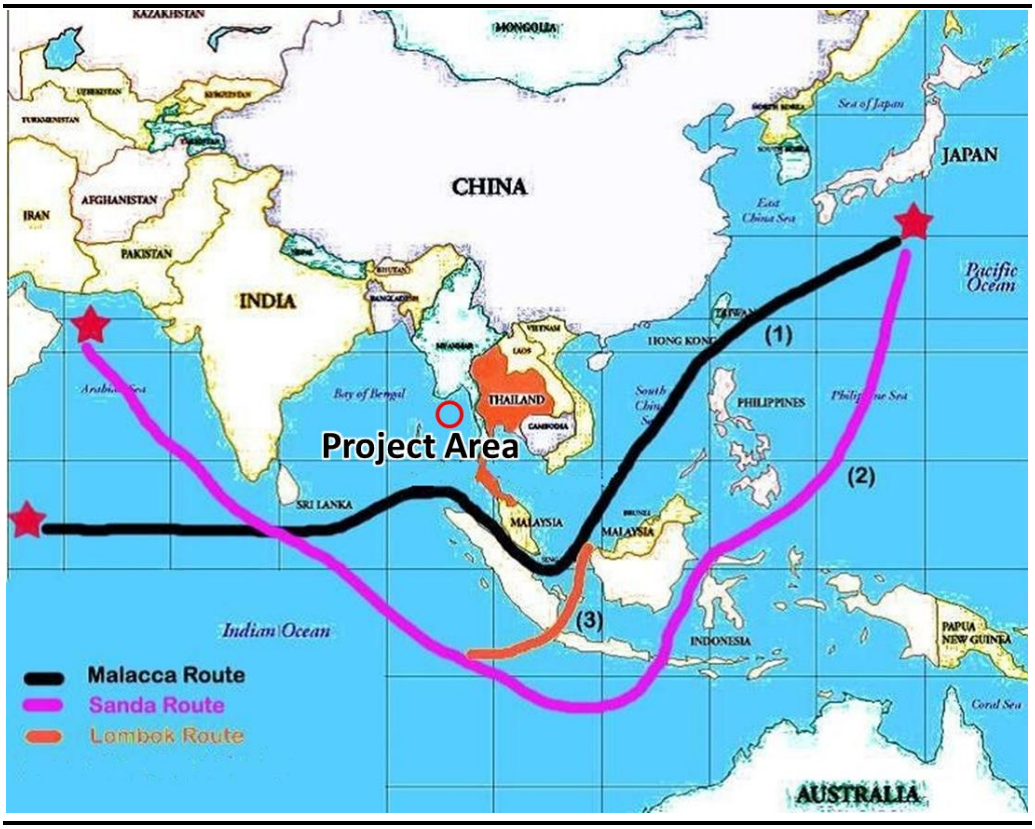
Source: http://marinetraffic.com/

Figure 5.28 Major Sea Routes around the World



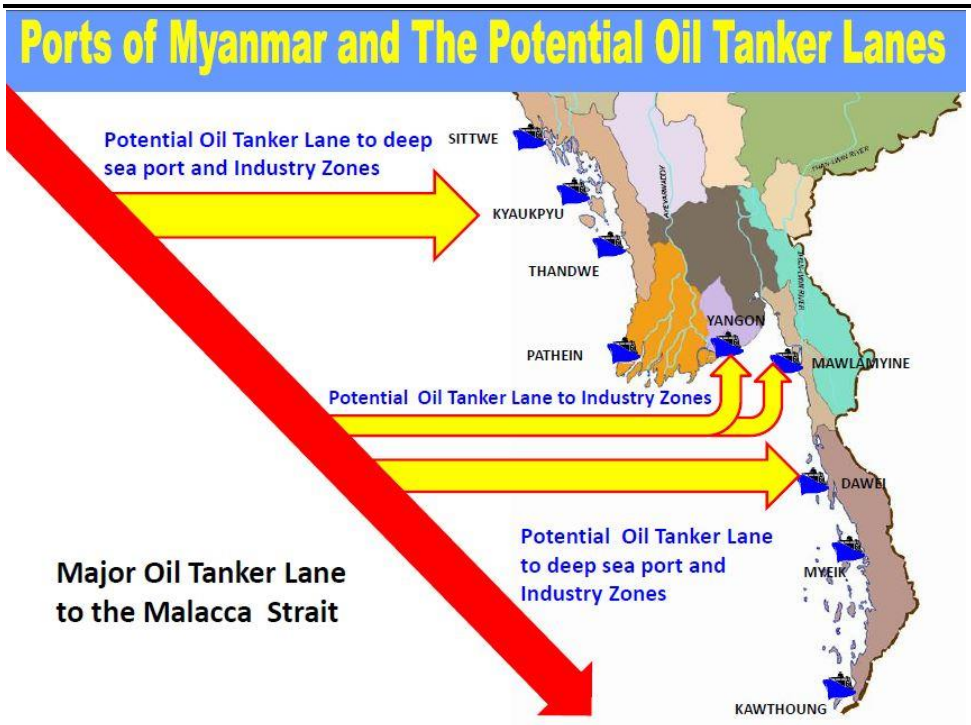
Source: http://mardekippel.blogspot.com/2012_07_01_archive.html

Figure 5.29 Existing Major Sea Routes



Source: Chanin Chuen-Im and Jiin Jen Lee (2011), modified by ERM (2016)

Figure 5.30 Potential Oil Tanker Lanes to Myanmar



Source: Soe-Htun and Tint Swe (2014) (1)

(1) Training on Socioeconomic Monitoring (SocMon) Methodology for Evaluation of Socioeconomics and Marine Resources Utilization at Selected Coastal Communities in Myanmar Mawlamyine University, Mon State and Asin Village, Ye Township 9-19 January 2014, http://www.boblme.org/

5.5.5.1 Ports

Myanmar has a total of nine (9) ports that serve coastal and seaborne trade (***Figure 5.31***). Currently 3 ports are under construction.

Port of Yangon, situated on the Yangon River about 32 km inland from Elephant Point on the Gulf of Martaban, is the primary port of Myanmar and handles about 90 % of the country's exports and imports. (1)

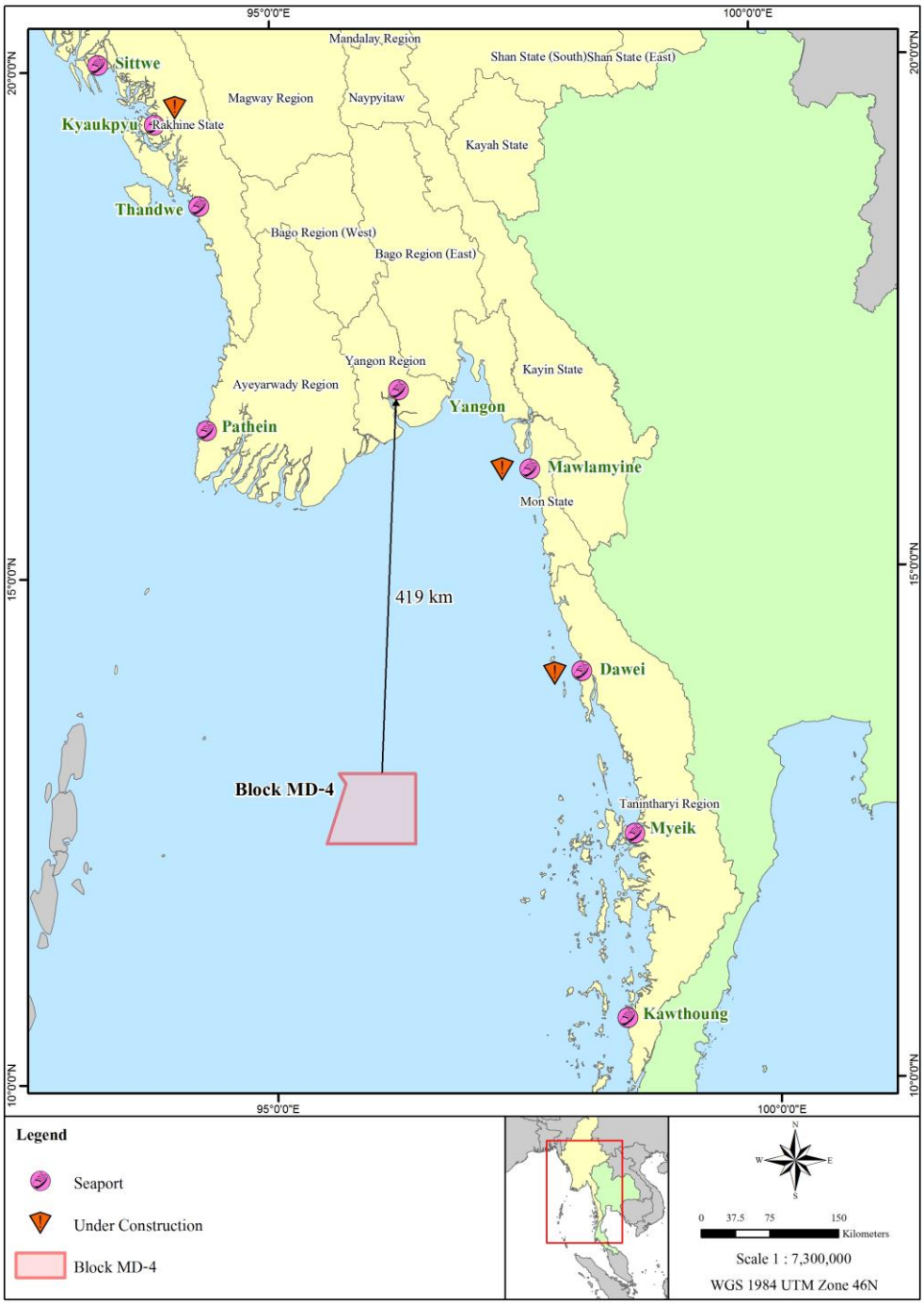
The coastal area including the Ayeyarwady delta is used by some river traffic including traffic to Yangon. (2)

The Project will utilize the port located at Yangon for emergency supplies and crew transport.

(1) Myanmar Port Authority, 2012

(2) Hydrographer of the Navy 1978

Figure 5.31 Port Locations in Myanmar



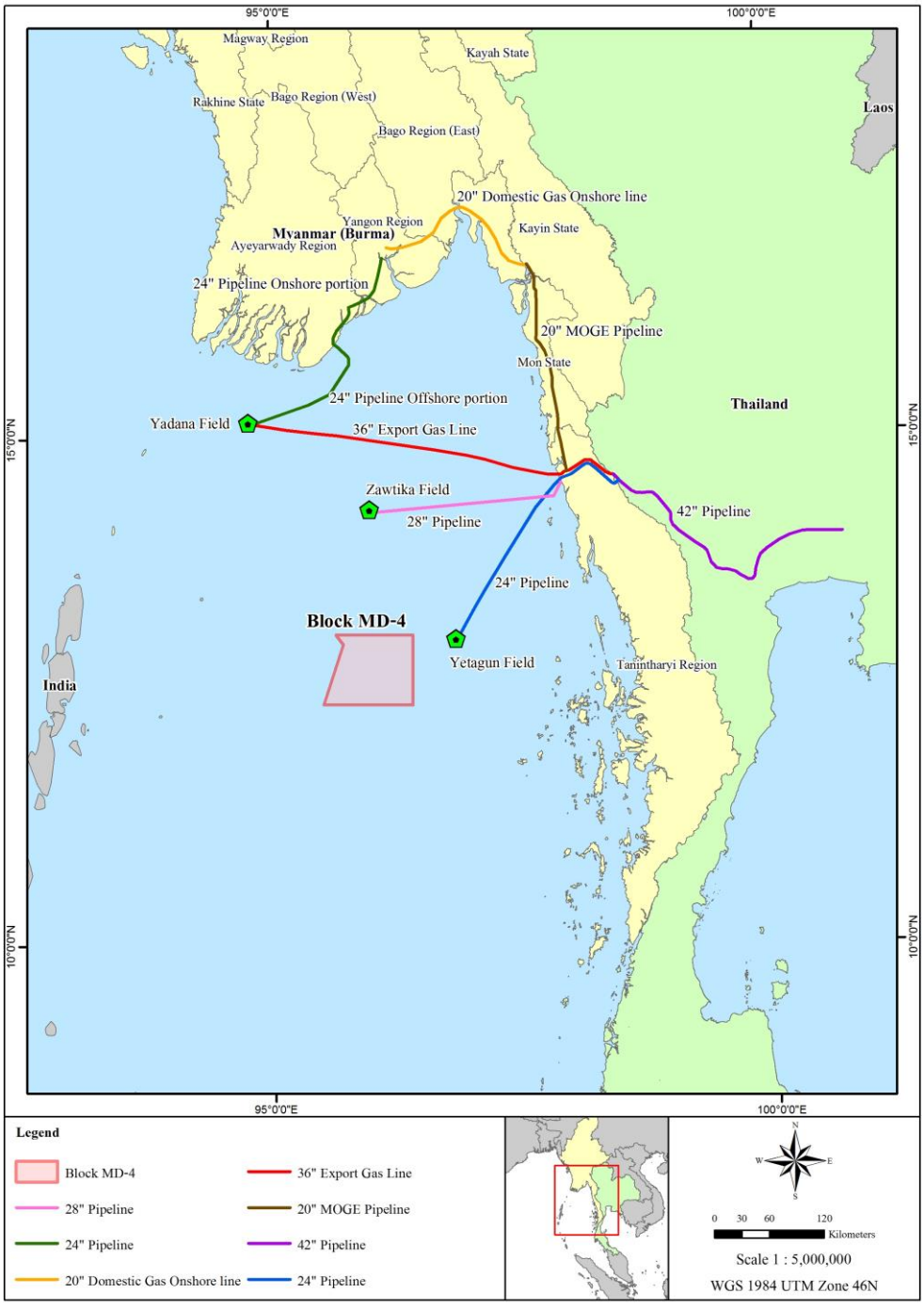
Source: http://www.myanmarburma.com/article/807/major-ports, modified by ERM (2014)

5.5.5.2 *Submarine Cable & Pipelines*

A gas pipeline, constructed by MOGE's national team, is routed from offshore Yadana Field and Yetakun Field through Kanbauk Pipeline Center, as shown in ***Figure 5.32.***

A 24 inch Myanmar Domestic Gas Pipeline is routed from Yadana Field, situated at the boundary of M5 and M6, and then to Dawnyein Pipeline Center to Yangon (both receiving and transmission station).

Figure 5.32 Gas Pipeline near the Project Area



Source: MOGE (2009), Total (2010), Myanmar Information Management Unit (2012), modified by ERM (2016)

5.5.6 *Regional Oil and Gas Exploration*

The region currently supports several industries including petroleum exploration and production. With the lifting of international sanctions, licensing has begun on a number of offshore oil and gas license Blocks in Myanmar. In 2014, the Ministry of Energy announced that 10 shallow water and 10 deep water Blocks had been awarded in Myanmar waters (1). The recently awarded license Blocks within the Moattama Area are listed in ***Table 5.20***.

Table 5.20 *Recently Awarded Oil and Gas License Blocks in Moattama Area*

Block	Operators
Shallow water	
M-4	Oil India Ltd., Mercator Petroleum Ltd., and Oilmax Energy
M-7	Tap Oil Limited (Tap Oil) (Tap Energy (M-7) Pte Ltd)
M-8	Berlanga Group (Berlanga Myanmar Pte Ltd)
M-15	Transcontinental Group
M-17	Reliance Industries Ltd (RIL)
M-18	Reliance Industries Ltd (RIL)
Deep Water	
MD-2	ENI Myanmar
MD-4	ENI Myanmar
MD-5	Shell Myanmar Energy and MOECO

In March 2015, Eni signed a Production Signing Contract (PSC) for the exploration of two offshore blocks, MD-2 and MD-4. These exploration blocks were awarded to Eni as a result of participation in an international tender called by the Republic of the Union of Myanmar.

5.5.7 *Tourist Attractions and Recreational Areas*

Tourism is a recent and slowly developing sector in Myanmar. However, the number of visitors has been increasing in recent years, and the government has been encouraging tourism. The total number of international tourists arriving in Myanmar during 2011 - 2014 is shown in ***Figure 5.21.***

In the 2013-2014 fiscal year, 29.67% number of tourists increasing from previous fiscal year (2012-2013).

Table 5.21 *Number of International Tourist Arrivals in Myanmar, 2011-2014*

Fiscal Year	Tourists (Number)			
	Total	by Air	by Sea	by Land
2011-2012	866,989	425,847,	137,437	303,705
2012-2013	1,309,225	660,281	159,282	489,662
2013-2014	1,967,680	826,308	227,118	914,254

(1) Oil and gas Journal, online. Myanmar awards exploration blocks. Available at http://www.ogj.com/articles/2014/03/myanmar-awards-exploration-blocks.html

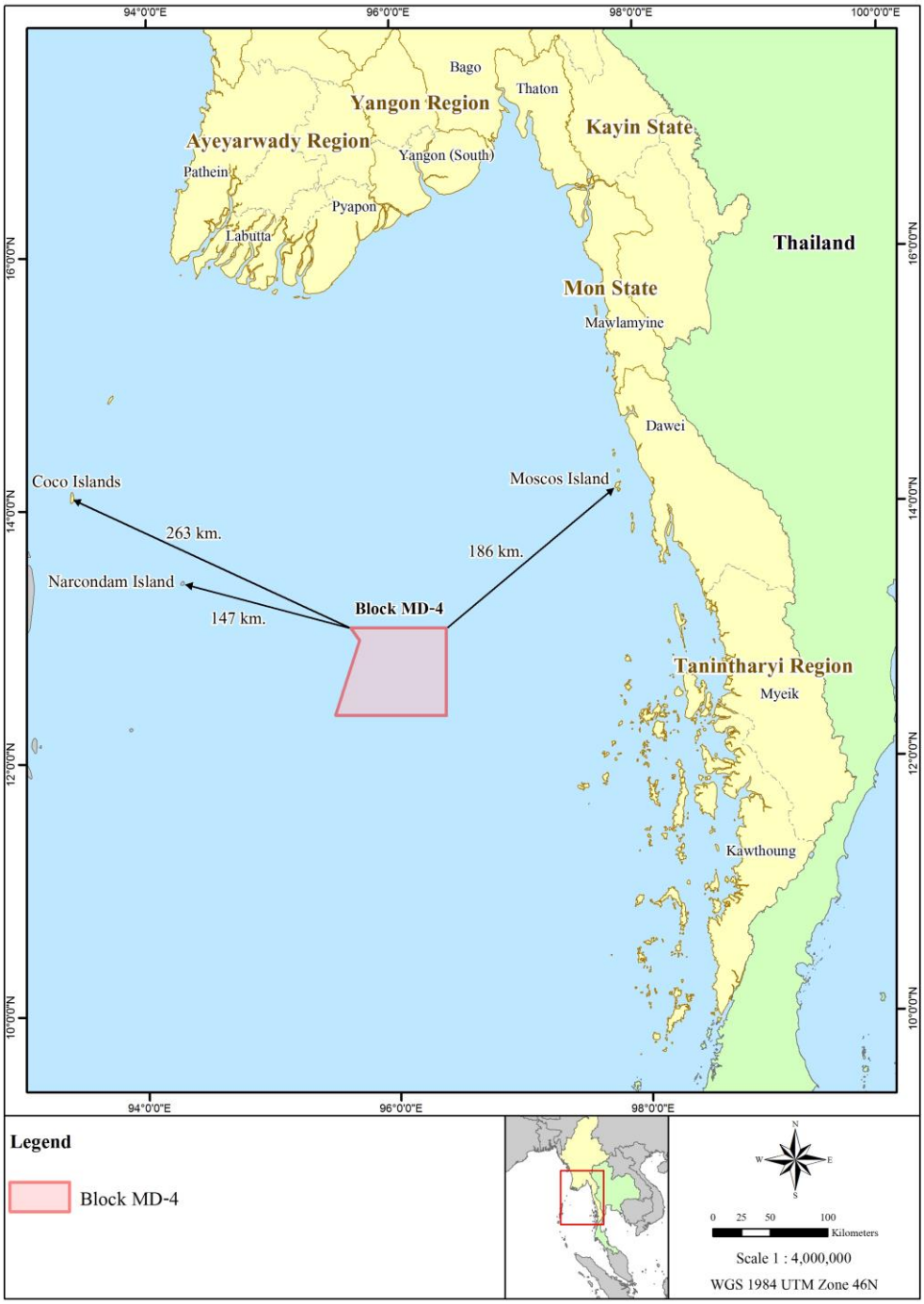
Source: Ministry of Hotel and Tourism, posted by the National Planning & Economic Development of Myanmar website, February 2014.
Note: Includes visitors with visa and daily or overnight travelers with border pass.

The nearest tourist attractions to the Project are Narcondam Island, Moscos Island and Coco Island, approximately 147, 186 and 263 km from Block MD-4. Distances from the Project are provided in ***Figure 5.33.***

Narcondam Island is a small volcanic island located in the Andaman Sea, covering an area of 6.81 sq.km. The island is declared a sanctuary and is the only abode of Narcondam Hornbill. The waters surrounding Narcondam Island are known to be a diver's paradise. The island is very remote and diving is accessible only via a live-aboard.

The Burmese government has decided promote the Coco island to be a resort destination as of 2015. Coco islands has a lodge constructed on an old section from the hospital. There are currently only 30 tourist passes issued for tourists to visit the island at one time. The island's attractions include an Old Monastery, a school, and an old resthouse on the island belonging to an elder Burmese.

Figure 5.33 Tourist Attractions near Project Study Area



5.6 HEALTH COMPONENTS

5.6.8 Public Health

5.6.8.1 Health Statistics

In 2008, in all of Myanmar, the leading causes of morbidity were "Certain infectious and parasitic diseases" (20.5%), "Pregnancy, childbirth and puerperium" (16.1%), and "Injury, poisoning and certain other consequences of external causes" (14.3%). The leading causes of mortality were "Certain infectious and parasitic diseases" (26.7%), "Diseases of the circulatory system" (16.2%), and "Injury, poisoning and certain other consequences of external causes" (10.5%).

5.6.8.2 Health Services

According to the Ministry of Health, per 100,000 populations, there are 22 midwives, 22 nurses, and 11 medical doctors available in Tanintharyi Region. In 2011, the total number of hospitals in Tanintharyi Region was 30, and the average available hospital beds per 100,000 population was 72 (1).

The distribution of health facilities in Tanintharyi Region according to the Ministry of Health is summarized in ***Table 5.22.***

Table 5.22 Distribution of Health Facilities in 2011

Health Facility	Tanintharyi Region
General hospital	2
District hospital	4
Township hospital	4
Station hospital	19
Rural health center	86
Doctors (Physicians)	159
Sub health center	243
Nurses	315
Midwives	260
Station hospital	19

Source: MIMU Baseline Data 2011-12

(1) https://knoema.com/marpqmg/myanmar-regional-statistics-2013?region=1000060-tanintharyi

5.7 CULTURAL COMPONENTS

No known offshore culture heritage was identified in the Block MD-4 or in the waters of offshore Tanintharyi Region through review of available desktop information.

5.8 VISUAL COMPONENTS

Given that the Project is located over 147 km from the nearest island, 220 km from the nearest coastline, and the survey vessels will be transient, there are unlikely to be any visual impacts from the Project.

6 IMPACT ASSESSMENT AND MITIGATION MEASURES

This chapter of the IEE provides an assessment of potential impacts arising from the Project. The impacts are organized by topic, and have been divided into three main aspects: environment, social and health. The contents presented in this chapter are as follows:

Section 6.1 Impact Assessment Methodology and Approach;
Section 6.2 Identification of Impacts;
Section 6.3 Impact Assessment and Mitigation.

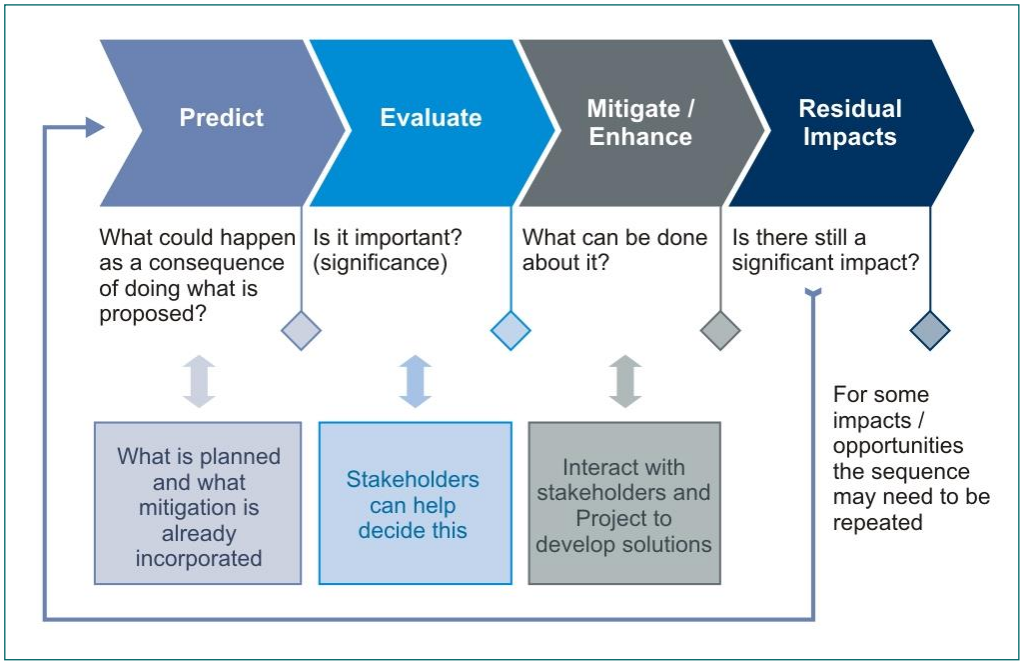
6.1 IMPACT ASSESSMENT METHODOLOGY AND APPROACH

6.1.1 Impact Assessment

Impact identification and assessment starts with scoping and continues through the remainder of the impact assessment process. The main impact assessment steps are summarized in ***Figure 6.1*** and comprise:

- **Impact prediction:** to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- **Impact evaluation:** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- **Mitigation and enhancement:** to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- **Residual impact evaluation:** to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

Figure 6.1 Impact Assessment Process



6.1.1.1 *Prediction of Impacts*

Prediction of impacts is essentially an objective exercise to determine what could potentially happen to the environmental and social sensitive receptors/resources as a consequence of the Project and its associated activities. From the potentially significant interactions identified in scoping, the potential impacts to the various resources/receptors are elaborated. The diverse range of potential impacts considered in the assessment process typically results in a wide range of prediction methods being used, including quantitative, semi-quantitative and qualitative techniques.

6.1.1.2 *Evaluation of Impacts*

The evaluation of the significance of impacts is based on a calculation matrix that combines the magnitude of the potential impacts (duration, extent and scale) against the sensitivity of the receptors/resources. The procedure for determining the magnitude of the potential impacts and sensitivity of receptors/resources is outlined below.

6.1.1.2 (1) *Description of Impact Characteristics*

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in ***Table 6.1***.

Table 6.1 Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	- Direct - Indirect - Induced
Extent	The "reach" of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc).	- Local - Regional - International
Duration	The time period over which a resource / receptor is affected.	- Temporary - Short-term - Long-term
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc)	[no fixed designations; intended to be a numerical value or a qualitative description of "intensity"]
Frequency	A measure of the constancy or periodicity of the impact.	[no fixed designations; intended to be a numerical value or a qualitative description]

The definitions for the "type" designations are shown in ***Table 6.2***. Definitions for "extent", "duration", "scale", and "frequency" are resource/receptor-specific.

Table 6.2 Impact Type Definitions

Designations	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor.
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment.
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is *likelihood*. The *likelihood* of an unplanned event occurring is designated using a qualitative scale, as described in ***Table 6.3***.

Table 6.3 Definitions of Likelihood Designations (for Unplanned Events only)

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

6.1.1.2 (2) Determining Impact Magnitude

Once impact characteristics are defined, the next step in the impact assessment phase is to assign each impact a 'magnitude'. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency

Additionally, for unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. The magnitude designations themselves are universally consistent, but the definitions for these designations vary depending on the resource/receptor. The universal magnitude designations are:

- Positive
- Negligible
- Small
- Medium
- Large

In the case of a *positive* impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a *positive* impact, without characterizing the exact degree of positive change likely to occur.

The impact magnitude for marine species, marine habitats and water quality impacts is provided in ***Table 6.4***, ***Table 6.5***, and ***Table 6.6***, respectively. The impact magnitude criteria for the social assessment are provided in ***Table 6.7***.

Table 6.4 Impact Magnitude for Marine Species

Magnitude Designation	Definition
Large	May affect an entire population or species in sufficient magnitude to cause a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations.
Medium	May affects a portion of a population and may bring about a change in abundance and/ or distribution over one or more generations, but does not threaten the integrity of that population or any population dependent on it.
Small	May affect specific group of localised individuals within a population over a short time period (one generation or less), but does not affect other trophic levels or the population itself.
Negligible	Immeasurable, undetectable or within the range of normal natural variation.

Table 6.5 Impact Magnitude for Marine Habitats

Magnitude Designation	Definition
Large	May affect the integrity of an area or region, by substantially changing, in the long term, its ecological features, structures and functions, across its whole area, that enable it to sustain the habitat, complex of habitats and/or population levels of species that makes it important.
Medium	May affect some, if not all, of the area's ecological features, structures and functions in the short or medium term. The area or region may be able to recover through natural regeneration and restoration.
Small	May cause some minor impacts of limited extent, or to some elements of the area, are evident but easy to recover through natural regeneration.
Negligible	Immeasurable, undetectable or within the range of normal natural variation.

Table 6.6 Impact Magnitude for Marine Water Quality

Magnitude Designation	Definition
Large	Change in water quality over a large area that lasts over the course of several months with quality likely to cause secondary impacts on marine ecology; and/or Routine exceedance of benchmark effluent discharge limits
Medium	Temporary or localised change in water quality with water quality returning to background levels thereafter and/or Occasional exceedance of benchmark effluent discharge limits
Small	Slight change in water quality expected over a limited area with water quality returning to background levels within a few metres and/or Discharges are well within benchmark effluent discharge limits
Negligible	Immeasurable, undetectable or within the range of normal natural variation

Table 6.7 Impact Magnitude for Social Impacts

Magnitude	Definition

Designation	
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the area of influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

6.1.1.2 (3) Determining Resource/Receptor Sensitivity

In addition to characterizing the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity (including vulnerability and importance) of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity of the resource/receptor, which may be physical, biological, cultural or human. Other factors may also be considered, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor basis. The sensitivity designations for all resources/ receptors are:

- Low
- Medium
- High

The receptor sensitivities for marine species, marine habitats and water quality are provided in ***Table 6.8***, ***Table 6.9***, and ***Table 6.10***, respectively. The receptor sensitivity criteria for the social assessment are provided in ***Table 6.11***.

Table 6.8 Receptor Sensitivity for Marine Habitat

Sensitivity Designation	Definition
High	A habitat that has designated conservation status at an international scale (e.g. IUCN). Areas of particular biodiversity importance that may support populations of restricted range, endemic or endangered species, or is in itself unique or threatened.
Medium	A habitat that has designated conservation status at a national or regional scale. Areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.
Low	A habitat not protected by law. Areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.

Table 6.9 Receptor Sensitivity for Marine Species

Sensitivity Designation	Definition
High	A species population that has designated conservation status at an international scale (e.g. IUCN). A species that is globally rare. A keystone species fundamental to the functioning of the ecosystem.
Medium	A species population that has designated conservation status at a national or regional scale. A species common globally but rare locally. Important to ecosystem functions or under threat or population in decline.
Low	A species not protected by law. Not critical to other ecosystem functions (e.g. as prey to other species or as predator to potential pest species) or common / abundant locally.

Table 6.10 Receptor Sensitivity for Marine Water Quality

Sensitivity Designation	Definition
High	Existing water quality is already under stress and/ or the ecological resources it supports are very sensitive to change (secondary ecological or health impacts are likely).
Medium	Existing water quality already shows some signs of stress and/ or supports ecological resources that could be sensitive to change in water quality.
Low	Existing water quality is good and the ecological resources that it supports are not sensitive to a change in water quality.

Table 6.11 ***Receptor Sensitivity for Local Communities, Fishermen and Other Marine Users***

Sensitivity Designation	Definition
High	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project.
Medium	Some but few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the Project.
Low	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.

6.1.1.2 (4) *Determining Impact Significance*

Once magnitude of impact and sensitivity of resource/receptor have been characterized, the significance can be assigned for each impact. Impact significance is designated using the matrix shown in ***Table 6.12***.

Table 6.12 ***Impact Significance***

		Sensitivity of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Negligible**	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/ importance designations that enter into the matrix. ***Box A*** provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the impact assessment process). This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

Box A *Context of Impact Significances*

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor significance** is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IEE is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

6.1.2 Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterised, the next step is to evaluate what mitigation and enhancement measures are warranted. For the purposes of this impact assessment, the following mitigation hierarchy has been adopted:

- **Avoid at Source, Reduce at Source:** avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
- **Abate on Site**: whereas avoidance is not possible, add something to the design to minimize the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).

- **Abate at Receptor:** if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
- **Repair or Remedy**: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- **Compensate in Kind, Compensate Through Other Means:** where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries access, recreation and amenity space).

The priority in mitigation is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

6.1.3 Residual Impact Evaluation

Once mitigation and enhancement measures are declared, the next step in the IEE Process is to assign residual impact significance. This is essentially a reiteration of the impact assessment steps discussed above, considering the implementation of the proposed mitigation and enhancement measures.

6.2 IDENTIFICATION OF IMPACTS

For the proposed Project, potential impacts have been identified through a systematic process whereby the features and activities (both planned and unplanned) associated with the preparation, operation and decommissioning of the Project have been considered with respect to their potential to interact with resources/receptors.

As a tool for conducting scoping, a Scoping Matrix has been utilized, and is presented in ***Table 6.13.*** The Scoping Matrix presents the various Project activities that could reasonably act as a source of impact down the vertical axis, and the resources/receptors relevant to the baseline environment have been listed across the horizontal axis. Each resulting cell on the Potential Interactions Matrix thus represents a potential interaction between a Project activity and a resource/receptor. Potential impacts have each been classified in one of three categories:

- **No interaction (White Cell):** where the Project is unlikely to interact with the resource/receptor (e.g., wholly marine projects may have no interaction with the terrestrial environment);

- **Interaction likely, but not likely to be significant (Grey Cell):** where there is likely to be an interaction, but the resultant impact is unlikely to change baseline conditions in an appreciable/detectable way; and
- **Significant interaction (Black Cell)**: where there is likely to be an interaction, and the resultant impact has a reasonable potential to cause a significant effect on the resource/receptor.

It should be noted that the list of project activities is not intended to be exhaustive but rather an identification of key aspects of the seismic survey operations that have the potential to interact with the environment/ cause environmental impacts. The list of resources/receptors is also a focused list of the key aspects of the environment that are considered vulnerable or important in the context of marine seismic survey activities in Block MD-4.

Table 6.13 Potential Interactions Matrix

PROJECT PHASES AND ACTIVITIES	Environmental Aspects						Social Aspects							Health Aspects		
	Air Quality	Seawater Quality	Seabed Characteristics	Sediment Quality	Marine Life and Marine Ecology	Sensitive Ecosystems	Visual Impact	Fishing Community / Fisheries	Shipping /Navigation	Subsea Infrastructures	Socio-Economy	Underwater Archaeology	Tourism and Recreation	Public Health	Health Services	Occupational Health & Safety
Planned Events																
Marine Traffic					■			■	■							
Physical Presence of Survey Equipment					■			■	■							
Vessel Lighting					■			■								
Operational Noise (from Airgun)					■			■								■
Air Emissions	■															
Wastewater and Vessel Operational Discharge		■		■	■			■						■		
Waste Generation and Disposal		■	■	■	■			■						■		
Labour, Equipment & Services Supply											■					
Unplanned Events																
Oil and Chemical Spills		■		■	■			■						■	■	■
Vessel Collision								■	■					■	■	■

Key:

	Interactions Identified as Unlikely
■	Interactions Likely, but Not Likely to Lead to Significant Impacts
■	Interactions are Likely to Result in Significant Impacts

6.2.1.1 *Summary of Scoped-Out (Non-Significant) Impacts*

Table 6.14 shows the resources/receptors for which interactions are unlikely from all Project activities, as well as resources/receptors with interactions that have been identified as likely, but which are not likely to lead to significant impacts.

Table 6.14 Summary of Unlikely and/or Non-Significant Impacts

Interaction (between Project Activity and Resource/Receptor)		Justification for Expectation of Non-Significant Impacts
Activity	Resource/Receptor	
All Project Activities (No Impact Caused by Any Project Activity)	**Seabed Characteristics**	• There will be no installation of structures that could disturb the seabed. • Minor risk of impact from dropped objects, but these will be mitigated/prevented by in-place control measures. • There is no documented evidence that offshore seismic activity causes any measurable impact to sub-seabed geology (i.e. underground noise/vibration impacts). This is also mitigated by designing the survey plan using a minimum noise level having energy suitable for the geological structure of petroleum reservoirs in offshore Myanmar.
	Sensitive Ecosystems	• No sensitive receptors located near the Project site, as it is far offshore, over 145 km from the nearest island.
	Visual Impact	• No sensitive receptors located near the Project site, as it is far offshore, over 145 km from the nearest island.
	Subsea Infrastructure	• Project is located in open sea in deep water. There are a number of pipelines associated with the current production operations in Block MD-4. However, the seismic survey will not have an impact on the seabed and therefore will not impact any subsea infrastructure. The vessel will not anchor offshore so there is no potential for anchor damage of the pipeline or any other subsea infrastructure.
	Underwater Archaeology	• Project is located in open sea in deep water. There are no known archaeological resources in the Project area, and no Project activities will take place near the seabed.
	Tourism and Recreation	• Nearest diving site is over 145 km from Project area. • Risk of physical interaction between streamers and divers/dive boats is extremely low. • Even though the risk of any impact to dive boats or other tourism is extremely low, existing control measures are adequate to mitigate the potential impact (such as using chase vessels, issuing Notice to Mariners, etc.).
Marine Traffic and Physical Presence of Survey Equipment	**Marine Life and Marine Ecology**	• The footprint and movements associated with the seismic and support vessels are not likely to be significant in relation to area of the open sea environment and other marine traffic in the region. • The survey is temporary and last for a short duration (100 days). • The seismic equipment will be towed at a maximum depth of 30 m from the sea surface and the survey vessel will not enter waters shallower than 50 m. As such, there is no potential for impact on marine benthic habitats or species from the presence of the vessel and equipment. • The potential for the vessel to collide with marine fauna (especially marine mammals) is not expected to be significant given vessel type (hull displacement vessel), the small number of vessels (~5) and the slow speeds of the seismic vessel (4 to 6 knots during survey and 10 to 12 knots en route).

Interaction (between Project Activity and Resource/Receptor)		Justification for Expectation of Non-Significant Impacts
Activity	Resource/Receptor	
Vessel Lighting	**Marine Life and Marine Ecology** **Fishing Community/Fisheries**	• Lights from vessels have potential to impact marine life and marine ecology, and subsequently fisheries, due to use of vessel lights at night time, which may attract fish away from fishing vessels. • However, impacts will be limited within the operational area, the Project will utilize the lighting system to limit light dispersion and and not use excess light more than is required. There are also a small number of vessels (4) for the seismic survey, and magnitude of light impacts is expected to be very small. In addition, the duration of the survey is temporary and for a short duration.
Operational Noise (from Airgun)	**Fishing Community/Fisheries**	• Impacts of airgun noise associated with the proposed seismic survey on commercial fisheries/ fish stocks may occur as indirect impacts with fisheries resources through changes in fish behaviour making them more difficult to catch. • However, survey is temporary and of short duration. • Existing control measures are adequate to mitigate the potential impact (such as soft start procedures, etc., discussed further in *Section 6.3*).
	Occupational Health & Safety	• Potential exposure of workers to unsafe noise levels during survey operation, however sensitivity is considered to be low as all workers will have appropriate PPE to protect against hearing damage. • Currently implemented control measures are adequate to mitigate the potential impact.

Air Emissions	**Air Quality**	• Potential for deterioration of air quality from fuel combustion. However, air quality problems are not typically a significant issue for offshore activities (ie. remote).
		• Because air pollutants will be emitted during a limited period, the survey located in an open area, and no communities or operations are located nearby, no significant environmental impacts from the air emissions during the survey are expected. In addition, regular maintenance of power generators will be conducted to minimize emissions.
		• Slight increase in ambient concentrations of gaseous pollutants - temporary activity.
		• Emissions well dispersed prior to arrival over land.
		• The following existing control/mitigation measures are deemed sufficient to mitigate any potential impacts:
		  o Vessels will be in compliance with MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI), so no significant impacts on ambient air quality are anticipated given the duration and scale of the survey.
		  o Conduct routine inspection and preventive maintenance as per maintenance schedule or recommended by manufacturers to maintain combustion efficiency and to reduce air pollutant emission.

Wastewater and Vessel Operational Discharges	**Seawater Quality** **Sediment Quality** **Marine Life and Marine Ecology**	• Potential water pollution from effluent discharges, which could have secondary impacts on sediment quality, marine life and marine ecology, and sensitive ecosystems. However, discharges to the marine environment from vessels will comply with MARPOL 73/78 Regulations, hence no significant impacts are expected to occur to any of these receptors from vessel discharges.

Interaction (between Project Activity and Resource/Receptor)		Justification for Expectation of Non-Significant Impacts
Activity	Resource/Receptor	
	Fishing Communities/Fisheries	• Quantity and quality of aquatic biota could decrease from deteriorated seawater quality, causing a reduction in the amount of fish suitable for sale/consumption. However, as discharges in compliance with MARPOL 73/78, these secondary impacts are non-significant.
	Public Health	• Potential health impacts on communities from exposure to hazardous chemicals, emissions or waste. However, Project will be operated offshore, far from communities (more than 145 km from nearest land), and is of short duration (approx. 100 days for survey). • Discharges in compliance with MARPOL 73/78 • Rapid dilution/ dispersion in offshore waters • Existing control measures are adequate to mitigate the potential impact.
Waste Generation and Disposal	**Seawater Quality** **Seabed Characteristics** **Sediment Quality** **Marine Life and Marine Ecology** **Fishing Communities/Fisheries** **Public Health**	• Inappropriate management of waste could lead to water fouling, which could lead to secondary impacts to marine life and marine ecology, sensitive ecosystems, fisheries, and public health. • However, the amount of waste generated from seismic survey activities is expected to be low, and will be separated and stored on board the survey vessel, with amount recorded, awaiting onshore disposal. Food waste will be ground to 25 mm prior to discharge into the sea, while combustible wastes eg wood, paper, and general waste will be incinerated in an on board incinerator. • In addition, Eni will follow Eni's Waste Management Plan ***(Annex B).*** • Currently implemented control measures are adequate to mitigate the potential impact.
Labour, Equipment & Services Supply	**Socio-Economy**	• Temporary provision of local labour, vessel rental, and employment • Small positive impact, but not of major significance

6.2.1.2 *Potential Impacts to be Assessed in this IEE Report*

The preliminary scoping of impacts undertaken indicates that the marine seismic survey in Block MD-4 may cause the following potentially significant impacts:

Environmental Impacts

- Impacts on Marine Life and Marine Ecology due to:
  - Operational Noise

Social Impacts

- Impacts to Fishing Community/Fisheries due to:
  - Marine Traffic
  - Physical Presence of Survey Equipment
- Impacts to Shipping/Navigation due to:
  - Marine Traffic
  - Physical Presence of Survey Equipment

Unplanned Events

- Impacts due to:
  - Oil and Chemical Spills
  - Vessel Collision

The impact assessment in the following section focuses mainly on these interactions.

6.3 *IMPACT ASSESSMENT AND MITIGATION*

6.3.1 *Assessment of Impacts to Marine Life and Marine Ecology*

6.3.1.1 *Scope of Assessment*

As determined during scoping, potential impacts to marine life and marine ecology may occur due to:

- Operational Noise (from Airgun)

Specifically, there may be potential harm/disturbance to marine mammals, fish & pelagic communities, plankton, and sea turtles.

6.3.1.2 *Summary of Relevant Baseline Conditions*

In general, the project is located offshore, far from most marine habitats. However, some endangered species, specifically sea turtles, have diverse migratory routes that may occasionally pass near the Project Area. Dolphins and whales may also occasionally pass through the Project Area.

The following receptors have the potential to be found either within the waters proposed for, or surrounding, the seismic survey area and are of sufficient sensitivity that they may be considered as sensitive to impacts from underwater noise generated by airgun emissions:

- Marine mammals;
- Fish;
- Plankton, fish eggs and larvae; and
- Sea turtles.

The desktop literature review in ***Chapter 5*** indicated the possible presence of up to 21 cetaceans (whale and dolphin) and one (1) sirenian species in Myanmar waters. Although there are little data available on the occurrence and distribution of marine mammals specifically within the proposed survey area, data collected from nearby waters indicates that the waters are not extensively used by marine mammals as sighting abundances are low. There are at least five species of sea turtles that have been recorded in the Andaman Sea. The abundance, distribution and seasonality of these organisms is not known, however, their presence warrants a potential cause for concern with regard to seismic survey operations. Impacts of seismic surveys on sea turtles may include auditory trauma, and/or behavioural disturbance.

6.3.1.3 Assessment of Impacts

The primary source of noise in marine seismic surveys is the airgun. The levels of noise generated depend on the number and size of airgun array, as well as the volume of compressed air, pressure, and the depth of the air gun during emission. The sound wave will transform to a high intensity pressure wave or shock wave, and produce the energy that penetrates through the water column. The pressure will increase and reach its peak in a short period of time, and then both pressure and energy will reduce exponentially.

For this Project, airgun shots will be fired at predetermined interval distances (approximately 8 seconds between releases, resulting in a shot interval of about 25 m), depending on the vessel speed. Seismic operations are expected to be conducted continuously for 24 hours each day. A range of airgun volumes will be used to increase the signal level, focus the signal downwards (limiting the unwanted spread of sound away from the target area) and to reduce seismic echoes. It is expected that the sound levels emitted will be of the order 220 - 230 dB at 1 m from a single airgun and ~245 - 250 dB at 1 m for the array (NB: all dB values quoted for underwater noise are referenced to 1 micro Pascal (*Pa). The fundamental frequencies are expected to fall within the range 0 - 300 Hz.

When airgun frequencies overlap with the auditory frequency range of marine fauna that are expected to occur in the vicinity of Block MD-4, it can be anticipated airgun sound is likely to be audible to these species (***Table 6.15***). Actual audibility by marine species will primarily be influenced by the distance from the airguns (and level of transmission loss over this distance) and the

specific hearing thresholds of marine fauna, but is also influenced by other factors such as background (ambient) sound levels (e.g. waves, rain, and shipping).

Table 6.15 Hearing Ranges of Marine Faunal Groups Potentially Present within or in the vicinity of Block MD-4

Group	Indicative Auditory Frequency Range
Toothed whales and dolphins (e.g. false killer whale)	15 Hz – 180 kHz (1)
Baleen whales (e.g. Bryde's whale)	7 Hz – 22 kHz (2)(3)
Dugongs	1 – 18 kHz (4)
Turtles	100 – 700 Hz (5)(6)
Whale shark	<1 kHz (7)
Fish	20 Hz – 1kHz (8)(9)

Underwater sound travels as a pressure wave and the pulsed sounds emitted from airguns are characterised by a rapid rise from ambient pressure to maximal pressure followed by a decay period. These are characteristics that mean underwater sound, at very high levels, can increase potential for injury to the sensitive auditory organs of marine fauna (10) or, at lower levels cause disturbance and a change in behaviour. Due to transmission loss as sound travels, the sound energy will decrease with distance from the sound source. Depending on received sound levels and the sensitivity of the specific marine fauna, exposure to underwater sound has the potential to affect receptors in five main ways:

- **Physical Injury -** Direct physical injury of the fauna due to rupture or damage of body tissue, which may lead to mortality in extreme cases.
- **Auditory Injury -** Permanent injury to hearing organs (known as a Permanent Threshold Shift (PTS)).

(1) Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33:411-521

(2) Southall et al. 2007. Op. cit.

(3) NOAA 2013. Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals: Acoustic Threshold Levels for Onset of Permanent and Temporary Threshold Shifts. Draft: 23 December 2013

(4) Anderson PK & Barclay RMR 1995. Acoustic signals of solitary dugongs: physical characteristics and behavioural correlates. Journal of Mammalogy 76(4):1226-1237.

(5) McCauley, RD, Fewtrell, J, Duncan, AJ, Jenner, C, Jenner, M-N, Penrose, JD, Prince, RIT, Adhitya, A, Murdoch, J & McCabe, K 2000, Marine Seismic Surveys – A Study of Environmental Implications, APPEA Journal, vol. 40, pp. 692-707.

(6) Bartol, SM & Musick, JA 2003, Sensory Biology of Sea Turtles in The biology of Sea Turtles, eds PL Lutz, JA Musick & J Wyneken, CRC Press, Boca Raton, Florida, USA, vol. 2, pp. 79-102.

(7) Myberg AA 2001. The acoustical biology of elasmobranchs, Environmental Biology of Fishes 30:31-45.

(8) Popper AN, Fay RR, Platt C and Sand O 2003. Sound detection mechanisms and capabilities of teleost fishes. In: Sensory Processing in Aquatic Environments eds. SP Colin and NJ Marshal, Springer-Verlag, New York, USA. pp. 3-38.

(9) Hastings MC, Popper AN, Finneran JJ and Lanford PJ 1996. Effects of low-frequency underwater sound in hair cells of the inner ear and lateral line of the teleost fish Asronotus ocellatus. Journal of the Acoustical Society of America 99:1759-1766.

(10) Southall et al. 2007. Op. cit.

- **Physiological and Behavioural Changes -** Physiological changes include temporary auditory fatigue (known as Temporary Threshold Shift (TTS). Temporary behavioural changes include changes in swimming behaviour or direction of fauna.
- **Masking -** interfering with biologically important sounds (including vocal communication), echolocation signals and sounds produced by predators or prey.
- **Audibility -** The zone of audibility is the zone within which a marine mammal can hear the seismic pulses. This may or may not have adverse indirect impacts to marine life (such as annoyance or mild disturbance).

6.3.1.3 (1) Marine Mammals

There have been several reviews of the effects of underwater noise, including seismic exploration, on marine mammals, which are cited as appropriate in this section.

Physical Injury

For marine mammals, there have been no confirmed cases where exposure to seismic airgun sound has directly caused mortality or serious physical injuries [(1)]. There is inconclusive evidence whether injuries recorded in stranded marine mammal species are from direct exposure to underwater sound [(1)].

Auditory Injury

Exposure to high levels of sound (whether from a seismic survey or other sources) may lead to permanent hearing impairment, also known as Permanent Threshold Shift, or PTS. PTS occurs when the animal suffers physical damage to its hearing apparatus, leading to total or partial deafness or an impaired ability to hear sounds within specific frequency ranges [(2)]. Southall *et al.* (2007) [(1)] published recommended cetacean physical injury threshold levels for Sound Exposure Levels (SELs) from multiple pulse sources such as noise generated from seismic operations. The cetacean physical injury threshold which may result in PTS was determined to be 198 dB re 1 $\mu Pa^2.s$ for cetaceans that hear at mid and low frequencies and 179 dB re 1 $\mu Pa^2.s$ for cetaceans that hear at high frequencies. It would be very unlikely for marine mammals to receive this magnitude of sound exposure level from the airguns.

(1) Southall, B.L., A.E. Bowles, W.T. Ellison, J.J. Finneran, R.L. Gentry, C.R. Greene, Jr., D. Kastak, D.R. Ketten, J.H. Miller, P.E. Nachtigall, W.J. Richardson, J.A. Thomas, and P.L. Tyack. 2007. Marine mammal noise exposure criteria: Initial scientific recommendations. Aquatic Mammals 33:411-521.

(2) Weilgart, L.,2013. "A review of the impacts of seismic airgun surveys on marine life." Submitted to the CBD Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity, 25-27 February 2014, London, UK.

Physiological and Behavioural Changes

Temporary Auditory Fatigue

Exposure to high levels of sound may also lead to temporary hearing impairment, also called Temporary Threshold Shift, or TTS. TTS occurs where the animals' hearing threshold rises temporarily and a sound must be louder to be heard. TTS can last for a few minutes to a few days before full recovery is achieved. This is generally referred to as auditory fatigue rather than auditory injury and is likely to cause a temporary change in the animals' behaviour as opposed to any physical change. Only a few data on sound levels and durations necessary to elicit mild TTS have been obtained for marine mammals. An experiment which exposed bottlenose dolphins and beluga whales to single one-second pulses of underwater sound determined that TTS generally became evident at received levels of 192 to 201 dB re 1 µPa rms at 0.4, 3, 10, 20, and 76 kHz (Schlundt et al., 2000) [(1)]. They established that the slight hearing impairment elicited by the sound exposures disappeared after exposure within an interval shorter than or equal to the interval of pulses. Finneran et al. (2000) [(2)] exposed bottlenose dolphins and a beluga whale to single underwater pulses designed to generate sounds with pressure waveforms similar to those produced by distant underwater explosions. Pulses were of 5.1 to 13 milliseconds (ms) in duration and the measured frequency spectra showed a lack of energy below 1 kHz. Exposure to those impulses at a peak received SPL (sound power levels) of 221 dB re 1 µPa produced no more than a slight and temporary reduction in hearing. Similar results were obtained by Finneran et al. (2002) [(3)] despite the use of a water gun (impulses contain more energy at higher frequencies than an airgun), which generated impulses with higher peak pressures and total energy fluxes than used in the aforementioned study.

Given the results of the aforementioned studies and a seismic pulse duration (as received at close range) of 20 ms, the received level of a single seismic pulse might need to be at least 210 dB re 1 µPa rms in order to produce brief, mild TTS. Exposure to several seismic pulses at received levels near 200 to 205 dB might result in slight TTS in a small odontocete. Received levels of less than or equal to 200 to 205 dB are usually restricted to a radius of no more than 100 m around a seismic vessel. Given that marine mammals are unlikely to be exposed to levels of seismic pulses that could cause TTS, it is highly unlikely that they would sustain hearing impairment.

(1) Schlundt, C.E., J.J. Finneran, D.A. Carder and S.H. Ridgway. 2000. Temporary shift in masked hearing thresholds of bottlenose dolphins, Tursiops truncatus, and white whales, Delphinapterus leucas, after exposure to intense tones. Journal of the Acoustic Society of America. 107(6):3496- 3508.

(2) Finneran, J.J., C.E. Schlundt, D.A. Carder, J.A. Clark, J.A. Young, J.B. Gaspin and S.H. Ridgway. 2000. Auditory and behavioral responses of bottlenose dolphins (Tursiops truncatus) and a beluga whale (Delphinapterus leucas) to impulsive sounds resembling distant signatures of underwater explosions. J. Acoust. Soc. Am. 108: 417-431.

(3) Finneran, J.J., C.E. Schulundt, R. Dear, D.A. Carder and S.H. Ridgway. 2002. Temporary shift in masked hearing thresholds in odontocetes after exposure to single underwater impulses from a seismic watergun. J. Acoust. Soc. Amer. 111: 2929-2940.

Avoidance and Displacement

There is evidence that exposure to underwater sound may cause certain cetacean species to exhibit behavioural changes such as avoidance or displacement and in some cases causes a change in vocalisations, diving and foraging activities, and migratory pathways [(1)]. Behavioural effects can range from a visible acknowledgement by an animal that it has heard the sound, such as a brief startle response, to strong and prolonged avoidance. Most commonly, marine mammals react by changing their direction and/or speed of movement or behavioural activity. If a marine mammal does react to an underwater sound by changing its behaviour or moving a small distance, the impacts of the change may have the potential to either be indistinguishable from natural behaviour, or may result in displacement of the individual marine mammal. If a sound source displaces marine mammals from an important feeding or breeding area or blocks the migration route to those areas for a prolonged period, impacts on the animals could be significant at the population level. Impacts of this nature are not expected given the available data on marine mammals in the Andaman Sea.

Goold (1996) [(2)] studied the effects on common dolphins, *Delphinus delphis*, of 2D seismic surveys in the Irish Sea (Goold, 1996) [(1)]. Passive acoustic surveys were conducted from the 'guard ship' that towed a hydrophone 180 m aft. The results indicated that there was a local displacement of dolphins around the seismic operation. However, observations indicated that the animals were tolerant of the sounds at distances outside a 1 km radius from the airguns. Initial reports of larger-scale displacement were later shown to represent a normal autumn migration of dolphins through the area, not attributable to seismic surveys.

Other tests have also been conducted to investigate behavioural response and temporary threshold shift in five bottlenose dolphins and two white whales in a captive situation (Richardson et al., 1995 [(3)], Schlundt et al., 2000 [(4)]). They were exposed to single one-second tones at received levels ranging from 141 to 201 dB re 1 µPa at frequencies of 0.4, 3, 10, 20, and 75 kHz. Dolphins exhibited short-term changes in behaviour above received sound levels of 178 to 193 dB re 1 µPa rms, and white whales did so at received levels of 180 to 196 dB and above. At 400 Hz, short-term changes in behaviour occurred at received levels of 180 to 190 dB.

(1) Weilgart, L.,2013. "A review of the impacts of seismic airgun surveys on marine life." Submitted to the CBD Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity, 25-27 February 2014, London, UK.

(2) Goold (1996) Acoustic assessment of populations of common dolphin Delphinus delphis in conjunction with seismic surveying. Journal of the Marine Biological Association UK 76: 811-820

(3) Richardson, W.J., Malme, C.I., Green, C.R., Jr., and Thomson, D.H. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA 576 pp.

(4) Schlundt, C.E., J.J. Finneran, D.A. Carder and S.H. Ridgway. 2000. Temporary shift in masked hearing thresholds of bottlenose dolphins, Tursiops truncatus, and white whales, Delphinapterus leucas, after exposure to intense tones. Journal of the Acoustic Society of America. 107(6):3496- 3508.

Although information on their likely abundance and distribution is data-deficient, odontocetes appear to demonstrate a lesser avoidance to operating seismic vessels than some other species recorded, eg. Baleen whales. Odontocetes are occasionally seen within a few hundred meters of an operating airgun array and dolphins are often seen from seismic vessels and exhibit some tolerance of airgun sounds, but when exposed to strong airgun sound from a nearby vessel they sometimes exhibit avoidance or behavioural changes (Goold, 1996) [(1)].

It is known that the threshold levels for behavioural responses by bottlenose dolphins to single one-second pulses ranged from 178 to 186 dB re 1 µPa for frequencies from 75 to 3 kHz. Several species of baleen whales are known to exhibit avoidance behaviour at broadband sound levels of approximately 114 to 131 dB re 1µPa (Ridgway et al. 1997) [(1)].

Different species and even different individuals of the same species react to a given acoustic stimulus in different ways. At times, the reactions may also vary by season, reproductive state, and the current activity of the animal. Some marine mammals seem to be very tolerant of underwater sounds under some circumstances but more responsive at other times.

Surfacing and Diving Behaviour

Increases in ambient underwater sound can also cause changes in surfacing and diving behaviour [(2)]. For example, the movements of sperm whales in the Gulf of Mexico were recorded before, during and after seismic exposures where it was observed that individuals swimming speed and foraging behaviour appeared reduced. Other changes observed in marine mammals in response to increases in ambient underwater sound included a decrease in the frequency of dives as well as changes in diving depths [(3)], an increase in the amount of time spent at the surface [(4)] and increased swimming rate [(5)]. In terms of avoidance behaviour, toothed whales in offshore waters appear to demonstrate less avoidance of operating seismic survey vessels than baleen whales. They are occasionally seen within a few hundred metres of an operating airgun array and common dolphins seem to be tolerant of the sound

(1) Ridgway, S.H., D.A. Carder, R.R. Smith, T. Kamolnick, C.E. Schlundt and W.R. Elseberry. 1997. Behavioral responses and temporary shift in masked hearing threshold of bottlenose dolphins, Tursiops truncatus, to 1-second tones of 141 to 201 dB re 1 µPa. Tech. Rep. 1751, Revision 1. Tech. Rep. to Naval Command, Control and Ocean Surveillance Center (NCCOSC), RDT&E DIV D3503, San Diego, CA. 27 p.

(2) Weilgart, L.,2013. "A review of the impacts of seismic airgun surveys on marine life." Submitted to the CBD Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity, 25-27 February 2014, London, UK.

(3) Richardson, W.J., Malme, C.I., Green, C.R., Jr., and Thomson, D.H. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA 576 pp.

(4) Stone, C.J., and Tasker, M.L. 2006. The effect of seismic airguns on cetaceans in UK waters. J. Cetacean Res. Manag. 8: 255–263.

(5) Weilgart, L.,2013. "A review of the impacts of seismic airgun surveys on marine life." Submitted to the CBD Expert Workshop on Underwater Noise and its Impacts on Marine and Coastal Biodiversity, 25-27 February 2014, London, UK.

from an array at distances greater than 1 km [1]. However, when dolphins are exposed to strong airgun sound from a nearby vessel they sometimes exhibit avoidance or behavioural changes. Vocalisation changes have been recorded in cetacean species where it may represent attempts to overcome 'masking' effects (described further below) and compensating for the additional sound in the environment [2]. These changes have been observed in response to sound generation from anthropogenic activities such as shipping, sonar use, and seismic activities.

Masking

Anthropogenic sources of sound can interfere with the detection of acoustic signals such as communication calls, echolocation calls, and environmental sounds important to marine mammals. If the man-made sound is strong enough relative to the received signal, the signal could be 'masked' and undetectable (auditory masking). There is very little information about masking of sounds important to marine mammals; however, masking most likely would result from continuous sounds rather than the short pulses associated with seismic exploration (Richardson et al. 1995) [2]. Seismic pulses would generally have a masking effect for less than 1 second out of every 10 seconds (the interval between successive pulses). Thus, for 90% or more of the time, the seismic pulses would not have an appreciable masking effect. Some whales are known to continue to call in the presence of seismic pulses (Richardson et al. 1995) [3].

Based on the above conclusions, masking is not identified as being a significant issue for the marine seismic survey, and is not considered further in this assessment.

Audibility

The zone of audibility is the zone within which a marine mammal can hear the seismic pulses. The size of the zone depends on the hearing threshold of the species at the frequency of the emitted sound, the received level of the sound at that distance, and the level of ambient noise at corresponding frequencies.

Odontocetes hear relatively poorly at low frequencies and communicate very little within low ranges. Bottlenose dolphins (*Tursiops truncatus*), which have been recorded in the Andaman Sea, have been shown to be sensitive in the single-digit kHz frequencies (1 kHz to 10 kHz) where they conduct the majority of their low frequency whistling. The maximum detection radius for low-frequency components of seismic sounds for odontocetes will normally be

(1) Goold (1996) Acoustic assessment of populations of common dolphin Delphinus delphis in conjunction with seismic surveying. Journal of the Marine Biological Association UK 76: 811-820

(2) Di Iorio, L. and Clark, C.W. 2010. Exposure to seismic survey alters blue whale acoustic communication. Biol. Lett. 6 (1): 51-54. doi:10.1098/rsbl.2009.0651

(3) Richardson, W.J., Malme, C.I., Green, C.R., Jr., and Thomson, D.H. 1995. Marine Mammals and Noise. Academic Press, San Diego, CA 576 pp.

determined by absolute hearing threshold rather than the ambient noise level (Richardson et al. 1995) [(1)].

However, seismic pulses also include significant energy at frequencies from a few hundred to a few thousand hertz. Although this mid-frequency energy is weaker than that at lower frequencies, it may be more prominent to odontocetes given their rapid increase in auditory sensitivity with increasing frequency.

The theoretical zone of audibility for seismic pulses can be quite large, reaching distances of over 50 km even for odontocetes (Richardson et al. 1995) [(1)]. Although the radius of audibility establishes the theoretical maximum possible zone of effect, there is no evidence that merely hearing weak seismic pulses from a distant source has any negative effect on marine mammals given the levels of natural and anthropogenic background sound generally present in the underwater environment (Richardson et al. 1995) [(1)]. The maximum radius of influence is normally expected to be less (often much less) than the maximum radius of audibility.

Impacts due to audibility (where there are no other impacts experienced) are generally considered to have insignificant effect on marine mammals.

Existing/ In-place Controls

The following management procedures will be in place to reduce potential impacts of underwater noise to marine mammals:

- Ensure that survey contractor follows codes of good practices for seismic survey, especially measures to minimise impact on marine mammals.
- Implement the 'Pre Start-up Visual Observation Procedures' (also known as "Pre-shooting search) as per JNCC Seismic Guidelines (***Annex C***) – make a visual check from a suitable high observation platform to see if there are any marine mammals within a 500 m radius at least 30 minutes prior the commencement of seismic acquisition. In deep waters (>200m) the pre-shooting search should extend to 60 minutes as deep diving species (e.g. sperm whale and beaked whale) are known to dive for longer than 30 minutes..
- If mammals are observed during the pre-shooting search, delay the start of the seismic sources until the marine mammals have moved out of the 500 m radius, or 20 minutes after the last sighting within 500 m.
- Implement "Soft Start Procedures" as per JNCC Seismic Guidelines (***Annex C***). Power should be built up slowly from a low energy start-up (e.g. starting with the smallest airgun in the array and gradually adding in others) over at least 20 minutes to give adequate time for marine mammals to leave the area. This build up of power should occur in uniform stages to provide a constant increase in output.
- Implement passive acoustic monitoring (PAM), whereby sea mammal vocalization is monitored to determine whether there may be any mammals near the survey vessel, especially during night time or low

visibility operations when mammals may not be able to be visually observed.

- Maintain visual observation continuously during soft starts and operations to determine the presence of marine mammals.
- After detecting marine mammals, a record shall be made that includes observation detail and marine mammal description, such as the seismic vessel coordinates and distance between the vessel and the marine mammal, and if possible, species & number of the marine mammal, frequency and duration of marine mammal in the observation area. Recorded information shall be collected in Observation Report for future reference.
- Utilize chase vessels to monitor the survey area at least 24 hours prior to commencement of airgun array operations.
- Where possible and data is available, maintain awareness and observation of the periods of migration of the most present species in the Project area, in order to stop the activities during those periods.

Data collected during the observations will help increase the knowledge of these animals in the Gulf of Martaban. Data on any whales observed, including details on the implementation of the mitigation measures (ie safety distance) will allow Eni to develop and fine tune its mitigation measures to protect these animals for future seismic surveys. Marine mammal observation reports should be made available to interested parties as and when requested under the discretion of Eni.

Significance of Impacts

As stated in the literature above, toothed whales are seen within a few hundred metres of an operating airgun array and common dolphins seem to be tolerant of the sound from an array at distances greater than 1 km. As such, it is anticipated that injury distances would be only within a few hundred metres of the sound source at most and with the soft-start procedure and use of the marine mammal observers, there is unlikely to be any injury to mammals from the proposed activity.

The majority of published literature on this issue indicates that behavioural change in marine mammals is not experienced at very large (i.e. beyond 10 km) distances from seismic surveys. It is also important to recognise that behavioural changes (for example a change to swimming patterns) are not an injury and any potential behavioural changes will be temporary i.e., until the species is far enough away from the sound source to not be impacted and/or until the seismic vessel has moved away from an area. Marine mammals are highly mobile and are likely to avoid the area of increased sound around the vessel. The control measures mentioned above will help reduce the potential impact on any marine mammals in the vicinity of the seismic vessel during start-up and will provide more time for marine mammals to vacate the area around the sound source in which potential impacts could occur. As the seismic vessel will also be moving, the temporal extent of the impact will be

small on a particular area (a number of hours maximum) and the resultant magnitude of the impact is considered to be small.

On the basis of the proposed sound exposure levels generated from the airguns and the tolerance thresholds of marine mammals presented in literature, there would appear to be potential for damage to hearing to occur should cetaceans be present in close proximity to operating airguns. However, the low auditory sensitivity of many, if not all of the species that potentially use the waters of the survey area, to low-frequency sounds may somewhat reduce their vulnerability to exposure to intense airgun sounds. No long-term or permanent displacement from critical habitat or other preferred habitat would be expected to occur, nor destruction or adverse modification of critical habitat.

Based on the above assessment, and considering the existing in-place controls, the significance of impacts to marine mammals from underwater noise is evaluated as **Minor** (***Table 6.16***).

Table 6.16 Assessment of Potential Impacts on Marine Mammals from Underwater Noise

Impact	Underwater noise from airgun emissions will lead to impacts to marine mammals.				
Nature	**Negative**	Positive	Neutral		
	Impacts to marine mammals would be considered to be negative impacts.				
Type	**Direct**	Indirect	Induced	Cumulative	
	Impacts to marine mammals would be direct				
Duration	Temporary	**Short-term**	Long-term	Permanent	
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would last the duration of the seismic survey.				
Extent	**Local**	Regional	International		
	Impacts would be limited to the survey area and hence would be considered to be local.				
Scale	The 3D seismic survey will cover an area of approximately 4,910 km². Vessel will travel at 4 knots. A small proportion of resource expected to be affected. It is estimated that the sound levels emitted will be of the order 220 - 230 dB re 1 µPa rms at 1 m from a single airgun and ~245 - 250 dB re 1 µPa rms at 1 m for the array. Sound levels emitted by the airguns may be high enough to cause some temporary behavioural changes in marine mammals, but long-term injuries are very unlikely.				
Frequency	Airgun will be operated intermittently but repeatedly throughout the seismic survey period.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact may affect a specific group of localised individuals within a population over a short time period, but does not affect other trophic levels or the population itself.				
Receptor Sensitivity	Low	**Medium**	High		
	Marine mammals have Medium sensitivity, as some of the species present in Myanmar waters are considered international and national species of conservation concern.				
Significance	Negligible	**Minor**	Moderate	Major	
	The combination of a Medium Receptor Sensitivity and Small Magnitude will result in an overall **Minor** Impact.				

Additional Mitigation Measures, Management and Monitoring

The significance of impacts is rated as **Minor,** and no additional mitigation is considered necessary provided that existing/in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Minor** significance.

6.3.1.3 (2) Plankton, Fish Eggs and Larvae

Available literature regarding the potential for pressure effects from airgun sound indicates that direct injuries to fish eggs, fish larvae or pelagic resources are predicted to occur only when they are within a few metres of the airguns (Booman et al. 1996) (1). Larval mortality, where observed, occurs in the range of 0.5 to 3.0 metres from the airguns and associated with relatively high peak energy levels. A distance of five metres has also been indicated as the range for producing various pathological effects in eggs and larvae (Payne., 2004) (2). Significant numbers can only be affected in situations where the survey line passes directly over plankton in shallow waters e.g. where large numbers of fish eggs, larvae or plankton exist.

Natural mortality of fish eggs and larvae is very high, estimated to be up to 15% per day for most species (Davis et al., 1998) (3). As such, the expected daily mortality rates of fish eggs and larvae caused by a seismic survey would be regarded as low compared to natural mortality rates and hence would be unlikely to have an effect on overall population levels.

Existing/ In-place Controls

Given that significant impact of airgun sound on fish and pelagic resources, such as fish eggs, fish larvae, plankton and coral spawn are only likely to occur within close proximity to the airgun array, mitigation measures specifically designed to minimise the potential impact are not necessary.

Significance of Impacts

Evaluation of impacts to plankton, fish eggs and larvae as a result of underwater sound from the 3D seismic survey activities have been conducted in accordance with the methodology and terminology presented in *Section 6.1*.

(1) Booman, C., J. Dalen, H. Leivestad, A. Levsen, T. van der Meeren and K. Toklum. 1996. Effecter av luftkanonskyting på egg, larver og yngel. Fisken Og Havet 1996(3):1-83 (Norwegian with English summary).

(2) Payne, J.F. 2004. Potential effect of seismic surveys on fish eggs, larvae and zooplankton. Can. Sci. Advis. Sec. Res. Doc. 2004/125.

(3) Davis, R. A., D. H. Thomson and C. I. Malme. 1998. Environmental Assessment of Seismic Exploration on the Scotian Shelf. 1998. Prepared for Mobil Oil Canada Properties Ltd., Shell Canada Ltd., and Imperial Oil Ltd. for submission to the Canada-Nova Scotia Offshore Petroleum Board.

The significance of impacts to plankton, fish eggs and larvae is evaluated as **Negligible** (***Table 6.17***).

Table 6.17 Assessment of Potential Impacts on Plankton, Fish Eggs and Larvae from Underwater Noise

Impact	Underwater noise from airgun emissions will lead to impacts to plankton, fish eggs and larvae.			
Nature	**Negative**	Positive	Neutral	
	Impacts to plankton, fish eggs and larvae would be considered to be negative impacts.			
Type	**Direct**	Indirect	Induced	Cumulative
	Impacts to plankton, fish eggs and larvae would be direct			
Duration	Temporary	**Short-term**	Long-term	Permanent
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would last the duration of the seismic survey.			
Extent	**Local**	Regional	International	
	Impacts would be limited to the survey area and hence would be considered to be local.			
Scale	The 3D seismic survey will cover an area of approximately 4,910 km^2.Vessel will travel at 4 knots. Impacts of airgun noise on plankton, fish eggs and larvae are only likely to occur close to the operating airgun array. Given the large distance between the airguns and any plankton, fish eggs or larvae present, the sound levels are unlikely to have any major effect. Taking into account the high natural mortality of plankton, fish eggs and larvae, the magnitude is small.			
Frequency	Airgun will be operated intermittently but repeatedly throughout the seismic survey period.			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact may affect a specific group of localised individuals within a population over a short time period, but does not affect other trophic levels or the population itself.			
Receptor Sensitivity	**Low**	Medium	High	
	Receptor is considered of low sensitivity as plankton, fish eggs and larvae are expected to be common throughout the Gulf of Martaban depending on seasonality.			
Significance	**Negligible**	Minor	Moderate	Major
	The combination of a Low Receptor Sensitivity and Small Magnitude will result in an overall **Negligible** Impact.			

Additional Mitigation Measures, Management and Monitoring

The significance of impacts is rated as **Negligible,** and no additional mitigation is considered necessary provided in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Negligible** significance.

6.3.1.3 (3) Sea Turtles

Physical and Auditory Injury

There are no available data on injury or mortality of turtles in relation to exposure to increases in underwater ambient sound. Marine turtles are considered less susceptible to increases in ambient underwater sound increases than marine mammals. However, turtles hearing range of highest sensitivity is at lower frequencies, with peak hearing range of sea turtles from around 200 to 700 Hz [(1)] and as such could be sensitive to the low frequency sounds generated by seismic surveys (typically from 10 to 300 Hz). There is little information on sea turtle hearing or the role of sound in their life cycle. However the impacts are likely to be similar to other marine animals including temporary or permanent hearing damage and avoidance behaviour [(2)]. Although turtles are considered less sensitive to increases in underwater sound than marine mammals, they are also less capable of quickly moving away.

Physiological and Behavioural Changes

Behavioural changes have been recorded in green turtles and hawksbill turtles when exposed to noise levels higher than 166 dB re 1 µPa (rms) and when levels were higher than 175 dB re 1 µPa (rms) demonstrated "erratic behaviour" or "agitation" [(2)]. Hypothetical studies on turtles in relation to 3D seismic surveys have shown that turtles could exhibit responses out to 2 km from the sound source and avoidance behaviour out to an estimate 1 km from the sound source [(3)]. As with marine mammals, turtles have also been observed to alter their diving behaviour in response to underwater sound. Some loggerhead turtles (*Caretta caretta*) in the Mediterranean Sea were observed to dive following an airgun shot [(4)]. In some instances, turtles were found to adapt to the noise after prolonged exposure although they did exhibit avoidance behaviours during initial exposure.

Marine turtles also show strong fidelity to specific nesting beaches and associated migratory corridors and it is therefore considered they can be susceptible to impacts which could alter these migrations. However, the Project Site is approximately 200 km from the mainland coast of Myanmar and is thus not likely to impact mainland nesting beaches. There are known green turtle nesting beaches near Moscos Island, however, these are located over 170 km from the area in which the seismic survey will be undertaken. There is a potential for migratory routes of turtles to these nesting beaches to be

(1) Samuel, Y., S.J. Morreale, C.H. Greene, and M.E. Richmond. 2005. Underwater, low-frequency noise in coastal sea turtle habitat. J. Acoust. Soc. Am. 117(3):1465-1472.

(2) McCauley R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch and K. McCabe, 2000. Marine seismic surveys – A study of environmental implications. APPEA J 40: 692–706.

(3) Bartol, SM & Musick, JA 2003, Sensory Biology of Sea Turtles in The biology of Sea Turtles, eds PL Lutz, JA Musick & J Wyneken, CRC Press, Boca Raton, Florida, USA, vol. 2, pp. 79-102.

(4) DeRuiter, SL and Doukara, KL., 2012. Loggerhead turtles dive in response to airgun sound exposure. Endang Species Res. Vol. 16: 55–63, 2012.

impacted by underwater sound generation by the Project however, given the extent of the survey area and the distance, there is unlikely to be an impact on turtle nesting ability.

In offshore waters, avoidance would cause only a temporary displacement from a particular geographic location during a seismic survey. Similarly, offshore seismic surveys would be unlikely to disturb or displace turtles from preferred coastal habitats, such as shallow seagrass beds or coral reef habitat.

Existing/ In-place Controls

There are no specific mitigation measures to be recommended for minimising impacts to sea turtles as a result of the proposed survey. It is considered that the soft-start or ramp-up procedures recommended to be employed to mitigate impacts to marine mammals, would also allow sea turtles sufficient time to avoid close proximity to seismic operations.

Significance of Impacts

Evaluation of impacts to sea turtles as a result of underwater noise from the 3D seismic survey activities have been conducted in accordance with the methodology and terminology presented in *Section 6.1*. Based on the assessment, whilst the seismic survey may disturb sea turtles should they be present in the survey area during operations, and may produce limited short term hearing impairment in some individuals should exposure be severe; it is unlikely to cause death or life-threatening injury. Therefore, the proposed survey would not be expected to cause long-term or permanent displacement from critical habitat or other preferred habitat, nor will they result in destruction or adverse modification of critical habitat.

The significance of impacts is rated as **Minor** (***Table 6.18***).

Table 6.18 Assessment of Potential Impacts on Sea Turtles from Operational Noise

Impact	Underwater noise from airgun emissions will lead to impacts to sea turtles.			
Nature	**Negative**	Positive	Neutral	
	Impacts to sea turtles would be considered to be negative impacts.			
Type	**Direct**	Indirect	Induced	Cumulative
	Impacts to sea turtles would be direct. .			
Duration	Temporary	**Short-term**	Long-term	Permanent
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would last the duration of the seismic survey.			
Extent	**Local**	Regional	International	
	Impacts would be limited to the survey area and hence would be considered to be local			
Scale	The 3D seismic survey will cover an area of approximately 4,910 km^2. Vessel will travel at 4 knots. Impacts of airgun noise on sea turtles are only likely to occur close to the operating airgun array. Mitigation measures designed to protect marine mammals would be expected to prevent impacts to turtles as well.			
Frequency	Airgun will be operated intermittently but repeatedly throughout the seismic survey period.			

Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact may affect a specific group of localised individuals within a population over a short time period, but does not affect other trophic levels or the population itself.				
Receptor Sensitivity	Low		**Medium**	High	
	Receptor is considered to be of medium sensitivity as sea turtles are part of a conservation and management program in Myanmar, and their migratory path has the potential to enter the Project area.				
Significance	Negligible	**Minor**	Moderate	Major	
	The combination of a Medium Receptor Sensitivity and Small Magnitude will result in an overall **Minor** Impact.				

Additional Mitigation Measures, Management and Monitoring

The significance of impacts is rated as **Minor,** and no additional mitigation is considered necessary provided in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Minor** significance.

6.3.1.3 (4) Fish

There is a lack of understanding about the effect of increases in sound on fish species. Research into underwater sound and the associated responses from fish species is currently based on a limited number of species (1). Some fish, such as Clupeids (e.g. herring and anchovy) are considered to be hearing specialists in that they have evolved specialised anatomical structures that enhance hearing sensitivity and hearing range. Many other species of fish (such as groupers and snappers) are not considered as sensitive to underwater sound. Fish are generally considered to have good low frequency hearing and are likely to hear seismic shots up to several kilometres from the source. Fish hearing ranges are between 20 Hz – 1 kHz. The frequency of the sound produced by seismic surveys is within this range.

Physical and Auditory Injury

The potential for physical injury of fish in relation to underwater sound is greater in species which have a swim bladder as the organ is unable to adapt quickly enough to the high intensity seismic pressure waves. However, this type of physical injury is only likely in very close proximity (a few metres) to the sound source and therefore, is highly unlikely for adult fish. Eggs and larvae in close proximity to the sound source could be physically injured as they are present near the sea surface and unable to avoid the sound. However, the amount of eggs and larvae likely to be impacted by exposure to sound is not considered to be significant when compared to the large areas in which eggs and larvae would cover in the water column (1).

(1) Popper, A. N., and M. C. Hastings, 2009. "The effects of anthropogenic sources of sound on fishes." Journal of Fish Biology 75.3: 455-489.

Trials in Scotland exposed various species of temperate fish of different age classes including cod (*Gadus morhua*), pollock (*Pollachius pollachius*), saith (*Pollachius virens*) and mackerel (*Scomber scombrus*) to airgun sound levels of up to 218 dB from a three gun array (Wardle et al., 2001) [(1)]. Involuntary C-starts were observed when airguns were fired within 10 m of the subjects; however, the fish did not move off the reef and diurnal rhythms were not seen to have been affected by the exposure. No mortality was observed.

Whilst generally focusing on temperate fisheries, international studies generally indicated that direct mortality is unlikely to occur as the majority of pelagic fish are likely to be driven away by the approaching sound source, the 'soft start' procedure and the movement of the vessel. Demersal fish are unlikely to be significantly affected. Overall, levels of injury are considered to be minor in the context of local species populations. In the absence of local data such findings provide an indication of potential impacts to commercial fisheries from the proposed seismic survey.

Physiological and Behavioural Changes

Underwater sound can potentially cause behavioural changes in fish species. Behavioural changes in relation to exposure to sound have been observed in fish species with alarm responses (or noticeable changes in fish swimming behaviour) expected from 1 to 5 km of the seismic source, depending on the species threshold and the sound transmission loss. Although there are no conclusive studies on fish behavioural changes in relation to increases in ambient underwater sound, no reported significant effects have been reported by numerous studies. However, there are a number of studies which have shown that fish will immediately leave the area around the sound source; this avoidance area can in some instances be up to 2 km [(2)]. It should be noted that any behavioural changes to fish have been observed to be short-lived and fish tend to exhibit normal behaviour after an initial startle or avoidance response [(36)].

In relation to coral reef species, studies conducted into the response of fish and invertebrates have found no permanent changes in behaviour on the reef [(3)]. At its closets extent the area in which 3D seismic survey will occur is located over 140 km from any potential reef areas and is therefore not likely to impact and reef associated species.

Existing/ In-place Controls

(1) Wardle, C. S., Carter, T. J., Urquhart, G. G., Johnstone, A. D. F., Ziolkowski, A. M., Hampson, G. & Mackie, D. (2001). Effects of seismic air guns on marine fish. Continental Shelf Research 21, 1005–1027.

(2) Turnpenny, A. W. H. and Nedwell, J. R. 1994. The effects on marine fish, diving mammals and birds of underwater sound generated by seismic surveys. Consultancy Report FCR 089/94, Fawley Aquatic Research Laboratories Ltd., 40pp.

(3) Wardle, C. S., Carter, T. J., Urquhart, G. G., Johnstone, A. D. F., Ziolkowski, A. M., Hampson, G. & Mackie, D. (2001). Effects of seismic air guns on marine fish. Continental Shelf Research 21, 1005–1027.

There are no specific mitigation measures to be recommended for minimising impacts to fish as a result of the proposed survey. It is considered that the soft-start or ramp-up procedures recommended to be employed to mitigate impacts to marine mammals, would also allow fish sufficient time to avoid close proximity to seismic operations.

Significance of Impacts

Overall, potential impacts to fish in Block MD-4 during the seismic survey are expected to be limited to individuals in very close proximity (i.e. a few metres) to the sound source and therefore, impacts are highly unlikely to occur in adult fish due to their high mobility enabling them to move away from the sound source [(1)] prior to any impacts occurring.

The significance of impacts is rated as **Minor** (***Table 6.19***).

Table 6.19 Assessment of Potential Impacts on Fish from Operational Noise

Impact	Underwater noise from airgun emissions will lead to impacts to fish.				
Nature	**Negative**	Positive	Neutral		
	Impacts to fish would be considered to be negative impacts.				
Type	**Direct**	Indirect	Induced	Cumulative	
	Impacts to fish would be direct. .				
Duration	Temporary	**Short-term**	Long-term	Permanent	
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would last the duration of the seismic survey.				
Extent	**Local**	Regional	International		
	Impacts would be limited to the survey area and hence would be considered to be local				
Scale	The 3D seismic survey will cover an area of approximately 4,910 km^2. Vessel will travel at 4 knots. Impacts of airgun noise on fish are only likely to occur close to the operating airgun array. Mitigation measures designed to protect marine mammals would be expected to prevent impacts to turtles as well.				
Frequency	Airgun will be operated intermittently but repeatedly throughout the seismic survey period.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	The impact may affect a specific group of localised individuals within a population over a short time period, but does not affect other trophic levels or the population itself.				
Receptor Sensitivity	Low	**Medium**	High		
	Fish are considered to be of medium sensitivity as some of the commercially caught species identified within the Area of Interest are listed as species of conservational concern on the IUCN Red List.				
Significance	Negligible	**Minor**	Moderate	Major	
	The combination of a Medium Receptor Sensitivity and Small Magnitude will result in an overall **Minor** Impact.				

Additional Mitigation Measures, Management and Monitoring

(1) Turnpenny, A. W. H. and Nedwell, J. R. 1994. The effects on marine fish, diving mammals and birds of underwater sound generated by seismic surveys. Consultancy Report FCR 089/94, Fawley Aquatic Research Laboratories Ltd., 40pp.

The significance of impacts is rated as **Minor,** and no additional mitigation is considered necessary provided in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Minor** significance.

6.3.2 Assessment of Impacts on Fishing Communities and Fisheries

6.3.2.1 Scope of the Assessment

As determined during scoping, potential impacts to fishing communities and fisheries may occur due to:

- Marine Traffic; and
- Physical Presence of Survey Equipment.

6.3.2.2 Summary of Relevant Baseline Conditions

As discussed in ***Chapter 5***, the Tanintharyi areas are productive in shoaling pelagic fish and demersal fish. The offshore area is used for commercial tuna fishing. Various types of fishing gear are used to exploit the marine species found in Myanmar waters. The Project Area falls within the Tanintharyi Fishing Area, which are fishing grounds designated by the Department of Fisheries. However, the Project Area is located far offshore, approximately 140 km away from islands and 200 km from main Tanintharyi shore, and the sea depth is about 1,000 to 2,200 meters. It is therefore expected that the number of fishing vessels in this area is very low. In addition to offshore fisheries, there are likely fishing activities on the islands nearby Block MD-4 (Coco Islands, Narcondam Island, and Preparis Island), but little documented information is available.

6.3.2.3 Assessment of Impacts

6.3.2.3 (1) Marine Traffic and Physical Presence of Survey Equipment

Block MD-4 is located within the Tanintharyi Fishing Area in the Gulf of Martaban, and commercial fishing activities could conceivably be expected within the Project Area. Potential adverse impacts to fishing operations may result from:

- Temporary restriction of access to fishing grounds due to the establishment of a temporary exclusion zone; and
- Removal of fishing gears prior to survey, displacement, damage or loss of fishing gears and snagging/entanglement of fish nets/trawls by towed equipment (dragging streamer and airgun arrays), and vessel movements; and

- Effects of airgun and vessel sound disturbance on target fish populations and their fish prey species (see *Section 6.3.1.3* for a discussion on impacts to fish due to underwater noise).

A temporary exclusion zone will be in place around the survey vessels, airguns and streamers during the surveys, whereby fishing will be forbidden. This will not cause a significant impact to the fishery as it covers only a small proportion. The exclusion zone will cover a maximum of approximately ~ 82 km^2 per day, based on a 500 m exclusion zone over 4,910 km^2 of acquisition area during the 60 day survey (i.e. 125 km^2/day + exclusion zone). In comparison to the Tanintharyi and Ayeyarwady Fishing Areas, the disturbed area per day is small. In addition, seismic acquisition activities will be temporary (100 days).

Interaction between large vessels and rights of passage are governed by international maritime regulations and protocols (eg. international regulations for preventing collisions at sea), which are generally adhered to by officers and crew of commercial fishing boats and other maritime traffic, who should be familiar with them. In the case of artisanal fishers, who are seldom versed in international maritime regulations, potentially hazardous situations may arise. Artisanal fishing craft are generally inadequately illuminated, are small and hence poorly visible, have limited ability to maneuver, and may deploy poorly-marked fishing gear (eg. nets, lines, fixed gear) in the area. However, in the project area, which is far offshore, there are not expected to be any artisanal fishing craft. Damage to fishing equipment is a concern from both a safety perspective (ie. potential risk to personnel on the fishing vessel and the survey vessel) and in terms of adverse reactions/complaints from fishermen whose equipment has been damaged (ie. loss of equipment and temporary loss of earnings/ livelihood). Damage to the streamers from fishing gear is also a concern. There are a number of standard procedures that seismic vessel operators adopt to reduce potential impacts with fishing vessels or equipment, a number of which will be adopted for the proposed survey (see below). Stationary fishing equipment (eg. static nets and associated fastenings, stakes and fishing gears) and fish aggregating devices would be considered to be at risk of being damaged from marine traffic associated with survey activities. Other effects of survey activities in areas of concentrated fishing may include temporary effects such as a perception of interference with fishermen's right to fish in these waters and disturbance of fish stocks. Encounters with fishing vessels and fishing equipment (gear) have been identified as a potential hazard and operational procedures will be in place to minimise the risk of conflicts.

Fishing activity in the offshore waters of Myanmar is most likely to occur outside of the rainy season due to the increased risk of being at sea during monsoon conditions. Therefore, fishing in the Block MD-4 is most likely to occur between September and May.

Existing/ In-place Controls

Potential impacts to fishing activities will be kept to as low as reasonably practicable (ALARP) (1) through mitigation and control measures that have been incorporated into the project design and implementation to safeguard operations. This includes:

- At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy).
- At least two/three weeks prior to survey Eni will engage fisheries liaison officers: one to stay on each Support Vessel, one to stay on the Chase Boat, and one to stay on the seismic vessel. Such fishery representatives will be fully qualified, and have offshore safety certificates, and preferably have experience with of offshore seismic operations. They will be responsible for and are in charge to take care of coordination activities for a proper "Fishing Activity Disruption".
- Patrol the seismic survey area for at least one (1) week before commencing seismic survey activity, and remove all obstructions in the survey area. Record location and details of removed fishing gear.
- Fishing vessels operating over the proposed surveys lines for a marine seismic survey, or those in danger of passing over the deployed streamer, will be warned off by the chase boats.
- Chase vessels will be available to warn vessels to keep clear of the seismic survey vessel and associated trailing equipment, and to escort any unauthorised vessels out of the Project Area. In addition, stationary fishing equipment (eg fishing gears) identified by the chase vessels on the survey route will be removed in advance of operations. Procedures for such removal are presented in ***Chapter 7***.
- Chase vessel with MOGE Representative will be employed to ensure navigational safety and appropriate management of fishing interactions.
- Mobile exclusion zone, limiting the duration and extent of disruption to the fishing activity in any area.
- Upon completion of the survey, all equipment will be immediately removed from the Project Area, i.e. demobilization.
- Organize a complaint, problem, and suggestion receiving point for the entire project duration. Findings from complaints and suggestions shall be reported to MOGE.
- Disclosure and implementation of the Grievance Mechanism for the Project and timely investigation of any grievances.

(1) ALARP has been defined as an impact that is tolerable only if impact reduction is impracticable or if the effort involved in reducing the impact further would be grossly disproportionate to the benefit gained.

Significance of Impacts

Evaluation of impacts to fishing operations as a result of 3D seismic survey activities has been conducted in accordance with the methodology and terminology presented in *Section 6.1*. Results are presented in ***Table 6.20***. The significance of impacts is evaluated as **Moderate**.

Table 6.20 Assessment of Potential Impacts on Fisheries from Marine Traffic and Physical Presence of Survey Equipment

Impact	Increased vessel traffic/ movements related to 3D seismic survey activities will lead to interference with fishing activities.				
Nature	**Negative**	Positive	Neutral		
	Impacts to fishing activities would be considered to be negative impacts.				
Type	**Direct**	Indirect	Induced	Cumulative	
	Impacts to fishing activities would be direct				
Duration	Temporary	**Short-term**	Long-term	Permanent	
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would last the duration of the seismic survey.				
Extent	Local	**Regional**	International		
	Impacts may extend to the onshore fishing communities outside the survey area and hence would be considered to be regional.				
Scale	The 3D seismic survey will cover an area of approximately 4,910 km². Vessel will travel at 4 knots. The exclusion zone will cover a maximum of approximately ~ 82 km² per day.				
Frequency	The seismic survey will operate continuously for 24 hours per day throughout the duration of the survey.				
Magnitude	Positive	Negligible	Small	**Medium**	Large
	Impact magnitude is considered to be medium as impact could affect a substantial number of fisherman, and frequency is continuous.				
Receptor Sensitivity	Low	**Medium**	High		
	Sensitivity is considered to be medium as fisherman are very low-income and dependent on fishing, and low ability to adapt to changes.				
Significance	Negligible	Minor	**Moderate**	Major	
	The combination of a Medium Receptor Sensitivity and Medium Magnitude will result in an overall Moderate Impact.				

Additional Mitigation Measures, Management and Monitoring

Additional mitigation measures to be implemented include the following:

- Chase vessel with MOGE Representative will be employed to ensure navigational safety and appropriate management of fishing interactions.
- Mobile exclusion zone, limiting the duration and extent of disruption to the fishing activity in any area.
- Disclosure and implementation of the Grievance Mechanism for the Project and timely investigation of any grievances.

Significance of Residual Impacts

If the above mitigation measures are implemented, residual impacts would be expected to be of **Minor** significance.

6.3.3 Assessment of Impacts on Shipping/Navigation

6.3.3.1 Scope of the Assessment

As determined during scoping, potential impacts to shipping/navigation may occur due to:

- Marine Traffic; and
- Physical Presence of Survey Equipment.

6.3.3.2 Summary of Relevant Baseline Conditions

As discussed in ***Chapter 5***, the Project Area may experience some traffic from international shipping/navigation routes, as well as local/regional traffic.

6.3.3.3 Assessment of Impacts

Interaction between vessels and rights of passage are governed by international maritime regulations and protocols (e.g. international regulations for preventing collisions at sea), which would be expected to be adhered to by the vessels in the area. Nevertheless, there is a concern with regard to physical interactions with other vessels that includes potential for loss of life in the event of a collision, concomitant pollution effects (fuel oil spillage) and damage/entanglement of streamers.

Vessel traffic within the Project Area is relatively light, consisting of cargo vessels and commercial fishing boats, with the occasional larger shipping vessel. However, there is a shipping lane between Yangon and the south connecting to Malaysia. This shipping lane is moderately used by marine traffic.

Existing/ In-place Controls

Potential impacts to fishing activities will be kept to as low as reasonably practicable (ALARP) (1) through mitigation and control measures that have been incorporated into the project design and implementation to safeguard operations. This includes:

- At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy).
- Use support vessels to warn off traffic.
- Provide adequate lighting and signal blinker on the seismic vessel, and chase vessel to prevent the collision hazard with fishing or cargo vessels.

(1) ALARP has been defined as an impact that is tolerable only if impact reduction is impracticable or if the effort involved in reducing the impact further would be grossly disproportionate to the benefit gained.

- Vessels will be equipped with radar, navigation equipment, and communication equipment to identify obstructions and to provide sufficient warning of approaching surface vessels that may pose a danger to the operations.
- Warning device (ie. Bell or Light) will be provided on the streamer tail buoy for night-time operations.
- Stop the survey in case of poor visibility or extreme weather conditions (such as cyclone), and record the event.
- Upon completion of the survey, all equipment will be immediately removed from the Project Area, i.e. demobilization.

Significance of Impacts

Evaluation of impacts to navigation as a result of 3D seismic survey activities has been conducted in accordance with the methodology and terminology presented in *Section 6.1*. The significance of impacts to shipping/navigation from marine traffic and survey equipment is evaluated as **Negligible** (***Table 6.21***).

Table 6.21 Assessment of Potential Impacts on Shipping/Navigation from Marine Traffic and Physical Presence of Survey Equipment

Impact	Increased shipping traffic/ movements related to 3D seismic survey activities will lead to interference with fishing activities.				
Nature	**Negative**	Positive	Neutral		
	Impacts to shipping and navigation would be considered to be negative impacts.				
Type	**Direct**	Indirect	Induced	Cumulative	
	Impacts would directly affect shipping and navigation through direct obstruction of vessels in the seismic survey area.				
Duration	Temporary	**Short-term**	Long-term	Permanent	
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would last the duration of the seismic survey.				
Extent	Local	Regional	**International**		
	Impacts would be limited to the survey area and hence would be considered to be local.				
Scale	The 3D seismic survey will cover an area of approximately 4,910 km². Vessel will travel at 4 knots.				
Frequency	The seismic survey will operate continuously for 24 hours per day throughout the duration of the survey.				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	Impact magnitude is considered to be small due to there only being localised impacts on receptors with low sensitivity. Although change in baseline conditions will be perceptible, impact affects a small proportion of vessels and is of short duration.				
Receptor Sensitivity	**Low**	Medium	High		
	Sensitivity is considered to be low as marine traffic is relatively light in the Project area.				
Significance	**Negligible**	Minor	Moderate	Major	
	The combination of a Low Receptor Sensitivity and Small Magnitude will result in an overall **Negligible** Impact.				

Additional Mitigation Measures, Management and Monitoring

The significance of impacts is rated as **Negligible,** and no additional mitigation is considered necessary provided in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Negligible** significance.

6.3.4 Impact Assessment due to Unplanned Events

6.3.4.1 Scope of the Assessment

Adverse impacts on the marine environment and survey personnel may occur from the following unplanned events:

- Oil and Chemical Spills; and
- Vessel Collision.

6.3.4.2 Assessment of Impacts

6.3.4.2 (1) Oil and Chemical Spills

Discharge of oily wastes into the marine environment due to minor accidents (eg. failure of spill containment systems, separation of fuel hoses during bunkering operations) may have an impact on water quality and marine ecology. The impact would depend on the type of oil released, the volume of oil, the location of the spill and the prevailing weather and tidal conditions.

Scenarios in which spills could arise vary from small scale spills (around 10m^3), such as a spill during refueling due to a hose break, to larger scale spills such as those from vessel collisions and rupture of the vessels fuel tank (2,000 m^3 or around half of the fuel carried by the seismic vessel). Smaller spills are more common but have a smaller magnitude of impact than larger spills. Larger spills are extremely rare. The seismic and other vessels are likely to use fuel which is non-persistent or "light" fuel (such as Marine Gas Oil (MGO) and Marine Diesel Oil (MDO)). These fuel spills, in the unlikely event of occurrence, would evaporate quickly in the open water environment and would be rapidly diluted and dispersed by ocean currents. Lubricating oils would be expected to form a visible sheen on the surface of the sea, and would persist for longer periods of time than the more volatile hydrocarbons. Heavier oils accidentally released during maintenance activities are predicted to be more persistent and may eventually wash-up on coastlines as weathered tar balls which can have localised impacts on coastal habitats and species.

Although dependent on the extent and location of the release, a small hydrocarbon spill would generally be predicted to have minor impacts. Such impacts are also considered to be unlikely to occur. The effects of a large release of marine gas oil/ diesel as a result of vessel grounding, collision or

other major accident will depend on the quantity of hydrocarbons released, the location of the release and the prevailing weather/oceanographic conditions.

Potential impacts from unplanned spills to marine mammals, marine turtles, fishes and seabirds which may be found within the offshore spill area are discussed below.

Marine Mammals

Marine mammals are highly mobile and a number of field and experimental observations indicate whales and dolphins may be able to detect and avoid surface slicks. Marine mammals that have direct physical contact with surface slicks may suffer surface fouling or ingestion of hydrocarbons and inhalation of toxic vapours. This may result in the irritation of sensitive membranes such as the eyes, mouth, digestive and respiratory tracts and organs, impairment of the immune system or neurological damage. However, in this instance, the only likely spill would be from the vessel diesel fuel which is unlikely to cause a surface slick as it is not oil.

Seabirds

Offshore Myanmar waters are potential foraging grounds for seabirds which are vulnerable when coming into contact with surface slicks during feeding or resting on the sea surface. Physical contact of seabirds with surface slicks may result in fouling of feathers and hypothermia (loss of thermoregulation), decreased buoyancy and potential to drown, inability to fly or feed, anaemia, pneumonia and irritation of eyes, skin, nasal cavities and mouths [(1) (2)]. This may also lead to mortality due to oiling of feathers or the ingestion of hydrocarbons. However, as stated above, the only likely spill would be from the vessel diesel fuel which is unlikely to cause a surface slick as it is not oil.

Marine Turtles

Adult marine turtles exhibit no avoidance behaviour when they encounter an oil slick [(3)]. Contact with surface slicks can therefore result in hydrocarbon adherence to body surfaces [(4)] causing irritation of mucous membranes in the nose, throat and eyes leading to inflammation and infection [(5)]. Oiling can also irritate and injure skin which is most evident on pliable areas such as the neck

(1) AMSA (Australian Maritime Safety Authority) (2012) The effects of maritime oil spills on wildlife including non-avian marine life. http://www.amsa.gov.au/marine_environment_protection/national_plan/general_information/oiled_wildlife/oil_spill_effects_on_wil

(2) IPIECA (International Petroleum Industry Conservation Association) (1995) Op. cit.

(3) Odell, DK. and MacMurray, C. (1986) Behavioural Response to Oil. Final Report: Study on the Effect of Oil on Marine Turtles. S. Vargo, Lutz, PL., Odell, DK., VanFleet, T. and Bossart, G., Mineral Management Services Contract.

(4) Gagnon, MM. and Rawson CA. (2010) Montara Well Release: Report on necropsies from a Timor Sea green sea turtle. Perth, Western Australia, Curtin University: 15.

(5) Etkins, D.S. (1997) Op. cit.

and flippers [1]. However, as stated above, the only likely spill would be from the vessel diesel fuel which is unlikely to cause a surface slick as it is not oil.

Fish

Fish mortalities are rarely observed to occur as a result of oil spills, especially in open water environments [2]. This is often attributed to pelagic fish being able to detect and avoid surface waters underneath oil spills by swimming into deeper water or away from the affected areas.

Existing/ In-place Controls

The proposed 3D seismic survey will be conducted in accordance with the highest standards of safety and industry association guidelines for offshore seismic operations (eg. the International Association of Geophysical Contractors Environmental manual for Worldwide Geophysical Operations, 2004). Survey activity will also be conducted following the standard operation procedures of the vessels, and Eni's Health, Safety, Environment Public Safety, Quality and Radiation Protection Integrated management system (HSE IMS).

The seismic survey vessels will have oil spill response/ contingency plans and spill kits on board in accordance with MARPOL 73/78 regulations (Shipboard Marine Pollution Emergency Plans). Oil, chemicals, and hazardous materials are required to be properly stored to prevent spills from occurring.

A standard for occupational health, safety, and environment will be developed and detailed written operational, contingency and response procedures including Eni's Emergency Response Plan (***Annex B***) will be in place onboard the vessels to cover all anticipated activities and hazard scenarios. Members of staff will be assigned to these procedures, including an Emergency Response Coordinator and crewmembers who are proficient in the use of clean-up equipment. Training will be provided to survey personnel according to the standard as appropriate. Primary medical care shall be provided on the survey vessel according to relevant regulation or standard including coordination measure with onshore public health agency in case there is medical emergency.

If a spill occurs, response and contingency plans for accidental events will be in place, including Eni's Oil Spill Contingency Plan, associated equipment and an appropriate spill kit. The safety of personnel will be the primary concern. Any crew members involved in clean up or containment will have an adequate level of training and will wear Personal Protective Equipment (PPE) appropriate to the nature and volume of spilled material.

(1) Lutcavage, ME., Lutz, PL., Bossart, GD., and Hudson, DM. (1995) Physiologic and clinicopathological effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28: 417-422.

(2) ITOPF (International Tank Owners Pollution Federation) (2011) Effects of Oil Pollution on the Marine Environment. Technical Information Paper. Technical paper No. 13. The International Tank Owners Pollution Federation Limited.

Eni will implement the following mitigation measures regarding fuel/chemical spills:

- Implement Eni's HSE IMS, including the following:
  - In case of oil or chemical spills, follow Eni's Emergency Response Plan (***Annex B***).
  - Follow Seismic Contractor SOPEP (Shipboard Oil Pollution Emergency Plan), which will be available before the start of the survey.
- Conduct the survey activity according to the operational procedure of the vessel which includes:
  - *Safety Management:* main components include policy, organization & responsibility, planning & operation, monitoring on operation performance, and inspection & review for improvement.
  - *Survey Planning* for the survey activity.
  - *Activity Recording:* record on role and responsibility of the key personnel.
- Ensure that the survey contractor has an oil spill response plan in place in accordance with MARPOL 73/78 regulations (Shipboard Marine Pollution Emergency Plans), and/or Seismic Contractor SOPEP (Shipboard Oil Pollution Emergency Plan), which will be available before the start of the survey.
- Implement proper training in the use and handling of the relevant chemicals and standard safety procedures implemented by all contractors.
- Staff will wear Personal Protective Equipment (PPE) appropriate to the nature and volume of spilled material.
- In case of spill, appropriate medical care will be provided, clean-up will be carried out, and incident or accident reports will be filed.
- Provide spill clean up kits and training for designated rapid response team to clean up any spills.
- Store all chemicals in secured storage area with impervious (cement or plastic sheet) floor and bund wall. Handle all chemicals according to their Safety Data Sheet (SDS).
- Assign chase vessels to report abnormal situation to the seismic vessel.

Significance of Impacts

Evaluation of impacts due to oil/chemical spills during the 3D seismic survey activities has been conducted in accordance with the methodology and terminology presented in *Section 6.1*. The significance of impacts to occupational health and safety from operational noise is evaluated as **Minor** (***Table 6.22***)**.**

Table 6.22 Assessment of Potential Impacts due to Oil/Chemical Spills during 3D Seismic Survey Activities

Impact	Oil/chemical spills during offshore operations.			
Nature	**Negative**	Positive	Neutral	
	Oil/chemical spills would be considered to be a negative impact.			
Type	**Direct**	Indirect	Induced	Cumulative
	Impacts would be considered to be direct due to originating from vessels used in the seismic survey.			
Duration	Temporary	**Short-term**	Long-term	Permanent
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would be short-term in the event of a spill, although the risk of such a spill will be present throughout the duration of the survey.			
Extent	**Local**	Regional	International	
	Impacts would be limited to the survey area within the Gulf of Martaban and hence would be considered to be local for vessel collisions (marine gas oil is light and would evaporate rapidly before it drifts outside of the survey area).			
Scale	Spills during offshore operations may impact marine resources, and/or water quality.			
Frequency	Refueling and maintenance activities will occur repeatedly throughout the seismic survey.			
Likelihood	Unlikely (The event is unlikely but may occur at some time during normal operating conditions, ie the event has occurred within industry).			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	Impact magnitude is considered to be small as the frequency is occasional and the likelihood is unlikely.			
Receptor Sensitivity	**Low**	**Medium**	High	
	As the key receptor for spills may be considered to be coral reefs and coastal marine habitats in the vicinity of the project area, receptor sensitivity is considered of medium sensitivity.			
Significance	Negligible	**Minor**	Moderate	Major
	The combination of a Medium Receptor Sensitivity and Small Magnitude will result in an overall **Minor** Impact.			

Additional Mitigation Measures, Management and Monitoring

The significance of impacts is rated as **Minor,** and no additional mitigation is considered necessary provided in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Minor** significance.

6.3.4.2 (2) Vessel Collisions

Any potential physical interactions between fishing vessels / rafts and exploration survey activities may result in damage to fishing gear (e.g. nets/lines damaged or entangled), damage to vessels / rafts or sinking of vessels / rafts with the potential for loss of life. Additional concerns associated with interactions with fishing vessels / rafts include potential for concomitant pollution effects (fuel oil spillage).

The review of baseline conditions identified that coral reefs are unlikely to be found in the Project Area. Whilst impacts to such organisms through vessel grounding / collision may be considered to be severe, such an event is considered extremely unlikely to occur as the survey vessel will not be operating or maneuvering within close proximity to these sites.

Statistics of collisions in Myanmar are not readily available. The International Maritime Organization (IMO) keeps records of serious and very serious casualties of maritime accidents. Out of a total of 6,530 accidents that occurred over a 17-year period from 1995-2012, two were in Myanmar waters. One incident occurred in 2000, when a general cargo ship (the ASEAN Liberty) had an unspecified incident off Myanmar port. A second incident occurred in 2007, when the general cargo ship DOLPHIN II (flag State Panama) sank in bad weather off the west coast of Myanmar, en route to Yangon (Myanmar) from Chittagong (Bangladesh) (1).

Information from other jurisdictions was investigated to determine risk frequency and consequence. There were 353 Canadian maritime accidents in 2010, of which 299 were shipping accidents and 54 were on-board accidents. Since 2001, 46% of the vessels involved in shipping accidents have been fishing vessels. In 2010, there were 136 fishing vessels involved in shipping accidents. After fishing vessels, bulk carriers/OBO vessels (13%) and tugs/barges (13%) were involved most often in shipping accidents. Shipping accidents in 2010 resulted in 11 fatalities and 14 injuries. (2)

Collisions on the UK Continental Shelf involving fixed units (oil and gas installations) during the 17-year period 1990-2007 (Health and Safety Executive, 2009) involved a total of 33 collision incidents at an average frequency of 0.0085 incidents per unit year.(3)

The seismic survey vessel will be accompanied at all times by an appropriate number of chase vessels that would act as fishing liaison as well as look out for the presence of other marine users. The shipping lane between Yangon in the north connecting to Malaysia is not heavily used and covers an area larger than the block. Shipping vessels in transit with a good standard of navigational equipment can easily avoid the Project activities without any disruption.

Existing/ In-place Controls

The proposed 3D seismic surveys will be conducted in accordance with the highest standards of safety and industry association guidelines for offshore seismic operations (eg. the International Association of Geophysical Contractors Environmental manual for Worldwide Geophysical Operations,

(1) International Maritime Organization. http://gisis.imo.org/Public/MCI/Default.aspx

(2) Transportation Safety Board of Canada. http://www.tsb.gc.ca/eng/stats/marine/2010/ss10.asp#table_1

(3) Accident Statistics for Offshore Units on the UKCS 1990-2007. www.oilandgasuk.co.uk/cmsfiles/modules/publications/pdfs/EHS30.pdf

2004). Survey activity will also be conducted following the standard operation procedures of the vessels.

A standard for occupational health, safety, and environment will be developed and detailed written operational, contingency and response procedures including Emergency & Crisis Management Plan will be in place onboard the vessels to cover all anticipated activities and hazard scenarios. Members of staff will be assigned to these procedures, including an Emergency Response Coordinator and crewmembers who are proficient in the use of clean-up equipment. Training will be provided to survey personnel according to the standard as appropriate. Primary medical care shall be provide on the survey vessel according to relevant regulation or standard including coordination measure with onshore public health agency in case there is medical emergency.

The risk significance of collisions will be reduced by using the following mitigation measures:

- Implement Eni's HSE IMS.
- In case of vessel collision, follow Eni's Emergency Response Plan (***Annex B***), including procedures in the event of an accidental vessel collision.
- At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and water police).
- Use support vessels to warn off traffic.
- Provide appropriate lights and warning signals on all vessels to prevent accidental collision.
- Chase vessel with MOGE Representative will be employed to ensure navigational safety and appropriate management of fishing interactions.
- Mobile exclusion zone, limiting the duration and extent of disruption to the fishing activity and other marine users in any area.
- Disclosure and implementation of the Grievance Mechanism for the Project and timely investigation of any grievances.

Significance of Impacts

Evaluation of impacts due to vessel collision during the 3D seismic survey activities has been conducted in accordance with the methodology and terminology presented in *Section 6.1*. Given the measures in place, the risk of collision or entanglement between the seismic vessel and equipment with fishing vessels / rafts or other marine users is considered to be unlikely. As such, the impact magnitude and subsequently the impact significance are considered as **Negligible** (***Table 6.23***)**.**

Table 6.23 Assessment of Potential Impacts through Vessel Collision during 3D Seismic Survey Activities

Impact	Vessel collision during offshore operations.			
Nature	**Negative**	Positive	Neutral	
	Accidental events such as vessel collision would be considered to be a negative impact.			
Type	**Direct**	Indirect	Induced	Cumulative
	Impacts would be considered to be direct due to originating from vessels used in the seismic survey.			
Duration	Temporary	**Short-term**	Long-term	Permanent
	The 3D seismic survey will be carried out in Q4 2017 and last approximately 100 days. Direct impacts would be short-term in the event of a vessel collision, although the risk of such a collision will be present throughout the duration of the survey.			
Extent	**Local**	Regional	International	
	Impacts would be limited to the survey area within the Gulf of Martaban and hence would be considered to be local for vessel collisions.			
Scale	Vessel collision during offshore operations may impact worker health and safety, and has the potential to impact marine resources, and/or water quality or create a physical hazard to other marine users.			
Frequency	Frequency of marine traffic is continuous during the survey, but collisions would be very rare if the appropriate mitigation measures are implemented.			
Likelihood	Unlikely (The event is unlikely but may occur at some time during normal operating conditions, ie the event has occurred within industry).			
Magnitude	Positive	Negligible	**Small**	Medium	Large
	Impact magnitude is considered to be small as the frequency is occasional and the likelihood is unlikely.			
Receptor Sensitivity	**Low**	Medium	High	
	As the key receptor for accidental events may be considered to be workers and other vessels, all of which are adequately trained and/or will follow appropriate marine protocols, receptor sensitivity is considered low.			
Significance	**Negligible**	Minor	Moderate	Major
	The combination of a Low Receptor Sensitivity and Small Magnitude will result in an overall **Negligible** Impact.			

Additional Mitigation Measures, Management and Monitoring

The significance of impacts is rated as **Negligible,** and no additional mitigation is considered necessary provided in-place controls are appropriately implemented.

Significance of Residual Impacts

Residual impacts would be expected to be of **Negligible** significance.

6.3.5 Cumulative Impact Assessment

Cumulative impacts encompasses impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. The IFC (2012) defines

cumulative impacts as those generally recognised as important on the basis of scientific concerns and or concerns from affected communities[(1)].

Cumulative impacts summarised in this section refer to the additional impacts that may be generated by other developments or activities in the vicinity of the Project Area, that when added to the impacts of the proposed seismic survey combine to cause a greater impact. Such impacts may arise due to spatial overlap (e.g. overlap in spatial extent of water quality changes) or temporal overlap (e.g. sound impacts caused by seismic activities at the same time from different sources).

Block MD-4 is surrounded by other offshore Blocks MD-5, YWB, and M14. It is understood that oil and gas production activities are being carried out in these blocks which may lead to cumulative impacts with the seismic survey activities in Block MD-4. At the time of preparing this IEE, concurrent activities are not expected in Blocks MD-5, YWB, or M14 during the execution of the Block MD-4 seismic survey. Regardless, to mitigate any potential cumulative impacts, Eni will publicly communicate its project location and schedule appropriately to avoid any potential cumulative impacts with adjacent activities in neighboring blocks.

Cumulative impacts to all aspects are considered Minor, and current in-place controls and mitigation measures are sufficient to mitigate any potential cumulative impacts.

(1) IFC Performance Standards on Environmental and Social Sustainability, January 2012, International Finance Corporation, World Bank Group

7 ENVIRONMENTAL MANAGEMENT PLAN

7.1 INTRODUCTION

This chapter presents the Environmental Management Plan (EMP) for the Project. This EMP provides the procedures and processes which will be applied to the Project activities to check and monitor compliance and effectiveness of the mitigation measures to which Eni has committed. In addition, this EMP is used to ensure compliance with statutory requirements and corporate safety and environmental policies.

7.2 DESCRIPTION OF THE PROPOSED MITIGATION MEASURES

This section presents the proposed mitigation measures that Eni will adopt to facilitate the management and control of potential adverse impacts associated with the Project, which were discussed in ***Chapter 6***. The proposed mitigation measures are verified to be practical and implementable in operational conditions. Mitigation measures will be taken into account in project implementation and execution such that potential adverse impacts are reduced to As Low As Reasonably Practical (ALARP). The mitigation measures are presented in ***Table 7.1***.

Table 7.1 Mitigation Measures for Proposed 3D Seismic Survey of Block MD-4

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
Environmental Impacts					
1. Air Quality	1.1. Impact on air quality due to the emission of air pollutants and greenhouse gases from engine combustion of the seismic vessel and support vessels	1.1.1. Conduct routine inspection and preventive maintenance as per maintenance schedule or recommended by manufacturers to maintain combustion efficiency and to reduce air pollutant emission.	All project vessels	Throughout the survey	Eni
		1.1.2. Vessels will be in compliance with MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI).			
2. Seawater Quality	2.1. Impact on seawater quality due to improper management of non-hazardous and hazardous waste	2.1.1. Regarding offshore discharges, operate the seismic vessels in compliance with the requirements under MARPOL 73/78 and Eni's Waste Management Plan (***Annex B***).	All project vessels	Throughout the survey	Eni
		2.1.2. Separate and store each type of waste (non-hazardous waste and hazardous waste) into appropriate containers having clear labels.			
		2.1.3. Store hazardous waste in sealed container and keep such container away from sparkling area until disposal/treatment. The container shall be durable, safe and proper for transporting, transferring, treatment and disposal.			
		2.1.4. Prohibit any discharge of hazardous waste into the sea.			
		2.1.5. Used oil and oil-contaminated waste shall be stored separately with labels for disposal onshore.			
		2.1.6. The vessel deck shall be cleaned to minimise the impact from oil and chemical contamination into the sea during periods of rain.			
		2.1.7. Oil absorbents are required in the case of a small spill and the used absorbent shall be stored in containers onboard and disposed of onshore.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		2.1.8. Dispose hazardous waste at onshore treatment & disposal facilities in accordance with MARPOL requirements, international standard practices of the vessel, and/or Eni's Waste Management Plan (***Annex B***).			
		2.1.9. Ensure manifest of all the waste is kept.			
		2.1.10. Segregate non-hazardous waste including food waste, paper, aluminium can, glass, rag and other wastes in separate containers or proper areas.			
		2.1.11. Grind food waste to a size less than 25 mm before discharge into the sea at a distance of 12 nautical miles from shore, in a location that is not located in coral reef area, according to the requirements under MARPOL 73/78.			
		2.1.12. The survey contractor is responsible for the proper onshore disposal of non-hazardous waste according to MARPOL requirements, international standard practices of the vessel, and/or Eni's Waste Management Plan (***Annex B***) .			
	2.2. Impact on seawater quality due to improper management of wastewater	2.2.1. Operate the seismic vessels in compliance with the requirements under MARPOL 73/78 and Eni's Waste Management Plan (***Annex B***), including all measures below.	All project vessels	Throughout the survey	Eni
		2.2.2. Large operating vessels (over 400 gross tons) shall comply with the MARPOL 73/78 requirements and Regulation of Vessel Inspection (No. 34) B.E. 2551 (A.D. 2008). Oil contaminated bilge water shall be de-oiled prior to discharge into the sea. Discharge water shall contain less than 15 ppm oil content.			
		2.2.3. Oil-contaminated waste separated by the Oil Filtering Equipment on vessels over 400 gross tons shall be stored in appropriate drums for disposal onshore.			
		2.2.4. An oily slop storage tank shall be provided.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		2.2.5. Oily effluents from bilges, machinery spaces etc. should not be discharged in shallow coastal waters or near coral reefs.			
		2.2.6. Sewage will either be treated by sewage treatment system before discharged into the sea, or will be retained in a storage tank and will be pumped for disposal at the port/support base after the operation is completed.			
		2.2.7. For sewage that is treated and discharged into the sea, it shall be discharged more than 12 nautical miles from the nearest land.			
3. Marine Life and Marine Ecology	3.1. Impact on marine life forms, especially marine mammals due to noise generated by airgun	3.1.1. Ensure that survey contractor follows codes of good practices for seismic survey, especially measures to minimise impact on marine mammals.	All project vessels Entire survey area	Throughout the survey	Eni
		3.1.2. Implement the 'Pre Start-up Visual Observation Procedures' (also known as "Pre-shooting search) as per JNCC Seismic Guidelines (***Annex C***) – make a visual check from a suitable high observation platform to see if there are any marine mammals within a 500 m radius at least 30 minutes prior the commencement of seismic acquisition. In deep waters (>200m) the pre-shooting search should extend to 60 minutes as deep diving species (e.g. sperm whale and beaked whale) are known to dive for longer than 30 minutes.			
		3.1.3. If mammals are observed during the pre-shooting search, delay the start of the seismic sources until the marine mammals have moved out of the 500 m radius, or 20 minutes after the last sighting within 500 m.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		3.1.4. Implement "Soft Start Procedures" as per JNCC Seismic Guidelines (***Annex C***). Power should be built up slowly from a low energy start-up (e.g. starting with the smallest airgun in the array and gradually adding in others) over at least 20 minutes to give adequate time for marine mammals to leave the area. This build up of power should occur in uniform stages to provide a constant increase in output.			
		3.1.5. Implement passive acoustic monitoring (PAM), whereby sea mammal vocalization is monitored to determine whether there may be any mammals near the survey vessel, especially during night time or low visibility operations when mammals may not be able to be visually observed.			
		3.1.6. Maintain visual observation continuously during soft starts and operations to determine the presence of marine mammals.			
		3.1.7. After detecting marine mammals, a record shall be made that includes observation detail and marine mammal description, such as the seismic vessel coordinates and distance between the vessel and the marine mammal, and if possible, species & number of the marine mammal, frequency and duration of marine mammal in the observation area. Recorded information shall be collected in Observation Report for future reference.			
		3.1.8. Utilize chase vessels to monitor the survey area at least 24 hours prior to commencement of airgun array operations.			
		3.1.9. Implement passive acoustic monitoring (PAM), whereby sea mammal vocalization is monitored to determine whether there may be any mammals near the survey vessel, especially during night time or low visibility operations when mammals may not be able to be visually observed.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
Social Impacts					
4. Fishing Communities and Fisheries	4.1. Fishermen may temporarily be unable to carry out fishing activities in some areas during survey	4.1.1. At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy).	All project vessels Entire survey area Relevant authorities	Throughout the survey	Eni
		4.1.2. Presence of the fisheries liaison officers: one to stay on each Support Vessel, one to stay on the Chase Boat, and one to stay on the seismic vessel to guarantee continuous sharing of information before (two/three weeks) and during the project execution.			
		4.1.3. Patrol the seismic survey area for at least one (1) week before commencing seismic survey activity, and remove all obstructions in the survey area. Record location and details of removed fishing gear.			
		4.1.4. Fishing vessels operating over the proposed survey lines for a marine seismic survey, or those in danger of passing over the deployed streamer will be warned off by the chase boats.			
		4.1.5. Chase vessels will be available to warn vessels to keep clear of the seismic survey vessel and associated trailing equipment, and to escort any unauthorised vessels out of the Project Area. In addition, stationary fishing equipment (eg fishing gears) identified by the chase vessels on the survey route will be removed in advance of operations.			
		4.1.6. Chase vessel with MOGE Representative will be employed to ensure navigational safety and appropriate management of fishing interactions.			
		4.1.7. Mobile exclusion zone, limiting the duration and extent of disruption to the fishing activity in any area.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		4.1.8. Upon completion of the survey, all equipment will be immediately removed from the Project Area, i.e. demobilization.			
		4.1.9. Organize a complaint, problem, and suggestion receiving point for the entire project duration. Findings from complaints and suggestions shall be reported to MOGE.			
		4.1.10. Disclosure and implementation of the Grievance Mechanism for the Project and timely investigation of any grievances.			
5. Shipping/Navigation	5.1. Survey equipment, including airgun arrays and steamers, could be a temporary obstruction to navigation in the area Increased marine traffic could increase the risk of accident or collisions in the survey area	5.1.1. At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy).	All project vessels Entire survey area Relevant authorities	Throughout the survey	Eni
		5.1.2. Use support vessels to warn off traffic.			
		5.1.3. Provide adequate lighting and signal blinker on the seismic vessel, and chase vessel to prevent the collision hazard with fishing or cargo vessels.			
		5.1.4. Vessels will be equipped with radar, navigation equipment, and communication equipment to identify obstructions and to provide sufficient warning of approaching surface vessels that may pose a danger to the operations.			
		5.1.5. Stop the survey in case of poor visibility or extreme weather conditions (such as cyclone), and record the event.			
		5.1.6. Warning device (i.e. Bell or Light) will be provided on the streamer tail buoy for night-time operations.			
		5.1.7. Upon completion of the survey, all equipment will be immediately removed from the Project Area, i.e. demobilization.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
6. Socio-Economy	6.1. Positive impact includes temporarily increasing income and employment.	6.1.1. Where possible, employ local fishing vessels as chase vessel during the survey period.	Relevant regions	Throughout the survey	Eni
Health Impacts					
7. Occupational Health and Safety of the Project Employees	7.1. Potential impacts on health and safety of employees on the seismic vessel from potential exposure of workers to unsafe noise levels during survey operation, accidents during operation and improper sanitary system	7.1.1. Implement Eni's HSE IMS, including the following: • Ensure that all employees wear appropriate PPE, and implement Eni's Personal Protective Equipment System (***Annex B***). • In case of emergency or accident affecting occupational health and safety, implement Eni's Emergency Response Plan (***Annex B)*** and conduct rehearsal/training for staff to handle emergency situations.	All project vessels	Throughout the survey	Eni
		7.1.2. Ensure that survey contractor implements standard operational procedures regarding occupational health, safety, and environment and the emergency response plan, and make it available on the seismic vessel. Training programs or drills shall be provided as appropriate.			
		7.1.3. Provide proper sanitary system including drinking water, potable water, toilet, and waste management.			
		7.1.4. Cooperate with the nearest health center/hospital in order to immediately support response to emergency events.			
		7.1.5. Implement steps of operation for occupational, health, and safety; and the protection and controlling of accidents: • Safety method for working with machines/equipment • Procedure for safety operation • Procedure for work permission • Provide SDS for all chemicals • Regulations for fuel storage and waste management • Compliance monitoring system and manifest system			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		for hazardous wastes			
		7.1.6. Provide fire protection equipment and manual for emergency management at project site, and provide the appropriate practice complying with mitigation measures.			
Unplanned Events					
8. Oil and Chemical Spills	8.1. Impact on water quality and marine organisms from spillage of fuel oil, or lubricant into the sea due to accidental collision between vessels, accidental spills, etc.	8.1.1. Implement Eni's HSE IMS, including the following: • In case of oil or chemical spills, follow Eni's Emergency Response Plan (***Annex B***). • Follow Seismic Contractor SOPEP (Shipboard Oil Pollution Emergency Plan), which will be available before the start of the survey.	All project vessels	Throughout the survey	Eni
		8.1.2. Conduct the survey activity according to the operational procedure of the vessel which includes: • Safety Management: main components include policy, organization & responsibility, planning & operation, monitoring on operation performance, and inspection & review for improvement. • Survey Planning for the survey activity. • Activity Recording: record on role and responsibility of the key personnel.			
		8.1.3. Ensure that the survey contractor has an oil spill response plan in place in accordance with MARPOL 73/78 regulations (Shipboard Marine Pollution Emergency Plans), and/or follows Seismic Contractor SOPEP (Shipboard Oil Pollution Emergency Plan), which will be available before the start of the survey.			
		8.1.4. Implement proper training in the use and handling of the relevant chemicals and standard safety procedures implemented by all contractors.			
		8.1.5. Staff will wear Personal Protective Equipment (PPE) appropriate to the nature and volume of spilled material.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		8.1.6. In case of spill, appropriate medical care will be provided, clean-up will be carried out, and incident or accident reports will be filed.			
		8.1.7. Provide spill clean up kits and training for designated rapid response team to clean up any spills.			
		8.1.8. Store all chemicals in secured storage area with impervious (cement or plastic sheet) floor and bund wall. Handle all chemicals according to their SDS.			
		8.1.9. Assign chase vessel to report abnormal situation to the seismic vessel.			
9. Vessel Collision	9.1. Collisions could potentially occur during the survey, potentially causing injury or death to personnel, damage to vessels, and possibly leading to accidental spills.	9.1.1. Implement Eni's HSE IMS (overview in *Section 3.1.2*).	All project vessels	Throughout the survey	Eni
		9.1.2. In case of vessel collision, follow Eni's Emergency Response Plan (***Annex B***, including procedures in the event of an accidental vessel collision.			
		9.1.3. At least 30 days prior to survey, coordinate with MOGE, who will then issue "Notice to Mariner" regarding project activities to appropriate parties (i.e. Department of Fisheries, Ministry of Livestock and Fisheries, and Navy).			
		9.1.4. Use support vessels to warn off traffic.			
		9.1.5. Provide appropriate lights and warning signals on all vessels to prevent accidental collision.			
		9.1.6. Chase vessel with MOGE Representative will be employed to ensure navigational safety and appropriate management of fishing interactions.			
		9.1.7. Mobile exclusion zone, limiting the duration and extent of disruption to the fishing activity and other marine users in any area.			

Aspects	Potential Impacts	Mitigation Measures	Implementation Area	Duration	Responsibility
		9.1.8. Disclosure and implementation of the Grievance Mechanism for the Project and timely investigation of any grievances.			

7.3 MONITORING PROGRAM

As detailed in the Myanmar's National Environmental Quality Guidelines, *"projects shall engage in continuous, proactive and comprehensive self-monitoring of the project and comply with applicable guidelines and standards. For purposes of these Guidelines, projects shall be responsible for the monitoring of their compliance with general and applicable industry-specific Guidelines as specified in the project EMP and ECC."*

Monitoring will be required in order to demonstrate compliance with legal limits (i.e. Myanmar's National Environmental Quality Guidelines), and Eni's Project requirements, and will also provide verification of the overall design and effectiveness of the implemented mitigation/control measures. Details of the environmental monitoring program are presented in ***Table 7.2.***

Note that, based on monitoring results, in the future Eni may decide to (or be required to) implement changes to the Project design or existing mitigation measures, in order to achieve compliance. In this case, the EMP will be updated as necessary.

Table 7.2 Monitoring Measures for the Project

Environmental Aspects	Parameters	Method	Location	Duration / Frequency of Monitoring	Responsibility	Estimated Budget
1. Sewage	Parameters to be analyzed for sewage as follows: **Required by NEQG (as per MARPOL 73/78*):** • Thermotolerant Coliforms • Biochemical Oxygen Demand (BOD) • Chemical Oxygen Demand (COD) • pH	Methods used for sampling/analysis should be as specified in MARPOL 73/78 and associated standards, as follows: • Thermotolerant Coliform Standard- determined by membrane filter, multiple tube fermentation or an equivalent analytical procedure. • TSS - Method of testing should be by: ○ 1. filtration of representative sample through a 0.45 µm filter membrane, drying at 105°C and weighing; or ○ 2. centrifuging of a representative sample (for at least five minutes with mean acceleration of 2,800-3,200 g), drying at least 105°C and weighing; or ○ 3. other internationally accepted equivalent test standard. • BOD and COD - The test method standard should be ISO 15705:2002 for COD and • ISO 5815-1:2003 for BOD5, or other internationally accepted equivalent test standards.	• Seismic Survey Area	• Once during survey	Eni	20,000 USD
2. Marine Mammals	• Species and number of marine mammals	• Record species and number of marine mammals observed before commencing survey and during survey within a distance of 500 m, including the seismic vessel coordinates, distance between the vessel and the marine mammal, and if possible, species & number of marine mammals, frequency and duration of marine mammal in the observation area.	• Seismic Survey Area	• As required throughout survey	Eni	75,000 USD
3. Fishery and Navigation	• Records of removed fishing gears • Records of complaints and responses • Records of fishing vessels • Accident reports	• Record containing details of removed fishing gears • Record containing details of complaints and responding results • Record containing details on number, type, and duration for fishing vessels and other vessels entering the survey area during survey • Report on accidents/incidents with a fishing vessel or other vessels during the survey	• Seismic Survey Area	• As required throughout survey	Eni	20,000 USD

Environmental Aspects	Parameters	Method	Location	Duration / Frequency of Monitoring	Responsibility	Estimated Budget
4. Hazardous and Non-hazardous Waste	• Type/volume of waste generated.	• Prepare a record on type and volume of generated waste	• Seismic Survey Area	• As required throughout survey	Eni	25,000 USD
5. Accidental Spills or Leaks	• Occurrence of spills or leaks of oil or other chemicals	• Conduct regular observation for occurrence of accidental spills or leaks • If accidental spill or leak occurs, they are to be recorded, reported to relevant authorities, and response measure implemented.	• Seismic Survey Area	• As required throughout survey	Eni	20,000 USD

* ANNEX 26 RESOLUTION MEPC.159(55) Adopted on 13 October 2006 REVISED GUIDELINES ON IMPLEMENTATION OF EFFLUENT STANDARDS AND PERFORMANCE TESTS FOR SEWAGE TREATMENT PLANTS

7.4 REPORTING REQUIREMENTS

This section outlines the reporting frequencies and types of reports to be prepared for the Project with regards to environmental management, monitoring, and compliance.

A robust reporting system will provide the Project with the necessary feedback mechanisms to ensure quality and timely implementation of the works. The reporting system will ensure regular flow of information from the Project site to the Project headquarters and, as necessary, to regulatory authorities. The reporting system will provide a mechanism to ensure that the measures proposed in the Project's EMP are implemented.

7.4.1 Reporting Requirements to Myanmar Authorities

There are a number of reporting requirements to Myanmar Authorities, as per the EIA Procedures and Administrative Instruction of Environmental Impact Assessment Procedure. These are summarized in ***Table 7.4***.

It is noted that the seismic survey will take place over very short duration (approximately 100 days). Therefore, it will not be possible or practical to submit reports "every 6 months" as required by law and shown in ***Table 7.4***. Eni will prepare and submit a monitoring report from the Project after completion of the seismic survey.

7.4.2 Eni's Internal Reporting

Eni has criteria for internal reporting, through internal documents, the results of monitoring of HSE performance and audits, including responsibilities, and methodologies. Details on Eni's HSE Reporting are presented in ***Annex B***.

The reporting activity allows the availability and presentation of data and information on HSE management, monitoring of HSE performance and audit activities, in order to provide access to the information on the effectiveness and constant suitability of the HSE management system adopted, on programme implementation status and the attainment of planned objectives.

HSE Audit and Reporting

Eni monitors the performance of its HSE IMS by means of auditing, which requires internal reporting. Findings, results and follow-up of HSE audits are communicated to Eni Myanmar Managing Director.

Findings are generally classified in five levels:

- Major Non Conformity: the minimum requirements set for the HSE IMS element are not satisfied or numerous deficiencies have been identified for several requirements of the element;

- Minor Non Conformity: the requirements for the HSE IMS element are only partly satisfied or minor deficiencies have been identified for some requirements;
- Observations: although the requirements for the HSE IMS element are substantially satisfied, it is considered appropriate to plan improvement actions to consolidate the level of satisfaction guaranteed and also to prevent the possible occurrence of problems in the future;
- Conformity: the requirements for a given element are totally satisfied and completely fulfills the requirements of the reference Standard/Model;
- Best Practices: technical or managerial solutions adopted which go beyond the mere satisfaction of the HSE IMS element.

A complete summary of HSE Reporting types and frequencies is shown below in ***Table 7.3***.

Table 7.3 HSE Reporting Frequency

Subject	Form Name	Reporting Entity		Frequency			
		Site	Subsidiary/ Affiliated Company	Other	Monthly	Six Monthly	Annual
Safety	HSE Incident – Accident / Near Miss/Splill/Process Safety events	X		X	X		
	Exposure Values / Man Hours		X		X		
Environment	ENV 1	X			X		
	ENV 2	X				X	
	ENV 4	X				X	
	GHG	X			X		
	GHG 4YP	X					X (Oct)
	Env Obj 4YP	X					X (Oct)
Industrial Hygiene	HEA 2		X			X	
Radiation Protection	RAD	X				X	
HSE Management	IMS 1 (quarterly)		X	X			
	IMS 1 (six-monthly)		X			X	
	IMS 2		X				X
	IMS 3		X	X (Sep, Oct)			
	HSE Tableau de Bord		X		X		
	Qu Obj 4 YP		X				X (Oct)

Subject	Form Name	Reporting Entity		Frequency			
		Site	Subsidiary/ Affiliated Company	Other	Monthly	Six Monthly	Annual
HSE Expenses	HSE and Sustinability OPEX		X	X (quart ley)		X	
OdV	OdV		X			X	

Incident Notification, Investigation and Reporting

The process of incident, investigation and analysis provides a mechanism for Eni Myanmar to continually improve its HSE management system to improve its HSE performance.

The process is divided into the following steps:

- "Incident notification": classification and evaluation of the gravity of the event, notification to Eni Upstream and to Eni corporate and if necessary, to the appropriate authorities and/or the competent authorities;
- "Incident Investigation" with the issuing of an Incident Investigation Report and action plan with improvement and preventative actions;
- "Follow-up" of the action plan and management of lessons learned.

Complete details on Eni's Incident Notification and Reporting are presented in ***Annex B***.

Table 7.4 Reporting Requirements to Myanmar Authorities

Report	Requirements	Frequency	Reference
Monitoring Report	• Submit monitoring reports to the Ministry not less frequently than every six (6) months, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry. • Within ten (10) days of completing monitoring report, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor. • Monitoring reports shall include: o documentation of compliance with all conditions; o progress made to date on implementation of the EMP against the submitted implementation schedule; o difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties; o number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation; o accidents or incidents relating to the occupational and community health and safety, and the environment; and o monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.	Not less than every 6 months*	EIA Procedure, Article 108 and 109
Report in Case of Breach of ECC or EMP	• Notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the ECC and the EMP as soon as reasonably possible	• In case of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours of Eni becoming aware of such incident. • In all other cases: within seven (7) days of Eni becoming aware of such incident.	EIA Procedure, Article 107
Report of Any	• Inform appropriate authorities as soon as practicably in the event of any accident or	As per conditions of ECC	Administrative

Report	Requirements	Frequency	Reference
Accident or Incident	incident. • As per conditions of ECC		Instruction of Environmental Impact Assessment Procedure, Annex 5, Page 3
Additional Reporting Requirements as per ECC	• The Ministry may prescribe conditions in the ECC. Such conditions may include additional reporting requirements, such as: o General management documentation, reporting and information disclosure procedures o Monitoring documentation and reporting o Documentation and reporting on (i) parameters and issues that must be documented and reported; (ii) types and methods; (iii) frequency and timing; (iv) quality controls; and (v) recipients;	As per conditions of ECC	EIA Procedure, Article 91

* See note in preceding paragraph. Due to short length of Project (100 days), Eni will prepare and submit monitoring report after completion of the survey.

7.5 *EMERGENCY PLAN*

Eni has prepared aspecific Emergency Response Plan for the MD-4 3D Seismic Acquisition, which is presented in ***Annex B***.

7.6 *CAPACITY DEVELOPMENT AND TRAINING*

Eni has strict policies regarding HSE Training, Information and Competence Skills. HSE activities and particularly those involving HSE risks are always and only carried out by personnel with the necessary know-how and expertise, constantly kept up to date by training activities. For that purpose, the HSE department defines and keeps up to date a document outlining the roles and skills of the professionals working specifically in the HSE area.

On a yearly basis, Eni Myanmar prepares/updates a specific HSE training plan, specifying:

- the responsibilities for providing training activities;
- the personnel involved in the training activities;
- the scope, contents and procedures of training on HSE risks, hazards, measures, procedures, roles and instructions;
- the schedule for training courses.

The plan is updated when significant changes/modifications of a technical, organisational and regulatory nature occur or following non-compliances that come to light (e.g. investigation teams, audits and/or control bodies). The training needs are communicated to the respective human resource functions, which work out a training plan in cooperation with the human resource function.

The HSE department of Eni shall guarantee that personnel are informed on:

- the HSE impacts of their job and behaviour;
- their role and responsibilities in order to comply with HSE policy, with procedures and requirements set by Eni's HSE Management System Guideline;
- the potential consequences deriving from deviations in operating instructions.

7.7 *PUBLIC CONSULTATION AND INFORMATION DISCLOSURE*

7.7.1 *Summary of Public Consultation Conducted for this IEE*

Eni initially engaged with MOGE to verify the most appropriate region to conduct public consultations for the MD-4 Block activities. Based on this, the Tanintharyi Region was the most relevant administrative location in terms of potential impacts from the Project (in particular fisheries, since most of the fisherman in Block MD-4 are likely to be from Tanintharyi Region).

Prior to any public meeting consultation, Eni Myanmar requested and organized a courtesy visit with the Regional Minister of Electricity and Energy of Tanintharyi Region on 28th March, 2017, to introduce the project activities and to request the permit to engage the local authorities, NGOs and villagers within the boundaries of the Tanintharyi Region. The townships engaged for the public consultations were Myeik and Dawei Townships.

Public consultation activities were conducted from April 7 - 8, 2017, via public meetings held in Dawei and Myeik Townships, with an additional follow up meeting held in Myeik on April 27th, 2017. Key stakeholders that were consulted consisted of fisherman that have the potential to fish in and around Block MD-4. Comments and recommendations of stakeholders obtained from the public consultation meetings are summarized in ***Chapter 8*** of this IEE Report.

The main issue raised was that there were not enough stakeholders that attended the 1st meeting in Myeik on April 8th (due to short notification time). As a result of this, Eni conducted an additional public meeting in Myeik on April 27th, which had additional attendees.

There were some questions and concerns raised at the public meetings regarding exclusion zones and impacts to fisheries, transparency of information disclosure, impacts to marine fauna, grievance mechanism, and CSR activities. All of the issues were responded to appropriately by Eni and ERM at the public meetings.

The implementation of the public consultation program achieved its goals in providing an opportunity for stakeholders to give opinions and recommendations on the Project. Opinions and recommendations obtained through public consultation have been used in the IEE study to help develop mitigation measures and monitoring programs on environmental and social impacts, as discussed in ***Chapter 8*** of this IEE report.

7.7.2 Project Information Disclosure

Eni conducted a number of disclosure activities for the Project. Initial notification of the Project and IEE Report was advertised in the newspapers The Global New Light of Myanmar (English version) and The Mirror (Myanmar version). Copies of the newspaper advertisements are included in ***Annex D***. Dates of disclosure were as follows:

- First disclosure (project notification): March 10, 2017
- Second disclosure (IEE submission): To be submitted in May, 2017

Eni will also disclose the Myanmar language Executive Summary of this IEE Report at the township General Administrative Department (GAD) and Department of Fisheries (DoF) offices in Myeik and Dawei Townships in Tanintharyi Region. Eni will further disclose the full IEE Report (in English)

and Executive Summary (in Myanmar) will be available at Eni's Office (Yangon Branch) and on its website at www.eni.com.

7.7.3 Grievance Procedure

Eni has a Local Grievance Mechanism. The aim of the Grievance Mechanism is to establish a formal process allowing people, communities or groups to raise complaints regarding any impact related to activities of Eni or its subsidiaries, and also to ensure that these complaints are addressed and resolved appropriately.

This Grievance Mechanism is applied to all of Eni's assets, domestic and international, and covers the entire lifecycle of the assets or operations from inception through decommissioning and abandonment. Eni's Grievance Mechanism, which defines all scope and processes of the grievance process in detail**.**

Eni's Local Grievance Mechanism Instruction is presented in ***Annex B***.

7.7.4 Corporate Social Responsibility (CSR) Activities

Eni employs CSR on a phased approach for all of its operating areas in Myanmar. This means that, during the initial exploratory phases, such as seismic operation, there is minimal investment into CSR, but if oil or gas is discovered and operations move to a more permanent and profitable phase, local CSR activities will be increased accordingly.

Although CSR will not be a specific component of the Block MD-4 Seismic Project, there are currently a number of ongoing CSR activities taking place by Eni. These activities have the objective to uplift quality of life and gain favourable relations from all stakeholders in the operating area. The CSR program consists of 3 main sectors: "Health, Education and Community Development Sector".

All of Eni's CSR activities are conducted in compliance with MOGE's Guidelines for Implementation of CSR Programmes, as well as approved budget. Eni will apply an appropriate CSR programme in the area it operates in relation to the phase and schedule of its operations in that area, taking into consideration the local community development.

Eni Myanmar is among the first Eni subsidiaries to adopt a systematic approach for the efficient management of the stakeholder engagement process. The process has also been tailored to fit the reality of the project areas. In this regard, Eni Myanmar undertook pre-emptive actions through prompt engagement with the stakeholders involved at an early stage of the project. The main purposes of these actions are to (a) inform stakeholders of project activities; (b) guide public perceptions and set a positive tone; (c) predict potential issues and risks that might affect the project throughout its lifecycle;

and, (d) to enable a proactive cultivation of relationships that can serve as "capital" during project life.

In particular, Eni Myanmar has so far delivered three key components of the stakeholder engagement:

1. Stakeholder identification and analysis: the project's geographic domain of influence was delineated by mapping the sphere of influence of different types of environmental and social impacts, and distinct groups were identified by impact area. A prioritisation of key stakeholders was then conducted, followed by the production of the Stakeholder Register.

2. Information disclosure: project related information was communicated early in the process through Scoping/Project Screening presentation meetings

3. Stakeholder consultation: official public consultations have been conducted in the interested Townships and Regional Divisions.

Eni also promotes projects in the field of Sustainability in the country, with training programmes and activities aimed at local communities.

Local Content Development

In the context of cooperation with the authorities of Myanmar and MOGE, Eni has set up training programmes aimed at local staff.

In 2013-2014 Eni sponsored a Masters in Integrated Petroleum Geosciences at the University of Perugia and two master's courses in Energy and Environmental Management and Economics (Medea) at the Eni Corporate University (ECU) in Milan.

Since 2015, yearly courses began as part of the wide range of training initiatives that foresees the sponsorship of further eight MOGE resources spread over three years program on the master's courses described above, to which is also added a course on Health, Safety and Environment & Quality (HSE-Q) Systems (at ECU). In addition, other specialised technical courses (Reservoir Geology, Reservoir Seismic, Production Optimisation, Field and Plant Performance Monitoring and HSE-Q Management in E&P operations) aimed at already qualified staff will be held in Myanmar with the involvement of around 100 people. The first two courses (Reservoir Geology and Reservoir Seismic) were successfully delivered in Nay Pyi Taw in March, July 2016 and March 2017.

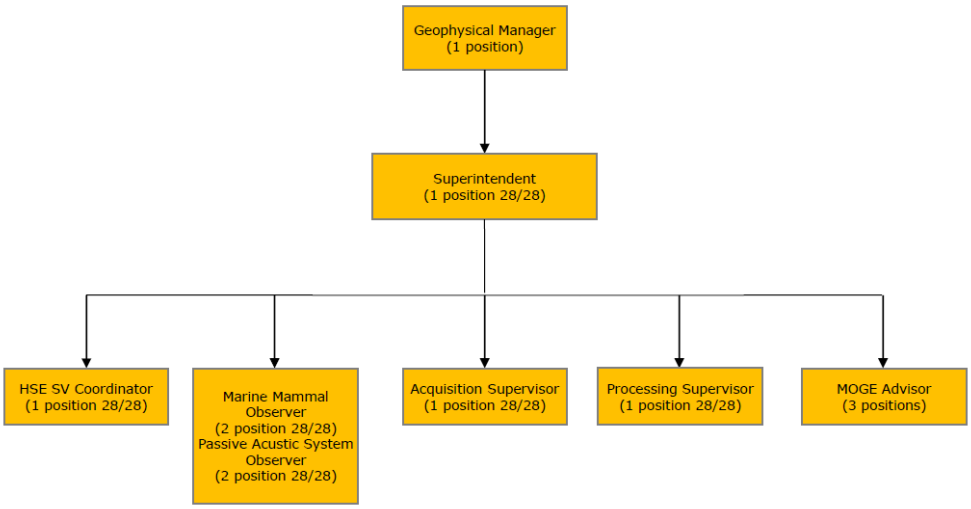
7.8 WORK PLAN AND IMPLEMENTATION SCHEDULE

7.8.1 Eni Organizational Structure

As discussed in *Section 3.1.2.1*, Eni have responsibility for monitoring performance of all contractors, and Eni will ensure that all contractors adhere to this EMP.

Eni's organizational chart for seismic survey and EMP implementation is shown in ***Figure 7.1***.

Figure 7.1 *Eni Organizational Chart for Seismic Survey and EMP Implementation*



Source: Eni, 2017

7.8.2 Schedule

Seismic data acquisition, which is the main activity of the seismic survey, is expected to take 100 days. A tentative project schedule for the 3D seismic survey is presented in ***Table 7.5***.

With regards to the scheduling and work plans of implementing mitigation measures, inspection and monitoring, reporting, and auditing, these have been specified within their respective sections in this EMP, along with estimates of cost for implementation, where applicable.

Table 7.5 Tentative Project Schedule for 3D Seismic Survey in Block MD-4

Project Activity	Schedule
Notification of Project	One month before site survey
Vessel in port	Kick Off Meeting & HSE audits of the seismic and supply vessels
Site survey and site preparation • **Conduct a survey of obstructions e.g. fish traps, etc in the survey area, and remove all obstructions as required.**	At least one week before commencement of seismic survey activity
3D Seismic data acquisition in Block MD-4	Starting date: Q4 2017. The seismic survey is approximately 100 days
Demobilization	Q4 2017

7.8.3 Costs for Implementation

The costs for implementing the mitigation measures are included within Eni's operational costs, and are estimated to be approximately 1,000,000 USD. The estimated costs for implementing the monitoring measures were specified in ***Table 7.2***, and total 160,000 USD.

7.9 STATEMENT OF COMMITMENTS

Eni will at all times comply fully with the commitments, mitigation measures, and plans that have been presented in this IEE Report.

Eni shall fully implement the EMP, all Project commitments, and conditions, and is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, including the Environmental Conservation Law (2012), Environmental Conservation Rules and Environmental Impact Assessment Procedure (2015), as well as the EMP, Project commitments and conditions.

Eni and ERM hereby confirm that:

(1) The IEE Report is accurate, consolidated and complete;
(2) The IEE has been conducted in accordance with relevant laws, including the EIA Procedure (2015).
(3) The Project will fully follow the commitments, mitigation measures and plans set out in this IEE Report.

In addition, as requested and in compliance to articles 62, 76 and 100 – 105 of the new EIA procedure, Eni Myanmar B.V. endorses and confirms to Ministry of Natural Resource and Environmental Conservation the following:

- the accuracy and completeness of the IEE and relevant EMP;
- that the IEE and the EMP have been prepared in compliance with applicable Environmental Conservation Law, Rules and Procedures;

- that eni Myanmar and its Seismic Contractor during the execution of the Project will at all times comply fully with the commitments, mitigation measures and plans set out in the IEE and the associated EMP;
- that Eni Myanmar and its Seismic Contractor confirm full commitment in complying with all laws and regulations as detailed in the IEE determined to be relevant to the planned seismic program;
- that Eni Myanmar is liable to ensure that all contractors and subcontractors of the Project comply fully with all applicable Laws, the Rules, this Procedure, the EMP, Project commitments and conditions when providing services to the Project.
- that Eni Myanmar shall incorporate all relevant environmental commitments and requirements set forth in the IEE Report, for the Construction Phase EMP and/or Operational Phase EMP as the case may, including applicable Emission Limit Values and Environmental Quality Standards, into detailed designs, construction contract specifications, and contracts on Project operations related to any part of the Project;
- that Eni Myanmar shall bear full legal and financial responsibility for:
  - all actions and omissions and those of its contractors, subcontractors, officers, employees, agents, representatives, and consultants employed, hired, or authorized by the Company acting for or on behalf of the Company, in carrying out work on the Project; and
  - Person Affected by the Project (PAP) until they have achieved socio-economic stability at a level not lower than that in effect prior to the commencement of the Project, and shall support programs for livelihood restoration and resettlement in consultation with the PAPs, related government agencies, and organizations and other concerned persons for all Adverse Impacts.
- that Eni Myanmar shall be responsible for, and shall fully and effectively implement, all requirements set forth in the ECC (or letter of Approval Letter equivalent of ECC), applicable Laws, the Rules, the EIA Procedure and standards.

8 PUBLIC CONSULTATION AND DISCLOSURE

8.1 INTRODUCTION

Eni is committed to undertaking an engagement process that is in line with Myanmar regulation and delivers an inclusive and continuous dialogue with the Project stakeholders. This includes:

- providing relevant information to stakeholders in a timely manner;
- facilitating two-way discussions to cover stakeholder issues and priorities as well as concerns and needs of the Project;
- ensuring engagement is in a language and format that is understandable and accessible to local stakeholders, including vulnerable groups, and is culturally appropriate;
- feeding stakeholder issues, concerns and priorities into Project decision-making processes, and demonstrating how decisions may have changed as a result;
- ensuring engagement is free from interference and manipulation and duly documented;
- ensuring the consultation are adequate and proportionate to the Project impacts; and
- providing a mechanism for grievances to be raised and resolved.

The following section describes the stakeholder engagement activities undertaken during the development of the IEE. These include key issues raised by stakeholders and how each of these issues has been addressed in the IEE.

8.2 PROJECT SUMMARY

8.2.1 *Project Location*

The 3D Offshore Seismic Survey is designed to verify the prospects in Block MD-4. After the data from the survey are acquired, it will be infield-processed and interpreted, and additional surveys may be decided based on the results of the initial one. The boundary coordinates of Block MD-4 are shown in ***Chapter 4 Table 4.1*** and a map of Block MD-4 is shown in ***Figure 4.3.*** The project will cover approximate area of 3,080 km^2.

8.2.2 Project Activities

The survey project comprises the following key activities:

1. **Preparation Phase**
    a. Notification of Project Activities to Relevant Authorities and Stakeholders
    b. Preliminary Site Survey and Site Preparation/Mobilization
2. **Seismic Survey Phase**
    a. HSE audit
    b. Seismic Data Acquisition
    c. Demobilisation
    d. Seismic Data Processing and Interpretation

8.2.3 Project Implementation Schedule

Seismic data acquisition, which is the main activity of the seismic survey, is expected to take 100 days (based on condition of 16 streamers and approximate survey size 3,080 km^2). The survey is expected to start in Q4 2017 and demobilization end of Q4 2017.

8.2.4 Potential Impacts

Based on the Project information above, the potentially significant impacts that might occur have been listed as follows (as assessed in ***Chapter 6***):

- Impacts on Marine Life and Marine Ecology due to Operational Noise;
- Impacts to Fishing Community/Fisheries due to Marine Traffic and Physical Presence of Survey Equipment;
- Impacts to Shipping/Navigation due to Marine Traffic and Physical Presence of Survey Equipment; and
- Unplanned Event such as Oil and Chemical Spills or Vessel Collision.

8.3 PUBLIC CONSULTATION METHODOLOGY AND APPROACH

In order to enhance stakeholder's understanding on the planned seismic survey activities in the Block MD-4, and obtain suggestions/concerns for developing appropriate mitigation measures, public consultation was conducted in April 2017. The approach for stakeholder engagement was divided into four key steps, as shown in ***Table 8.1***.

Table 8.1 Approach to Public Consultation and Objectives

Step	Approach	Objective
1	Stakeholder Identification	Identify potential concerns for the Project, and all potential stakeholders.
2	Public Consultation Plan	Develop public consultation strategy, participatory methodologies and plan.
3	Public Consultation Implementation	Conduct public consultation as per agreed approach.
4	Public Consultation Results and Disclosure Report	Describe actions necessary to implement mitigation measures identified during public consultation.

Stakeholder Identification was done with the help of local authorities and the relevant stakeholders were consulted during public consultation and their feedback was integrated into the IEE report as described in the following sections.

8.3.1 Stakeholder Identification

The first step in establishing a dialogue is identifying the Project stakeholders. Stakeholders are persons or groups who are directly or indirectly affected by a project, and those who may have interests in and/ or the ability to influence a project's outcomes (either positively or negatively).

The initial stakeholder identification and analysis process for the proposed Project was guided by:

- a preliminary understanding of the Project and its components as well as the present setting of the Study Area;
- a high level knowledge of similar projects operating in the Tanintharyi Region; and
- a review of existing IEE and EIAs conducted by ERM nearby Block MD-4, including for Block M-9 and M-11.

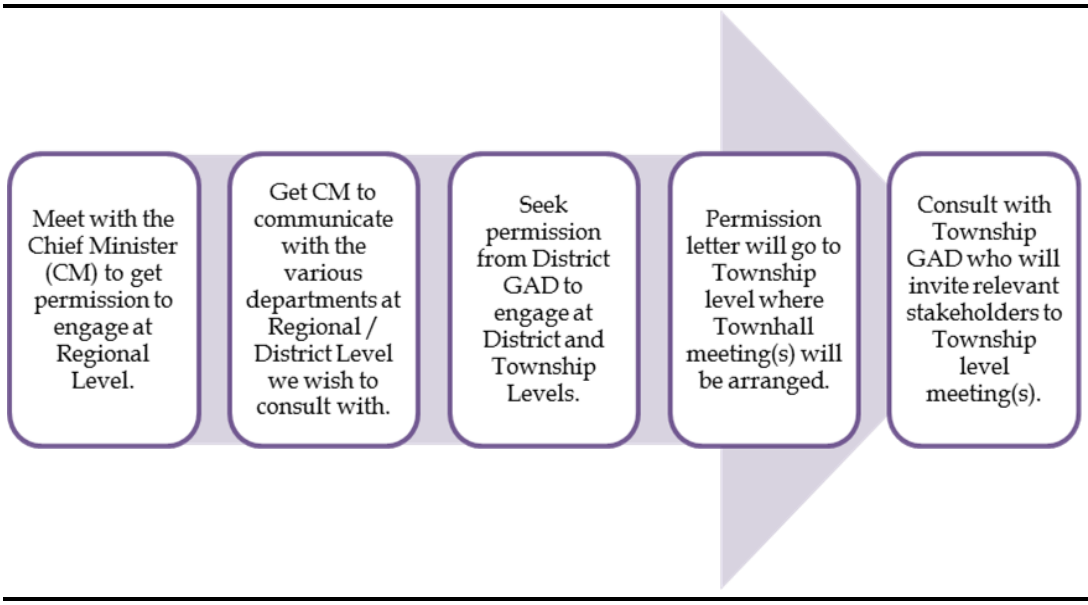
The potential impacts and groups of stakeholders from the above townships who are likely to be impacted by the project are shown in ***Table 8.2***.

Table 8.2 Groups of Stakeholder Related to Potential Impacts

Potential Impacts	Relevant Groups of Stakeholder
• Operational Noise	• Environmental NGOs • Local fisheries • Local community working as labourers on fishing vessels operating in the area
• Restriction of access to the survey area	• Local fisheries • Local community working as labourers on fishing vessels operating in the area • Commercial vessel crossing in the area • Government ministries (including Ministry of Transport, Department of Fisheries, Myanmar Fisheries Federation, General Administration Department and Myanmar Navy)
• Unplanned events	• Environmental NGOs • Local fisheries • Vessel crossing in the area • Local rescue services

Following the establishment of the above relevant stakeholder groups, Eni pursued appropriate permissions and collaboration with local government authorities to further refine the specific stakeholders for the Project and to issue invitations to public consultation. An overview of the permissions and stakeholder invitation process is shown in ***Figure 8.1***.

Figure 8.1 Permissions and Stakeholder Invitation Process



Eni initially engaged with MOGE to verify the most appropriate region to conduct public consultations for the MD-4 Block activities. Based on this, the Tanintharyi Region was the most relevant administrative location in terms of potential impacts from the Project (in particular fisheries, since most of the fisherman in Block MD-4 are likely to be from Tanintharyi Region).

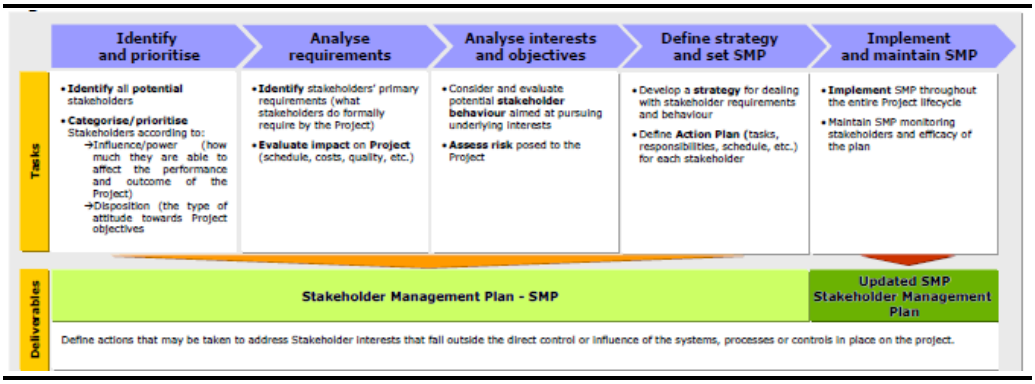
Prior to any public meeting consultation, Eni Myanmar requested and organized a courtesy visit with the Minister of Electricity, Energy, Industry and Transportation of Tanintharyi Region on 28 March, 2017, to introduce the project activities and to request the permit to engage the local authorities, NGOs and villagers within the boundaries of the Tanintharyi Region. The most relevant areas in which to conduct public consultation were determined to be located in **Dawei (in Dawei Township)**, and **Myeik (in Myeik Township)**.

Specific stakeholders from the above groups were further refined and invited to the public consultations through collaboration with the local General Administration Departments. A complete list of stakeholders who attended the meetings is shown in ***Annex D***.

8.3.2 Public Consultation Plan

The public consultation plan for Block MD-4 was aligned with both Myanmar regulatory requirements from the EIA Procedure, and with Eni's Stakeholder Management Process, shown in ***Figure 8.2***.

Figure 8.2 Eni's Public Consultation Process



8.3.2.1 Objectives

The objectives of public consultation are to disseminate the results of the Project's draft environmental, social and health impact assessment (***Chapter 6*** of this IEE Report) and obtain concerns and suggestions regarding the Project's mitigation measures and monitoring program.

8.3.2.2 *Key Engagement Activity – Public Meetings*

Public meetings are the primary consultation activity for informing the stakeholders and other interested parties about the Project activities, the Project proponent, the IEE process, and potential Project impacts. These meetings are conducted in a townhall-style atmosphere, and consist of a presentation of the Project activities and IEE process/results (undertaken by Eni and ERM/REM in Myanmar language), as well as question and answer sessions.

Public meetings were arranged by Eni and ERM, through local partner REM, and after consultation with the relevant government authorities, with all key strategic stakeholders. The meetings were conducted under Myanmar Oil and Gas Enterprise (MOGE)'s permission and direction.

In preparing for the public meetings, consideration was given to the following:

- Local community sensitivities and structures to ensure that the engagement approach aligns with cultural norms;
- Stakeholder representation. When inviting stakeholders to meetings, consideration was given to ensure that every group of interested stakeholder was represented;
- Potential language barriers. Engagement activities were conducted in Myanmar (i.e. the local language); and
- Literacy rates. Literacy rates vary between stakeholders, as a result, where possible consultation was conducted using face-to-face communication and video support.

In Myeik, due to the low turn out of stakeholders at the first public meeting, the team was concern that the stakeholder representation would not be complete and a second engagement was organized in Myeik with sufficient heads-up for the stakeholders. The better turn out of stakeholder translated into a much better representation of all the group of stakeholders and a very rich discussion during the question and answer session.

8.3.2.3 *Engagement Materials*

Prior to engaging with the public, Project information materials were prepared and translated into Myanmar language. This included Project brochure, a backdrop displaying the Project name and involved parties, and a Power Point presentation (presented in ***Annex D)***.

8.3.2.4 Topics Discussed

The meetings were structured as follows:

1) Presentation of Project and Project Proponent (undertaken by Eni and ERM/REM (in Myanmar language)) – ~30-60 minutes; and
2) Question and Answer Session – ~30-60 minutes.

The presentation focused on the following topics:

- Company introduction and profile;
- Overview of Initial Environmental Examination process;
- Objective of public consultation;
- Project description/information;
- Overview of baseline conditions;
- Methodology of seismic survey activities;
- Key potential impacts; and
- Proposed project Environmental Management Plan.

8.3.2.5 Location and Schedule of Public Consultation Meetings

As discussed above, for this Project, public consultation meetings were arranged to be conducted in Dawei and Myeik and a second session was organized in Myeik. The consultations were carried out at the dates and locations as shown in

Table 8.3 Schedule and Locations of Public Consultation Meetings

Day	Time	Activity	Venue
Friday, April 7 2017	2:00 PM	Public meeting with Dawei township GAD and stakeholders (including ECD and DoF representatives)	Regional Fishery Department, Dawei
Saturday, April 8, 2017	11:30 AM	Public meeting with Township Fishery Federation	Grand Jade Hotel, Myeik
Thursday April 27, 2017	10:00 AM	Public meeting with Myeik stakeholders (including Myeik District Fisheries Federation and Fisheries Department)	Meeting Room, Myeik District Fisheries Federation, Myeik Township

8.4 PUBLIC CONSULTATION IMPLEMENTATION

As discussed in *Section 8.3*, in order to inform stakeholders of the public consultation meetings, Eni discussed with the GAD at the township level to inform the relevant stakeholders of the consultation process and plan and invite them to the meeting. This was arranged by ERM and with the approval received from the Chief Minister.

Presentation of the Project, the IEE process, the potential impacts and relevant mitigation measures was given in Myanmar language. For the purpose of these consultations, an MOGE representative was also present with the field team and presented the context of the Project.

A Q&A session was organised at the end of the presentation where the stakeholders were given an opportunity to ask questions, provide their feedback on the presentation, in particular the mitigation measures, and express their concern and expectations. These concerns and expectations were then taken into account while assessing the impacts from the Project activities and the identification of the proposed mitigation measures in the final IEE report. Brochures were also given to all stakeholders attending the meeting and some were left at the township and district office.

A summary of the consultation activities is provided in ***Table 8.4***.

Table 8.4 Public Consultation Activity Implementation Details

Date, Time and Location	Stakeholders	Number of Participants
April 7th at Regional Fishery Department, Dawei township (02:00 PM)	• Representatives from government agencies including ECD and DoF • Township authorities • Civil Society representatives • Fisheries Association representatives • Public • Political parties representatives	33 people
April 8th at Grand Jade Hotel, Myeik township (11:30AM)	• Representatives from Township Fishery Federation • Village track authority • Media	5 people
April 27th at Myeik District Fisheries Federation, Myeik Township (10:00AM)	• Representatives from regional, district and township Fishery Federations • Business Owner • Local government representatives (Planning Department, Township Public Health, etc.) • Media	32 people

A list of participants' names and photos of meetings are presented in ***Annex D.***

8.5 OUTCOME/RESULTS OF PUBLIC CONSULTATION

During Public Consultation, ERM maintained records (sign-up sheet, questions, answers, discussions, photos, etc.) to summarize into the IEE report and develop appropriate mitigation measures and monitoring programs to reflect public concerns/issues.

Stakeholders were encouraged to ask questions and raise concerns throughout the engagement process. For those stakeholders not comfortable speaking up or who identified concerns after the stakeholder meetings, a local telephone number was provided on which a representative from the Project Proponent could be reached.

Comments and recommendations of stakeholders obtained from the public consultation meetings are presented in ***Table 8.5***.

Table 8.5 Comments/Recommendations and Clarifications from Public Consultation Meeting in Dawei and Myeik Township, Tanintharyi Region

Questions, Concerns and Recommendations	Clarifications
1. Are there any CSR programme planned for this Project?	Eni founded its own non-profit organization, Eni Foundation, to carry out CSR project in the Countries where Eni operates. Eni Foundation is already active in Myanmar, some meetings with the Myanmar Authorities at ministerial level have been organized and it will start a cooperation in the near future.
2. Since the current project is offshore, there might be impact to fisheries. It is recommended to meet with fisheries from other townships as well.	The IEE Report is currently being prepared, which will document and take into consideration all fisherman and affected stakeholder's concerns accordingly. Future engagement with affected stakeholders will be carried out as required.
3. How will you manage waste from the vessels, including seismic vessels?	Eni has prepared a waste management plan for the MD-4 3D seismic offshore survey. All the wastes will be disposed as per International Standard and Myanmar law and regulation. For all the wastes to be treated onshore, a licensed waste management contractor will be engaged. Eni Myanmar for its onshore operations, currently is cooperating with Dowa Company as a third party waste management contractor.
4. Project should be developed with consideration of local people.	Comment is noted and will be included in the final IEE report.
5. There may be undesirable impacts if seismic survey is done at the same time as fishing season. What will happen if we are unable to access the fishing ground during fishing season?	Eni Myanmar offshore seismic acquisition will be conducted from November 2017 until the beginning of 2018. Eni Myanmar will coordinate with relevant government authorities and stakeholders via a "Notice to Mariners", sent to the Myanma Oil and Gas

Questions, Concerns and Recommendations	Clarifications
	Enterprise (MOGE), at least four weeks prior to the survey. This is to inform stakeholders of the schedule of the Project in order to avoid conflicts wth the fisheries. In addition, continuous coordination will be facilitated for fishing and seismic operations throughout the survey.
7. -The project area lies within a fishing area, and there is seasonal fishing in this area. Whenever oil & gas companies come and make meeting, the impacts to fish resources are not precisely presented. Although the assessment is carried out by experts, we are still concerned whether the project will affect our fishing area.	Seismic and fishing activities will be coordinated through the marine notice and fishing liason officers and MOGE representatives as above described. The area of exclusion from the fisheries activities will be restricted and it will change every day. Impact on the acquatic species is negligible, due to mitigation measure implemented to not disturbe the marine species.
8. While seismic survey is conducted, are there any impacts to other aquatic animals in the sea?	The impact on marine mammals and other marine organisms is negligible due to implementation of mitigation measures as described in the IEE Report. These measures include the presence of marine observers, which are professionals specialized in recognizing the presence of the marine mammals day and night. If marine mammals are sighted within a radius of 500 m, the survey will be stopped until the marine mammals leave the safety zone. The restart of the operation will be gradual (i.e., a soft start procedure).
9. Information disclosure to local community should be more transparent. An understandable explanation of the extent of the impacts due to current project activities should be disclosed to local affected people.	Community concerns are considered throughout all project activities. This includes project disclosure and transparency. All impacts will be assessed in the IEE Report and this report will be disclosed to the public.

The implementation of the public consultation program achieved its goals in providing information about the Project to stakeholders as well as an opportunity for them to give opinions and recommendations on the Project. Opinions and recommendations obtained through public consultation have been used in the IEE study to adapt mitigation measures and monitoring programs on environmental, social and health impacts.

8.6 FURTHER ONGOING CONSULTATIONS

The engagement activities so far were undertaken as part of the IEE process. However, stakeholder engagement is a continuous process to be undertaken throughout the life of the Project, as described below.

The overall approach for ongoing public consultation is similar to the one described in the previous sections and Eni will ensure it remains a 2-way process where stakeholders can express their concerns about the Project.

Further ongoing consultations will include, but not be limited to:

- Project must invite MOGE to observe the works and receive suggestions where necessary.
- Issue letter to MOGE in order to request MOGE representative to notify regional government and local representatives of the relevant townships about the Project schedule and the survey procedures. MOGE will assign representative and inform fisheries about the time and location of the survey at least one weeks in advance.

To maintain better communication with fisheries, Eni will utilize fisheries liaison officers: one to stay on each Support Vessel, one to stay on the Chase Boat, and one to stay on the seismic vessel. Eni will also ensure the presence of MOGE representatives, who will facilitate continuous sharing of information during the project execution. Such fishery representatives will be fully qualified, and have offshore safety certificates, and have experience with offshore seismic operations. They will be responsible for coordination activities for a proper "Fishing Activity Disruption". This activity will include:

- Communication and disclosure with the fishing communities;
- Providing awareness and information to fishing communities, including guidelines on survey area size and safe passing procedures;
- Distribution of proper warning notices (in English and local language) to fisherman;
- In case of damages, handle the reimbursement activity in respect of local laws (if any);
- In case of damage request, keep a proper register acknowledging damage, date of grievance request, name of complainant and amount in compliance with the Eni grievance mechanism (further discussed in *Section 8.8* and ***Annex B***).

To allow an efficient and effective action of the fisheries liaison officers, the above activity must start at least two/three weeks in advance befoe the start of the operation and last for the entire duration of the operations.

8.7 DISCLOSURE

Initial notification of the Project and IEE Report was advertised in the newspapers The Global New Light of Myanmar (English version) and The Mirror (Myanmar version) on March 10, 2017. Copies of the newspaper advertisements are included in ***Annex D***.

In addition, prior to the commencement of the survey, notification of submission of the IEE Report will be disclosed as per Article 38 of EIA Procedure Notification No. 616/2015:

Not later than fifteen (15) days after submission of the report to the Department, the Project Proponent shall disclose the report to civil society, PAPs, local communities and other concerned stakeholders: (i) posting on the Project or Project Proponent's

website(s), (ii) by means of local media (i.e. newspapers); (iii) at public meeting places (e.g. libraries, community halls); and (iv) at the offices of the Project Proponent.

Eni will also disclose the Myanmar language Executive Summary of this IEE Report at the township General Administrative Department (GAD) and Department of Fisheries (DoF) offices in the relevant Townships in Tanintharyi Region. Eni will further disclose the full IEE Report (in English) and Executive Summary (in Myanmar) on its website.

8.8 GRIEVANCE PROCEDURE

Eni Myanmar has implemented a Local Grievance Mechanism. The aim of the Grievance Mechanism is to establish a formal process allowing people, communities or groups to raise complaints regarding any impact related to activities of Eni or its subsidiaries, and also to ensure that these complaints are addressed and resolved appropriately.

This Grievance Mechanism is applied to all of Eni's assets, domestic and international, and covers the entire lifecycle of the assets or operations from inception through decommissioning and abandonment. Eni's Grievance Mechanism, which defines all scope and processes of the grievance process in detail**.**

Eni Myamar Grievance Mechanism Instruction is presented in ***Annex B***.

9 CONCLUSION AND RECOMMENDATIONS

9.1 CONCLUSIONS

This IEE Study for the proposed seismic survey in Block MD-4 was conducted to comply with the requirements of the MONREC (formerly MOECAF) EIA Procedures. The IEE demonstrates that Eni understands the environmental, social and health setting in which they are operating and has properly assessed the key potential environmental and social impacts associated with the proposed Project. A project-specific, dedicated EMP has been developed and presented as a tool to manage impacts associated with the Project and ensure legislative compliance and standards of good practice during the execution of the seismic survey in Block MD-4. Provided that the recommended mitigation measures are properly implemented, it is expected that the environmental, social and health impacts of the proposed seismic survey at Block MD-4 would be managed by Eni in a professional manner. As such, the IEE concludes that no Major impacts on the environment and people are expected from this Project and all impacts have been properly mitigated to be as low as reasonably practical.

9.2 RECOMMENDATIONS

The Project will have an EMP which will detail the required mitigation measures and all reporting and monitoring.

The IEE Report disclosure process will include disclosure of the executive summary of the IEE study in Myanmar language in the townships visited: Dawei and Myeik in Tanintharyi Region. The IEE Report disclosure will be advertised in national and local newspapers. Detailed plans for disclosure will be developed prior to the commencement of the Project.

The engagement activities thus far, were undertaken as part of the IEE process. However, stakeholder engagement is understood to be a continuous process to be undertaken throughout the life of the Project, in this case during the duration of the seismic survey. Eni will implement and manage this ongoing consultation, address concerns if new stakeholders emerge, and monitor stakeholder feedback.

Chapter 1

Environmental Conservation Law (2012) and Articles 52 and 53 of the Environmental Conservation Rules (2014) of the Republic of the Union of Myanmar

Chapter 3

ERM (2016) Project Proposal Report for the Marine Seismic Survey for Block MD-4, Offshore Myanmar.

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Annex A

ERM's Relevant Registrations and Licenses

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံတော်အစိုးရ

အမျိုးသားစီမံကိန်းနှင့် စီးပွားရေးဖွံ့ဖြိုးတိုးတက်မှုဝန်ကြီးဌာန

ကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်

အမှတ် ၁၀၉၄ အက်ဖ်စီ ၂၀၁၄-၂၀၁၅

မြန်မာနိုင်ငံ ကုမ္ပဏီများ အက်ဥပဒေအရ အီ အာ အမ် မြန်မာ ကုမ္ပဏီ လီမိတက်

.....အား ပေးရန်တာဝန် ကန့်သတ်ထားသော လီမိတက်

ကုမ္ပဏီအဖြစ် ၂၀၁၅ နှစ်၊ ဖေဖော်ဝါရီလ၊ ၂... ရက်နေ့တွင် မှတ်ပုံတင်ခွင့်ပြုလိုက်သည်။

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)

(နီလာမူ ၊ ညွှန်ကြားရေးမှူး)

ရင်းနှီးမြှုပ်နှံမှုနှင့်ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာန

THE GOVERNMENT OF THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF NATIONAL PLANNING AND ECONOMIC DEVELOPMENT

CERTIFICATE OF INCORPORATION

NO. 1094FC of 2014-2015

I hereby certify that ERM MYANMAR COMPANY LIMITED

.....is this day incorporated under the Myanmar Companies Act and that the company is Limited.

Given under my hand at Yangon this SECOND day of FEBRUARY, TWO THOUSAND AND FIFTEEN.

For Driector General
(Nilar Mu, Director)

Directorate of Investment and Company Administration

ဤကုမ္ပဏီမှတ်ပုံတင်လက်မှတ်သည်(၂-၂-၁၅)မှ(၁-၂-၂၀) ရက်နေ့အထိ (၅)နှစ် သက်တမ်းအတွက်သာ ဖြစ်သည်။ သက်တမ်း မကုန်ဆုံးမီ (၃)လအလိုတွင် သက်တမ်းတိုးရန် ရင်းနှီးမြှုပ်နှံမှုနှင့် ကုမ္ပဏီများညွှန်ကြားမှုဦးစီးဌာနသို့ လျှောက်ထားရမည်။

ညွှန်ကြားရေးမှူးချုပ်(ကိုယ်စား)
(သက်ပိုင်၊ ဒုတိယညွှန်ကြားရေးမှူး)

ISSUED DATE

(Translation)

OFFICIAL EMBLEM SorWorLor. 4 Form

LICENSE

Given to person having rights to prepare reports about the studies
and measures for preventing and solving impact on environmental quality

License No. 15/2554

By virtue of Article 19 of the Enhancement and Conservation of National Environmental Quality Act, B.E. 2518, National Environment Board has issued this License to ERM-Siam Co., Ltd. in order to indicate that it has rights to prepare reports about the studies and measures for preventing and solving impact on environmental quality, with 3 years term from 16th December 2011 to 15 December 2014, provided that the conditions are as follows:-

(1) There is no condition.

(2)

(3)

(4)

Given on this 7th day of December 2011.

-Signature-
(Mr. Santi Boonprakub)
Deputy Secretary-General,
Acting Secretary-General of Natural Resources and Environmental Policy and Planning Office

รับรองคำแปลถูกต้อง
Certified correct translation

ศุภรัตน์ สำราญ / Supparat Samran

PLOENCHIT Translation Center Tel/Fax: 02-6553916 Mobile: 081-4462705

15 JAN 2013

Environmental
Resources
Management

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http://www.erm.com

June 3, 2016

Natural Resource and Environmental Impact Assessment Division (NR-EIA),
ECD-MONREC,
No.53 Building,
Oattara Thiri Township,
Nay Pyi Taw,
Myanmar 15011

ENVIRONMENTAL RESOURCES MANAGEMENT (ERM)
ERM-Siam Co., Ltd.
- Transitional Consultant Registration Submission -

Dear Sirs,

In accordance with Article 17 to 22 of the EIA Procedure, the Consultant Registration process sets out so as to verify and ensure qualification of the consultants who wish to undertake an EIA or IEE studies. Currently, the full-scale "*Consultant Registration Scheme*" is under development. For the transitional period until the Scheme issued, the Environmental Conservation Department of the Ministry of Natural Resources and Environmental Conservation (ECD-MONREC) has provided guidance of the "*Transitional Consultant Registration*" in accordance with Article 17 (a) of EIA Procedure.

ERM-Siam Co., Ltd and a number of employees would like to continue undertaking IEE/EIA studies in Myanmar. As such, we have followed the *Transitional Consultant Registration* process provided by MONREC on their website (http://www.ecd.gov.mm/?q=node/292).

Please find enclosed the hard copies of the *Transitional Consultant Registration* forms for ERM-Siam Co., Ltd (Organization).

We have also sent electronic copies of the above applications to your NR-EIA email address. Should you have any queries, please do not hesitate to contact me or Becky Summons (ratchanee.phensri@erm.com).

For ERM-Siam Co., Ltd.

ERM-Siam Co.,Ltd.

Nat Vanitchyangkul
Managing Partner
Tel: +66 2 679 5200
E-mail: nat.vanitchangkul@erm.com

Registered office
ERM-Siam Co., Ltd.
179 Bangkok City Tower
24th Floor, South Sathorn Road
Tungmahamek, Sathorn
Bangkok, 10120, Thailand

Registered number
0105539126954

TRANSITIONAL CONSULTANT REGISTRATION FORM FOR ORGANIZATION

This form was set out by ECD-MOECAF in accordance with Article 17 (a) of EIA Procedure No. 616/2015, i.e. smooth application and registration for organization who wishes to undertake an IEE / EIA study during the transitional period — until coming into force of "Consultant Registration Scheme".

SECTION A – ORGANIZATIONAL PROFILE

Information of the Representative of the Organization

Full Name (Sur name, Given name)	Nat Vanitchyangkul
Courtesy Title (Prof, Dr, Mr., Mrs., Ms)	Mr.
Position	Managing Partner
Date of birth	09 September 1971
Identity card number (Citizen in Myanmar)	N/A
Passport number (Foreigners only)	AA1000644
Name of Organization	ERM-Siam Co., Ltd
Company Registration Number issued by Ministry of National Planning and Economic Development**	N/A

* A copy of ID card or Passport shall be attached to this form.
** A copy of the certificate of incorporation shall be attached to this form.

Office Address:

179 Bangkok City Tower 24th Floor South Sathorn Road,
Thungmahamek, Sathorn, Bangkok 10120

Postcode: 10120 Country: Thailand

Contact Information:

Telephone (office):+66 2 679 5200 E mail: ermsiam@erm.com

Fax (office): +66 2 679 5209 Mobile phone: +66 81 921 8488

SECTION E : DECLARATION

I hereby apply for registration and agree to observe and abide by the Code of Conduct specified in the final part of this form. I certify that the statements contained in this form and the supporting evidence are correct to the best of my knowledge and belief.

Signature (Representative of the Organization) :	**Date :**
	3 June 2016

CODE OF CONDUCT

The registered organization is obliged to improve the standing of the environmental impact assessment profession by rigorously observing the following Codes of Conduct. Failure to conform may result in suspension or deregistration. All key consultants shall:

To act professionally, accurately and in an unbiased manner;

Strive to increase the competence and prestige of the environmental impact assessment profession;

Assist those under my supervision (if relevant) in developing their management, professional and environmental impact assessment skills;

Not to represent conflicting or competing interests and to disclose to any client or employer any relationship that may influence my judgment;

Not to accept any inducement, commission, gift or any other benefit from any interested party or knowingly allow colleagues to do so;

Not to intentionally communicate false or misleading information that may compromise the integrity of any EIA / IEE study; and

Not to act in a manner detrimental to the reputation of any of the stakeholders including the Ministry and the client.

FOR OFFICE USE ONLY

Date received:

Recorded by:

Attachment:

☐ Copy of ID card or Passport of the Representative and every selected Consultant

☐ Professional Resume of the Representative and every selected consultant

☐ Copies of certificate / any proof for academic qualification (written in or translated into Myanmar or English language)

☐ Copy of the certificate of incorporation

Additional comments, notes or recommendations (attached if necessary):

Annex B

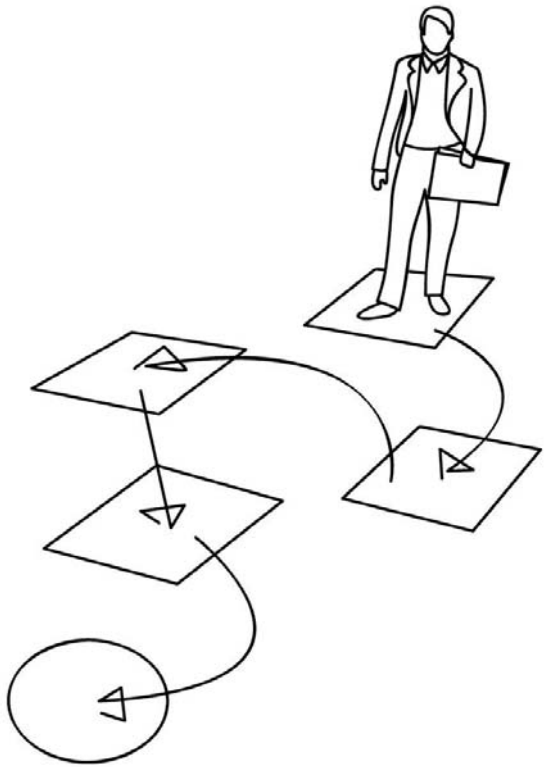
Eni HSE Management Plans and Policies

Annex B1

Eni Emergency Response Plan

Procedure

Eni Myanmar B.V. Emergency Response Plan
MD-4 3D Seismic Acquisition



REFERENCE MSG:
HSE

TITLE:		
Procedure Eni Myanmar B.V. Emergency Response Plan MD-4 3D Seismic Acquisition		
NOTES:		
DATE OF ISSUE:	**EFFECTIVE DATE:**	
April 2017	April 2017	
PREPARED BY:	**CHECKED BY:**	**APPROVED BY:**
HSE Specialist Aung Phone Myat **HSE Engineer** Khant Thaw Htoo	**HSE Manager** Laura Consalvi	**Managing Director** Stefano Carbonara

Contents

Preface

Revision Index

Rev.	Doc. Ref.	Date	Description
00	pro hse 027 rev00 Eni Myanmar	April 2017	

Document Control

The Owner of this Emergency Response Plan (ERP) is the Eni Myanmar Managing Director (MD).

The Custodian of the ERP and its attachments is the Eni Myanmar HSE Manager and he/she is responsible for its update.

The Emergency Response Plan will be periodically reviewed to confirm that the emergency response organization is still appropriate, and updated whenever there is a change to the Eni Myanmar operations or external situation which may significantly affect the content of the Emergency Response Plan.

The Custodian (HSE Manager) is responsible for obtaining the Owner (MD) approval to the ERP updated version, for distributing it to the involved functions and for storing it in the dedicated intranet folder.

Any significant comment or suggestion on this document should be addressed to its Custodian.

References

Internal References

Eni spa

- Eni spa Code of Ethics;
- Eni spa Model 231;
- msg-coe-eni-spa-eng-r02 – Management System Guideline "External Communications";
- msg-hse-Eni spa r03-eng - Management System Guideline "HSE Management System Guideline" and annexes;
- msg-hse-eni-spa-eng-AllH-r01 – Management System Guideline "Emergency and Crisis Plan – Annex H";
- msg-hse-eni-spa-eng-allS-B-r01 – Management System Guideline "HSE Management System Guideline – Annex S-B "Investigation (accidents and near misses)";
- msg-hr-eni-spa-eng-allG-r01 - Management System Guideline "Medical emergencies: preparedness and response – Annex G";
- opi-hse-001-eni-spa-r01 – Professional Operating Instruction "Procedure for managing incidents using the Incident Database Collector application (INDACO)";
- msg-ope-Eni spa-allB r01 – Management System Guideline "Operations – Wells Integrity and Delivery – Annex B of 30 April 2013".

Eni Upstream

- man sg hse 001 ups r01 – "Guidelines for the implementation of an HSE IMS in Eni upstream subsidiaries";
- opi sg hse 001 ups r02 – "HSE Risk Management and Reporting";
- pro sg hse 003 ups r02 – "Crisis and emergency response management UPS & DOT";
- opi sg hse 006 e&p r02 – "Planning and Execution of Level 2 and 3 Emergency Response Drills";
- opi sg hse 013 e&p r01 – "Guidelines for Oil Spill Contingency Planning";

- opi sg hse 020 e&p r01 – "Emergency Response Competency Assurance Process";
- opi sg hse 005 ups r03 – "Emergency Response Strategy";
- STAP-P-1-MG–26504–rev.02- "Blowout Emergency Response Plan Guidelines for Offshore-Subsea Wells";
- STAP-P-1-MG– 26610–rev.01- "Blowout Emergency Response Plan Guidelines for Offshore Wells -Surface Wellhead".

Eni Myanmar

- Pro hse 026 r00 Eni Myanmar -"Eni Myanmar Emergency Response Strategy";
- Pro hse 020 r00 Eni Myanmar – "Eni Myanmar B.V. Medical Emergency Response Plan for Permitting, Construction and Seismic Operations";
- Rep hse 001 2016 Eni Myanmar HAZID – Risk Assessment Report;
- Reg hse 001 2016 Eni Myanmar HSE Risk Register.

External References

- BS OHSAS 18001:2007 – Occupational health and safety management systems-Requirements
- ISO 14001:2015 - Environmental Management System – Requirements with guidance for use
- ISO 14004: 2016 - Environmental Management System – General guidelines on implementation
- ISO 15544:2010 – Offshore production installation - Requirements And Guidelines For Emergency Response
- ISO 17776:2000 - Petroleum and natural gas industries – Offshore production installations – Guidelines on tools and techniques for hazard identification and risk assessment
- ISO 13702:1999 - Petroleum and natural gas industries – Control and mitigation of fires and explosions on offshore production installations – Requirements and guidelines
- International Maritime Organization (IMO): 2010 – Oil Spill Risk Evaluation and Assessment of Response Preparedness

- International Maritime Organization (IMO): Manual on Oil Pollution – 2015 edition
- OGP - E&P Forum "Guidelines for Development and Application of Health, Safety and Environmental Management System" - Report N° 6.36/210
- OGP – Risk Assessment Data Directory "Evacuation, Escape and Rescue" - Report N° 434/19
- NORSOK Standard Z-013 Rev.3 - (2010) "Risk and emergency preparedness analysis";
- "The Disaster Management Rules" - The Republic of the Union of Myanmar, The Union Government, The Ministry of Social Welfare, Relief and Resettlement - Notification No. 22 / 2014 (7th April, 2015)
- "The Social Security Rules" - The Government of the Republic of the Union of Myanmar, Ministry of Labour, Employment and Social Security - Notification, No. 41/2014 (2nd April, 2014)
- "The Factories Act, 1951" (No. 65 of 1951);
- "The Myanmar Mine Rules" - The Government of the union of Myanmar, Ministry of Mines - Notification No. 125/96 (30th December 1996)

Definitions

ACCIDENT: event or chain of events (sequence of accident) that causes or may cause damage to people, the environment, company and/or third party assets, or Eni's image;

CRISIS: an event whose resolution can be prolonged over time and that has the potential to cause severe repercussions on the integrity of the company, both nationally and internationally, as well as to compromise the image and reputation of Eni on the international markets. A crisis is declared by the top management, who sets up adequate structures (Crisis Committee) for its ad hoc management, identifying the appropriate resources from the company top executives or specialists.

CRISIS COMMITTEE: operating structure convened upon request by the top management and devoted exclusively to managing events related to crises of a non-financial nature;

CRISIS UNIT: Unit composed of qualified representatives of the managements of Eni Central Structure and of the BUs, appointed with a company directive. The Unit provides support, upon request, to a BU during a third level emergency. In case the crisis is declared, the Unit cooperates with the Crisis Committee for its operational management. In case of national or international emergencies, in which Eni is called to provide operational support upon explicit request from the government, the Unit is activated by the Eni HSEQ manager or his/her deputy: SIC manager (see HSE MSG Annex H);

EMERGENCY: a situation where, in absence of risolutive actions, the associated undesired consequences may develop or further worsen over time, and which may cause damage to people, the environment, assets and the company image;

EMERGENCY RESPONSE: actions undertaken by personnel to control the event;

EMERGENCY RESPONSE PLAN: Specific document for the management of an emergency. The Emergency Response Plan shall contain a clear statement of keys individual's role and responsibility during emergencies.

EMERGENCY RESPONSE MANAGER: the Employer (for the Line Management) or the Managing Director (for the Subsidiaries);

EMERGENCY RESPONSE PLANNING COORDINATOR: the support function for the Head Quarter Emergency Response Coordinator and for the Head Quarter Emergency Response Team;

EMERGENCY RESPONSE ROOM: rooms for managing emergencies located both at the Subsidiary and Head Quarter;

EMPLOYER: as defined in the HSE MSG. The Employer is at the apex of the Employer Line;

ESCALATION: increase of the consequences deriving from hazardous events;

EXTERNAL COMMUNICATION: the "traditional" ones (press, radio and television broadcasts) as well as digital communication;

HAZARD: anything with the potential to cause harm, including ill health or injury, damage to property, plant, products or the environment; production losses or increase liabilities;

HEAD OFFICE: Subsidiary Headquarter Organization;

HEAD OFFICE EMERGENCY RESPONSE COORDINATOR: function of reference in the Subsidiary for the Eni Representative on site;

HEAD OFFICE EMERGENCY RESPONSE TEAM: group of people with management responsibilities in the case of emergency;

HEAD QUARTER: Upstream and Technical Services in San Donato Milanese – Italy;

HEAD QUARTER EMERGENCY RESPONSE COORDIANTOR: function of reference for the Emergency Response Manager;

HEAD QUARTER EMERGENCY RESPONSE TEAM: group of people with management responsibilities in the case of emergency;

INTERVENTION COORDINATOR: Head Quarter technical function that oversees the application of the intervention plan on site;

LOG KEEPER: Subsidiary's and Head Quarter's Emergency Team function that prepares and updates the Emergency Diary;

MANAGING DIRECTOR: Employer (for the Line Management) (see Emergency Response Manager);

MEDEVAC (MEDical EVACuation procedure): the medical evacuation activities carried out in order to prevent the risk of death, or to reduce the seriousness of the harm that could be suffered following a disease or injury, particularly in cases where the risk to life is high;

MITIGATION: attenuation of any undesirable effects from a hazardous event;

RISK: combination of the likelihood of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event of exposure(s);

SITE: offices, production plants, cluster or well areas, onshore or offshore drilling installations, etc.

UPS: Upstream Business Unit responsible for RESS, RENA, RECA, REFA, REOM, RENUR, REAM and REME.

Acronyms and Abbreviations

ALARP	As Low As Reasonably Practicable
CEO	Eni Chief Executive Officer
CO/DOT	Chief Development, Operations & Technology Officer
CO/EXP	Chief Exploration Officer
CO/UPS	Chief Upstream Officer
DICO	External Communication Department
EER	Escape, Evacuation and Rescue
EMERG	Emergency Liaison Unit (San Donato Milanese – Italy)
EMRIL	Major Emergencies Unit (Rome – Italy)
ER	Emergency Response
ERCAP	Emergency Response Competency Assurance Process
ERM	Emergency Response Manager
ERP	Emergency Response Plan
ERPC	Emergency Response Planning Coordinator
ERR	Emergency Response Room
ERS	Emergency Response Strategy
ERT	Emergency Response Team
FGLLID	Factories and General Labour Laws Inspection Department
HAZID	Hazard Identification
HO	Head Office
HOERC	Head Office Emergency Response Coordinator
HOERT	Head Office Emergency Response Team
HQ	Upstream and Technical Services Head Quarter
HQERC	Head Quarter Emergency Response Coordinator
HQERT	Head Quarter Emergency Response Team
HR	Human Resources
ICT	Information and Communication Technology
IPC	Intervention Plan Coordinator

MEDEVAC	Medical Evacuation
MERP	Medical Emergency Response Plan
MD	Managing Director
MSG	Management System Guidelines
OIM	Offshore Installation Manager
OPI	Professional Operating Instruction
OSCP	Oil Spill Contingency Plan
OSRL	Oil Spill Response Limited
PoB	Personnel on Board
SECUR	Security (Rome – Italy)
SEQ	Safety, Environment and Quality (San Donato Milanese – Italy)
SIC	Safety (Rome – Italy)
SICEL	Safety and Emergency Liaison Unit (San Donato Milanese – Italy)
SIMOPS	Simultaneous operations
UPS	Upstream

1 Purpose and Field of Application

1.1 Purpose

The protection of health, safety, the environment and public safety is a priority objective for Eni, that operates adopting principles, procedures and behaviours oriented towards standards of excellence.

This Emergency Response Plan covers all stages and phases of the emergency response, from call out until the emergency is over and the restoration phase has started.

It defines the organisational structure, the communication channels, the main actions to be taken by the designated Eni Myanmar personnel and the resources that should be available in case of emergency.

The main objectives of this Emergency Response Plan are to:

- minimise the consequences of an accident according to the **PEAR approach**:
  - Protection of **P**eople;
  - Protection of the **E**nvironment;
  - Protect/minimise damage to Company **A**ssets;
  - Protection of Company **R**eputation;
- ensure the availability of adequate information on the emergency situations through the implementation of an efficient communication system;
- define roles and responsibilities of Eni Myanmar Emergency Response Team members;
- ensure an efficient Emergency Management System using all dedicated equipment and resources.

1.2 Field of Application

This document is the Eni Myanmar Emergency Response Plan and it is applicable to all exploration activities carried out by Eni Myanmar within the Block MD-4.

Included within the area of application of this plan are:

- Emergencies derived from operational accident (e.g. fire, explosions, release of toxic substances, etc.);
- Medical emergencies (e.g. Medevac) for personnel involved following an operational accident requiring evacuation from the site;
- Emergencies that could be reported in local, regional, national or international media and which may require the issue of “ad hoc” press releases relating to the emergency.

Not included within the area of application of this plan are:

- Medical emergencies (e.g. Medevac) for injuries and/or health emergencies regardless of the urgency (e.g. limb fractures, cardiac problems, etc.) that require evacuation from the site but are not due to an operational accident. These emergencies must be communicated and managed in accordance with the Human Resources MSG and its annexes and with the Eni Myanmar Medical Emergency Response Plan (ref. doc pro sg hse 020 r 00).

This plan is aligned with eni procedure “Emergency and Crisis Response Management UPS & DOT” - ref. pro sg hse 003 ups r02 - and operates within a tiered response framework, which allows for the mobilization of resources at varying levels according to the incident circumstances.

2 Operational Overview

The Eni Myanmar Emergency Response Plan describes the specific requirements for Eni Myanmar to manage possible emergencies and crises arising from its own operations.

Eni Myanmar BV is planning to develop offshore exploration activities in the block MD-4, an area of around 5900 km^2 located in Tanintaryi Region. The acquisition block is sistuated approximately 460 km west of the main office in Yangon. The project foresees the development 3D seismic surveys within the Block.

The full surface coordinates for Block MD-4 are presented in Table 1.

Table 1. Block MD-4 geographical coordinates

Point	Longitude	Latitude
A	95° 38' 00" E	13° 00' 00" N
B	96° 19' 00" E	13° 00' 00" N
C	96° 19' 00" E	12° 19' 00" N
D	95° 31' 00" E	12° 19' 00" N
E	95° 42' 00" E	12° 54' 07" N

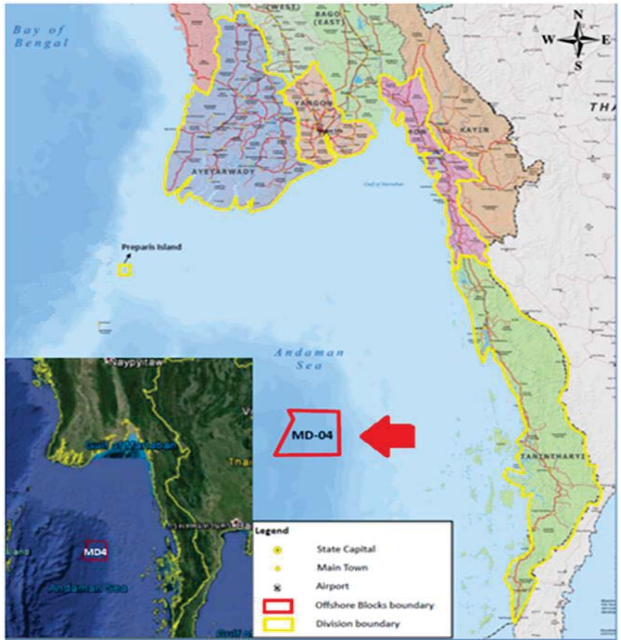


Figure 1. Location of the MD-4 Block

The project foresees the development of 3D seismic surveys within the Block and it extends for approximately 4910 km^2. The 3D seismic survey will have a Shooting Direction of E-W with 16 streamers configuration.

The proposed 3D seismic survey coordinates for Block MD-4 are presented in Table 1.

Table 2. Block MD-4 Seismic Survey Coordinates

Point	Longitude	Latitude
1	829,231.39	1,440,184.90
2	866,884.46	1,440,486.52
3	867,873.75	1,360,439.05
4	797,335.80	1,359,716.74
5	796,717.46	1,396,564.94
6	806,581.87	1,396,862.56
7	806,338.17	1,420,968.92
8	815,721.32	1,421,064.65
9	815,548.48	1,429,463.33
10	829,346.01	1,429,630.14

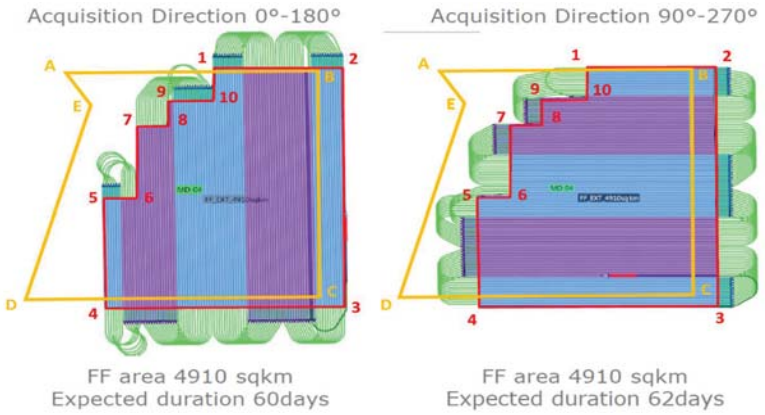


Figure 2. Survey Area of Block MD-4

3 Eni Myanmar Emergency Response Documentation

The overall Emergency Response Documentation for the operations carried out by Eni Myanmar includes emergency plans and procedures issued by Eni Myanmar as well as all the plans developed by the contractors involved in the operations.

The Emergency Response Documentation has the aim to prepare for and promptly respond to all the possible emergency scenarios related to the planned construction and seismic activities (section 4.1).

The Eni Myanmar Emergency Response Documentation (Subsidiary Emergency Response documents) consists of:

- Eni Myanmar Emergency Response Strategy (pro sg hse 026 r00 Eni Myanmar)
- Eni Myanmar Emergency Response Plan (present document);
- Eni Myanmar Medical Emergency Response Plan for Permitting, Construction and Seismic Operations (Pro sg hse 020 r00 Eni Myanmar).

Subsidiary and Site Emergency documents shall be always available both at Eni Myanmar Head Office located in Yangon and at each site. Table 3 summarizes the main emergency response documents available for the operations carried out by Eni Myanmar.

Table 3. Emergency response documentation available for the eni Myanmar operations

Eni Myanmar	Documents Codes
Eni Myanmar Emergency Response Strategy	Pro hse 026 2016 r00 Eni Myanmar
Eni Myanmar Emergency Response Plan	Pro hse 027 2016 r00 Eni Myanmar
Eni Myanmar Medical Emergency Response Plan for Permitting, Construction and Seismic Operations	Pro hse 020 2016 r00 Eni Myanmar

4 Emergency Classification and Scenarios

4.1 Emergencies and Crisis Classification

According to the severity of the emergency and the level of involvement of the different organizational structures (Site, HO and HQ), three emergency levels plus a Crisis level have been defined in line with MSG HSE "HSE emergency and crisis management" (§ 3.2.2.5), as shown in Table 4.

Table 4. Emergency Levels and Crisis

	Definition	Person in charge of the emergency management
Level 1 Emergency	An event that can be managed at site level with the personnel and equipment available on site, under the responsibility of the Employer/Managing Director	Employer/MD
Level 2 Emergency	An event that can be managed at Subsidiary level under the responsibility of the Employer/Managing Director, with assistance from the Eni Myanmar Head Office Emergency Response Team (HOERT) and from Authorities and public administrations at a local and regional level	Employer/MD
Level 3 Emergency	An event that can be managed at Subsidiary level under the responsibility of the Employer/Managing Director, with assistance from the Eni Myanmar Head Office Emergency Response Team (HOERT), Eni Upstream Head Quarter Emergency Response Team (HQERT) and from Authorities and public administrations at a local, regional and national level	Employer/MD
Crisis	An event whose resolution may take a long time and that possesses the potentiality of determining serious repercussions for the Company's integrity, both at a national level and internationally, as well as compromising Eni reputation on the international markets. A crisis condition shall be declared by the top management that will organize adequate structures (Crisis Committee) in order to manage ad hoc the crisis, identifying the appropriate human resources among the Company's top executives or specialists	Crisis Committee* *activated by top management (CEO of Eni spa)

4.2 Emergency Scenarios

This Emergency Response Plan is based on the predictable hazardous scenarios that have the potential to escalate into an emergency.

Hazards that may originate an emergency are identified and recorded in the Eni Myanmar HSE Risk Register (reg hse 001 r00 Eni Myanmar).

A list of credible major emergency scenarios is provided below:

- Fatalities due to Eni Myanmar operational activities;
- Injury due to Eni Myanmar operational activities;
- Missing person(s);
- Toxic or Flammable Gas Release;
- Oil and Chemicals Pollution (limited amount of oil);
- Fire / Explosion;
- Site Evacuation / Abandonment;
- Loss of explosive materials;
- Earthquake, tsunami, volcanic eruptions, flood, extreme precipitation, extreme weather (high temperature), etc.

The list of stakeholders that could be involved in each one of the listed scenario is reported in Appendix K – External Stakeholders Notification Checklist.

The Eni Myanmar Emergency Response Plan is a living document that shall be updated to encompass new operations, facilities, plans or any new pertinent local, National or International legislative requirements.

5 Emergency Response Organization

Emergency Response Teams are identified at each organizational level:

- Site Emergency Response Team(s), located on the operation site(s);
- Eni Myanmar Emergency Response Team (HOERT) located in the Eni Myanmar Head Office;
- Head Quarter Emergency Response Team (HQERT) in San Donato Milanese (Italy).

All members of the Site, Head Office and Head Quarter Emergency Response Teams have identified alternates (deputies). The deputies shall be competent, skilled and trained in the disciplines they are responsible for which they have been nominated.

5.1 Site Emergency Response Team

The Site Emergency Response Team(s) at the operational site is responsible for implementing the necessary local actions to respond and manage the Level 1 (see § 4 and Appendix B) emergencies according to the Site Emergency Response Plan.

As the seismic activities are contracted, Level 1 emergencies shall be managed according to the contractor emergency management system, provided that a bridging document is in place to ensure alignment with the Eni Myanmar Response System. Contractor shall appoint a Site Representative to act as liaison between the Eni Myanmar Superintendent on Site and the Contractor Organization. If the Eni Myanmar Superintendent is not available then the Eni Myanmar HSE Supervisor Coordinator will assume this position, and vice versa.

The Eni Myanmar Superintendent on Site shall inform the Geophysical Manager in Yangon Head Office who will inform the Head Office Emergency Response Coordinator (ERT leader). In the meanwhile the Eni Myanmar HSE Supervisor Coordinator on Site will inform the HSE Manager who will inform the Managing Director (ERM) (for the notification requirements, refer to § 6.2 – Emergency Notification) or his/her delegate (Exploration Manager).

5.2 Head Office Emergency Response Team

The Eni Myanmar Head Office Emergency Response Team (HOERT) is responsible for the implementation of the actions required to support any Level 2 and Level 3 (see § 4 and Appendix B) emergencies and to manage any broader implications of the event, such as

communication with Authorities, mobilization of additional resources and equipment and liaison with Eni Head Quarter in San Donato Milanese (Italy).

The organizational structure of the Eni Myanmar Head Office Emergency Response Team is aligned with the Eni procedure (ref. pro sg hse 003 ups r02). The HOERT organization is based on a "modular structure" that can be adjusted according to the incident severity and the emergency scenario needs.

The Eni Myanmar Head Office Emergency Response Team is led by the Emergency Response Manager (Managing Director or his/her deputy). According to the accident severity, the emergency management could be expanded, including the external stakeholders involved.

The Head Office Emergency Response Team functions will be activated during a Level 2 or Level 3 emergency at the discretion of the Emergency Response Manager.

Table 5 reports the HOERT positions within the Eni Myanmar organization.

Table 5. Eni Myanmar HOERT

Eni Myanmar Organization	Head Office Emergency Response Team Functions	Deputies
Managing Director	**Emergency Response Manager**	Exploration Manager
Exploration Manager	**Head Office Emergency Response Coordinator**	Geophysical Manager
Geophysical Manager	**Emergency Response Team member (First Notification)**	HSE Manager
HSE Manager	**Emergency Response Team member (First Notification)**	HSE Engineer/HSE Specialist
HR Manager	**Emergency Response Team member**	HR Administrator
Finance Manager	**Emergency Response Team member**	Accountant
Procurement Manager	**Emergency Response Team member**	Vendor Management Specialist
Company Doctor	**Emergency Response Team member**	Alternate Doctor assigned by International SOS time by time when needing.
IT Administrator	**Emergency Response Team member**	HSE Specialist
Log Keeper	**Emergency Response Team member**	HSE Engineer – HSE Specialist

The duties and responsibilities of the main roles within the Eni Myanmar organization are reported in Appendix L.

Taking into account that the HR Manager and the Procurement Manager are based in Vietnam, any time the Head Office Emergency Response Team will be activated, their deputies will be called in the emergency room and it will be established the videoconference connection with Eni Vietnam immediately after the emergency room set up will be completed.

In case of Level 2 and Level 3 emergencies, the Head Quarter Intervention Coordinator can be called to provide support to Eni Myanmar Emergency Response Team. In case of Level 3 emergencies, the Intervention Coordinator can be mobilized in order to provide assistance directly at the Yangon Head Office.

5.2.1 "On-call"

In order to ensure an effective response, the Eni Myanmar Emergency Response Team members are available on a 24/7 basis and can be mobilized in a timely manner.

This is achieved through the implementation of the "on-call system", which consists in the set-up of a priority contact list. The Eni Myanmar priority contact list is reported below:

- The **Eni Myanmar Superintendent** on site will inform the **Geophysical Manager** in Yangon Office who will inform the Head Office Emergency Response Coordinator (ERT leader);
- If the **Eni Myanmar Superintendent on site is not available, the HSE Supervisor Coordinator** will contact the **Geophysical Manager** in Yangon Office;
- the **Eni Myanmar HSE Supervisor Coordinator** on site will inform the **HSE Manager** who will inform the Emergency Response Manager.
- If the **Eni Myanmar HSE Supervisor Coordinator on site is not available**, the **Superintendent** will contact the **HSE Manager** in Yangon.

The Eni Myanmar on-call system is summarized in Figure 2.

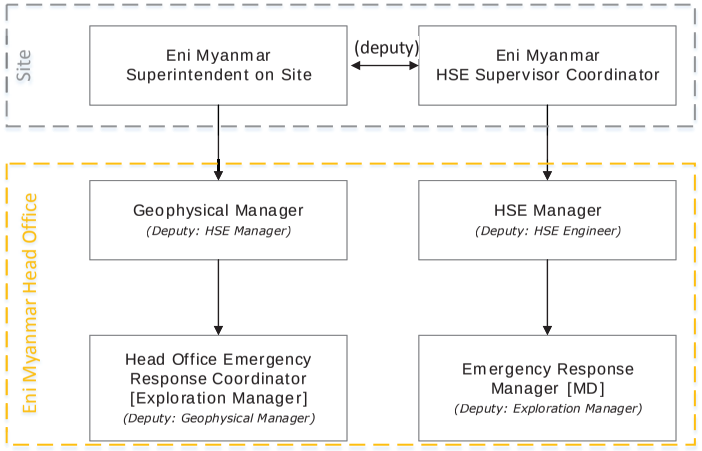


Figure 2. Eni Myanmar on-call system

The language to be used during the emergency communication shall take into consideration also the local requirements/needs.

Eni Myanmar Contact Details are reported in Appendix E – Head Office ERT and ERR Contact List.

The contact details of the Eni Myanmar Superintendent on Site (and his/her deputy) and the Eni Myanmar HSE Supervisor Coordinator (and his/her deputy) are reported in Appendix F – Site Contact List.

The Appendix E – Head Office ERT and ERR Contact List is distributed to:

- Head Office Emergency Response Team members;
- Eni Myanmar Superintendent on Site and Eni Myanmar HSE Supervisor Coordinator.

The Site and Head Office ERT Contact list shall be available in the HO Emergency Response Room.

The Eni Myanmar Geophysical Manager (or the HSE Manager, if the Geophysical Manager is not available) provides the first point of contact from the site. In case of

emergency, the Eni Myanmar Representative on Site will inform or report to him/her, who will inform the Eni Myanmar Head Office Emergency Response Coordinator. In the meanwhile the HSE Supervisor Coordinator will inform the HSE Manager who will inform the Managing Director (ERM).

5.2.2 Subsidiary Emergency Response Rooms

The Subsidiary Emergency Response Room (ERR) is the "Sala Luigi" Meeting Room, located in the Eni Myanmar HO building, at the following address:

Eni Myanmar b.v.

Yangon Branch

0602, Registered in SakuraTower,

339 Bogyoke Aung San Road

KyauktadaTownship, Yangon, Myanmar

The Room is equipped with facilities to allow effective communication with the organisations and entities involved in any emergency situation.

The layout and fixed telephone numbers of the main ERR are reported in:

- Appendix H – Emergency Response Room Layout
- Appendix E – Head Office ERT and ERR Contact List

The HSE Manager is responsible to keep updated the list of HOERT members (see Appendix E) that have access to the main ERR after the working hours in case of emergency.

The HSE Manager is the Custodian of ERR.

The ICT Administrator is responsible for the periodical checks and updates of the electronic and communication equipment in ERR. Checks must be recorded.

All documentation necessary to support the response actions (e.g. ERPs, Procedures, drawings, etc.) will be kept in the Emergency Response Room.

5.3 Head Quarter Emergency Response Team (HQERT)

The Eni Head Quarter Emergency Response Team (HQERT) is responsible for:

- Providing support and assistance to Eni Myanmar where local/national resources and arrangements are not sufficient to manage the emergency;
- Managing any additional implications to Eni UPS as a result of the incident;
- Liaising with Eni Rome in case of crisis.

The HQERT is notified by the Eni Head Quarter Emergency Response Coordinator (HQERC) in case of Level 2 emergencies while it is notified and activated by the Eni Head Quarter Emergency Response Coordinator (HQERC) in case of Level 3 emergencies.

5.4 Crisis Unit

Whenever a Level 3 emergency requires additional response capability in terms of resources and equipment, the HQ Emergency Response Coordinator in San Donato Milanese, in agreement with the Eni Myanmar Emergency Response Manager, requires the activation of the Eni Crisis Unit.

The Eni Crisis Unit responsibilities include:

- the coordination of specialized resources and equipment from different Eni business lines to support the on-going emergency response actions;
- to provide support through the software available at the EMRIL Unit.

5.5 Public Authorities and External Resources

Public Authorities include governmental, regional and local agencies like Fire Brigade, Police, air rescue services, Health and Environment Ministry.

During an emergency, a number of external organizations, resources and/or entities may need to be contacted. In particular, the main **external contractor** resources will include:

- Medical Contractors (and associated organisations) (refer to the "Eni Myanmar B.V. Medical Emergency Response Plan for Permitting, Construction and Seismic Operations, Doc. Pro hse 020 2016 Eni Myanmar);
- Logistics Subcontractors (land transportation).

In addition, in case of accident, a number of **Agencies and Ministries** shall be notified according to the on-going scenario (ref. section 6.4.3 and Annex K), including:

- the Factories and General Labour Laws Inspection Department (FGLLID) under the Ministry of Labour;
- Ministry of Oil and Gas Enterprise
- the Fire Brigade;
- Police.

The list of Contractors, Authorities and Agencies and contact references is reported in Appendix G – External Contacts List.

The San Donato HQERT, when activated, can support the Subsidiary in identifying those contractors that are not likely to be available locally.

6 Emergency and Crisis Response Management

6.1 Emergency Level Assessment

The Eni Myanmar Head Office Emergency Response Coordinator (ERC, Exploration Manager) will consult the Emergency Response Manager (Managing Director) and, together, they will establish the Level of Emergency and the need to inform and/or mobilise the pertinent Emergency Response Team members and, if needed, the Head Quarter.

The emergency classification shall follow the definitions reported in Section 4.1 – Emergencies and Crisis Classification.

N.B. – It is important to assess the potential for escalation of an emergency or accident in order to ensure timely notification or mobilization of additional resources.

In case of doubt on the level of classification, it is always prudent to over classify the emergency.

The Appendix B – Emergency Classification Flowchart – shows the 'decision tree' for the emergency classification.

6.2 Emergency Notification

6.2.1 Level 1 Emergencies Notification

For Level 1 emergencies, the Eni Superintendent on site will be the point man for communications to the Head Office in Yangon. If he is not available then the HSE Supervisor Coordinator will assume this position, and vice versa.

The Eni Superintendent on Site shall inform Geophysical Manager in Yangon Office who will inform the Head Office Emergency Response Coordinator (ERC, Exploration Manager). In the meanwhile, the HSE Supervisor Coordinator will inform the HSE Manager who will inform the Managing Director (ERM).

No notification to the Eni Head Quarter in San Donato nor to Eni Rome is required.

The Level 1 emergency shall however be reported in the INDACO Database, as required in the pro sg hse 003 ups r02.

6.2.2 Level 2 and Level 3 Emergencies Notification

For Level 2 and Level 3 emergencies, the Eni Superintendent on site (or, in his absence, the HSE Supervisor Coordinator) shall inform Geophysical Manager in Yangon Office who will inform the Head Office Emergency Response Coordinator (ERT leader). In the meanwhile, the HSE Supervisor Coordinator (or, in his absence, the Eni Superintendent on site) will inform the HSE Manager who will inform the Managing Director (ERM).

According to the pro sg hse 003 ups r02, the Eni Myanmar Emergency Response Manager (Managing Director) shall then notify by phone:

- The competent Geographic Region;
- The Head Quarter Emergency Response Coordinator (HQERT) in San Donato Milanese (Italy);
- The Eni Rome switchboard (+39 06 598 25050), highlighting his/her name and surname, the contact number, the site in emergency and a brief description of the on-going accidental event.

In addition, the Eni Myanmar Emergency Response Manager (Managing Director) shall submit the "Emergency Notification Form" (see Appendix C) to the following email addresses:

- HQ Emergency Response Coordinator in San Donato Milanese (Italy);
- EMERG email address: Eni.emergencySDM@eni.com
- EMRIL email address: Eni.emergency@eni.com

The Eni HQ and Eni Rome contact details for Level 2 and Level 3 emergency notification are listed in the **Unique Phone List** periodically distributed to Subsidiaries by the EMERG Unit. The Eni Myanmar HSE Manager is responsible for the update and/or validation of the contact details of the Unique Phone List concerning his/her Subsidiary (names, positions and telephone numbers). Any update of the Subsidiary contact details shall be promptly sent by the Eni Myanmar HSE Manager to the EMERG email Eni.emergencySDM@eni.com.

Level 2 and Level 3 emergencies shall be reported in the INDACO Database, as required in the pro sg hse 003 ups r02.

Whenever a Level 3 emergency requires additional response capability in terms of resources and equipment, the HQ Emergency Response Coordinator in San Donato Milanese, in agreement with the Eni Myanmar Emergency Response Manager requires the

Eni Crisis Unit activation. The activation process is reported in the Annex A of the pro sg hse 003 ups r02.

6.2.3 Declaration of Crisis

The crisis condition, when necessary, is then declared by the CEO, who organizes adequate structures (Crisis Committee) in order to manage ad hoc the crisis. The declaration process is reported in the Annex A of the pro sg hse 003 ups r02.

6.2.4 Emergency Notification Form

Level 2 and Level 3 emergencies shall be notified by Eni Myanmar to the Head Quarter Emergency Response Coordinator using the Emergency Notification Form (Appendix C). The emergency notification procedure is detailed in Section 6.2.2.

6.3 Mobilization of the Head Office Emergency Response Team members

In case of Level 2 and Level 3 emergencies, the Head Office Emergency Response Coordinator is in charge for the mobilization of the necessary Myanmar ERT members.

As soon as they are notified, the Emergency Response Team members should proceed directly to the Emergency Response Room in the Eni Myanmar Head Office.

Target is 10 minutes during working hours and 90 min during the silent hours.

The custodian of the ERR should begin the process of setting up/switching on the Emergency Response Room equipment.

6.4 Emergency Response Management

6.4.1 Level 1, Level 2 & Level 3 Emergency and Crisis Management

Appendix J – Emergency Management Flowchart reports the different level of management of emergencies response in case of Level 1, Level 2 and Level 3:

- For Level 1, the emergency is managed at the site level with the activation of the Site ERT; Eni Myanmar Head Office is informed. The Head Office Emergency Response Room is normally closed. No liaison with the Eni Head Quarter in San Donato is required.
- For Level 2, the Eni Myanmar Head Office is directly involved in the emergency management and the HOERT is activated. The Head Office Emergency Response

Room is opened. The Eni Head Quarter in San Donato and Eni Rome are informed.

- For Level 3, the Eni Head Quarter in San Donato is directly involved in the emergency management and the HQERT is activated. The Head Office Emergency Response Room and the Head Quarter Emergency Response Room are opened. Eni Rome is informed.

Whenever a Level 3 emergency requires additional response capability in terms of resources and equipment, the HQ Emergency Response Coordinator in San Donato Milanese, in agreement with the Eni Myanmar Emergency Response Manager, requires the Eni Crisis Unit activation.

- In case the event resolution takes a long time and possesses the potentiality of determining serious repercussions for the Company's integrity, both at a national level and internationally, as well as compromising Eni reputation on the international markets, the crisis condition is declared by the CEO, who organizes adequate structures (Crisis Committee) in order to manage ad hoc the crisis.

6.4.2 Eni Myanmar Emergency Response Team Members Duty Cards

When the requested Emergency Response Team Members have been mobilized, each member will assume his/her designated role and responsibility. The Emergency Response Duty Cards provide each ERT Member with indications about the actions to be implemented in case of emergency, according to the specific covered role.

Emergency Response Duty Cards refer to the main positions to be covered according to Eni Myanmar organization. The Duty Cards are reported in Appendix L.

Emergency Response Team members shall familiarize with their pertinent Duty Card before starting the operations and use it as an individual 'aid memoir' in case of emergencies or drills.

6.4.3 Stakeholders to be involved

According to the on-going incident, different Authorities and/or Agencies may be called and be involved in the emergency management. The alignment between Eni Myanmar emergency response actions and Authorities and/or Agencies requirements shall be performed according to "The Disaster Management Rules" (Notification No. 22 / 2014, 7th April, 2015). Furthermore, a number or reporting requirements to public Authorities and Agencies are required, as reported in Annex A.

Scenario Checklists have been prepared for a set of reference scenarios, to provide a quick reference of the external parties to be involved in each situation.

Scenario Checklists are meant to cover the main predictable risks associated to the operations, and define the notification requirements (urgent, important, required, advisory) towards the relevant Authorities and Agencies; moreover, they define the HOERT members in charge of notifications/communications. The Checklists are provided for reference in Appendix K – External Stakeholders Notification Checklist and shall be customized according to the local context.

6.4.4 Emergency Management Forms

The traceability of communications and operations during an emergency represents a fundamental issue for Emergency Response in terms of information storage for references and records.

In case of Level 2 and Level 3 emergencies, the Eni Myanmar Emergency Response Manager (Managing Director) shall submit the "Emergency Notification Form" for any significant update of the on-going emergency (see Appendix C) to the following email addresses:

- HQ Emergency Response Coordinator in San Donato Milanese (Italy);
- EMERG email address: Eni.emergencySDM@eni.com

In addition, it is important that the Emergency Response Team members fill Personal Logs (see the standard Form in Appendix M) of the key actions taken and information received.

The Log Keeper will fill in the Emergency Diary (see the standard Form in Appendix N) with the actions/information acquired and provided by the HOERT members.

6.5 Emergencies and Crises Closure

An Emergency/Crisis is considered closed when:

- all personnel and installations involved are in a safe condition;
- the causes and consequences of any environmental impact are removed or contained;
- the emergency response actions can be considered completed and eventually the restoration actions can be initiated.

6.5.1 Level 1 Emergencies Closure

The closure of a Level 1 emergency shall be communicated by the Eni Representative on Site to the Head Office Emergency Response Coordinator in the Eni Myanmar Head Office.

For Level 1 emergencies, no communication of closure to the Eni Head Quarter in San Donato and to Eni Rome is required.

6.5.2 Level 2 and Level 3 Emergencies Closure

For Level 2 and Level 3 emergencies, the closure of the emergency is communicated by the Eni Myanmar Emergency Response Manager, as specified in the pro sg hse 003 ups r02, to:

- The competent Geographic Region;
- HQ Emergency Response Coordinator in San Donato Milanese (Italy).

In addition, the Eni Myanmar Emergency Response Manager (Managing Director) shall submit the "Emergency Notification Form" for the emergency closure (see Appendix C) to the following email addresses:

- HQ Emergency Response Coordinator in San Donato Milanese (Italy);
- EMERG email address: Eni.emergencySDM@eni.com

6.5.3 Crises closure

The closure of a Crisis condition is confirmed by the Eni S.p.A. CEO, as specified in the pro sg hse 003 ups r02 "Crisis and Emergency Response Management UPS & DOT".

6.6 External Communication Management

The external communications (digital media or newspapers) about emergencies are in charge of the Eni DICO (External Communication Department), as reported in the pro sg hse 003 ups r02.

Any statement to the media during an emergency shall be released by the DICO Department, provided that the Eni Myanmar Emergency Response Manager as well as the REFA Geographic Region and CO/UPS have been previously consulted for the statement agreement.

DICO Department has the responsibility to select the spokesperson among the Eni management, if deemed necessary, to release the information to the media.

The process for the statement release to the media according to the different emergency levels (Level 1, Level 2 and Level 3) is detailed in the pro sg hse 003 ups r02.

7 Appendices and Forms

A. Local, National and Regional References

"The Disaster Management Rules" – The Republic of the Union of Myanmar, the Union Government, the Ministry of Social Welfare, Relief and Resettlement – Notification No. 22 / 2014 (7th April, 2015):

CHAPTER VIII: "Emergency Response Activities including Search and Rescue during the Disaster Stage": The emergency status level of disaster shall be categorized as follows:

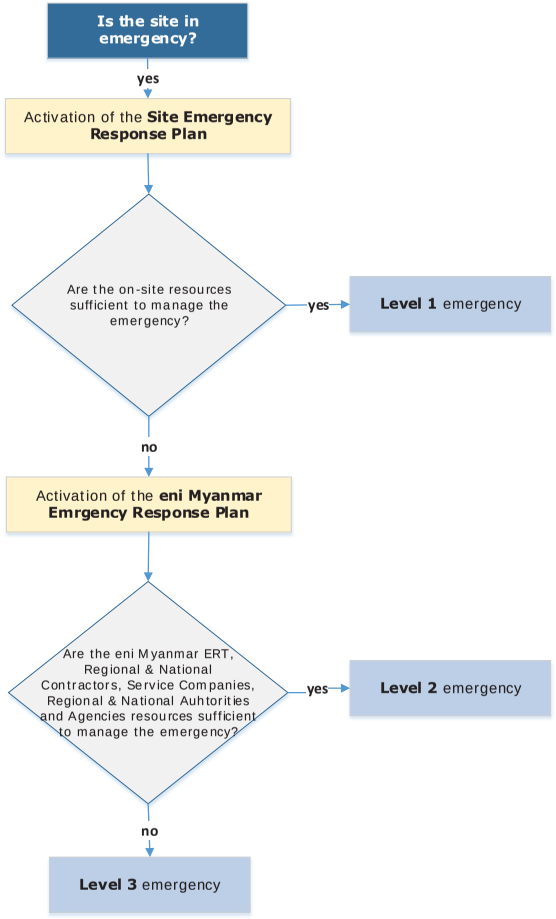
- Emergency Status Level 5: if a disaster is considered to be controlled by ward or village tract level;
- Emergency Status Level 4: if a disaster is considered to be controlled by township level;
- Emergency Status Level 3: if a disaster is considered to be controlled by the Self-administered Division or Self-administered Zone level or District level;
- Emergency Status Level 2: if a disaster is considered to be controlled by Region or State level;

Emergency Status Level 1: if a disaster is considered to be controlled by national level.

"**The Social Security Rules**" – The Government of the Republic of the Union of Myanmar, Ministry of Labour, Employment and Social Security – Notification, No. 41/2014 (2nd April, 2014):

The primary public agency involved in the supervision of occupational health and safety framework for workers in the manufacturing sector is the Factories and General Labour Laws Inspection Department (FGLLID) under the Ministry of Labour, which is responsible for enforcing occupational health and safety rules, mainly through factory inspections and training. With reference to "The Social Security Rules", Chapter XI, in case of accident the "*employer shall inform to the relevant Township Social Security Office immediately if his insured worker occurs serious employment injury or dies for such injury. Moreover, it shall be informed again to the relevant Township Social Security Office within 24 hours in the stipulated (Form-37) in triplicate*". The Form-37 of the Social Security Rules is reported in Annex D – "Employer's Report relating to the Employment Injury".

B. Emergency Classification Flowchart



C. Emergency Notification Form

	Emergency notification form 2nd level ☐ 3rd level ☐	☐ notification ☐ update ☐ close out	Page: 1 of 6

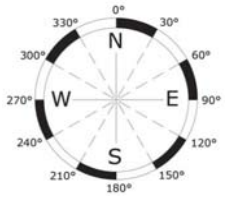
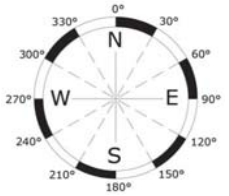
Communication n°: ___	Transmission date: __/__/____	Transmission time (LT): ___:___
Subsidiary:	Country:	Phone n°:
Mail address:	Event date: __/__/____	Event time (LT): ___:___
Name of the emergency site:		onshore ☐ offshore ☐
Geographical Coordinates(WGS84)	Latitude: ___°___'____"	Longitude: ___°___'____"
Activity	production ☐ drilling ☐ work over ☐ wire line ☐ seismic ☐ other (specify):_____	
Fluid release yes ☐ no ☐	oil ☐ gas ☐ H_2S ☐ chemicals ☐ production water ☐ other:_____	
Emergency type	1) fire ☐ 2) explosion ☐ 3) blowout ☐ 4) spill ☐ 5) collision ☐ 6) road accident ☐ 7) other:_____ 8) ship sinking ☐ 9) helicopter/plane crash ☐	
Complete only for point 8 or 9	Position at last contact(WGS84): Lat ___°___'____" Long ___°___'____" Route from _____ to _____	
Restriction for	naval operation ☐ air operation ☐	

Company					Contractors					Visitors				
Total number present	Minor injuries	Serious injuries	Missing	Fatalities	Total number present	Minor injuries	Serious injuries	Missing	Fatalities	Total number present	Minor injuries	Serious injuries	Missing	Fatalities

Fill in the present data indicated above (e.g. name, role, company name, type of injury, ect)

	Emergency notification form 2nd level ☐ 3rd level ☐	☐ notification ☐ update ☐ close out	Page: 2 of 6

Weather Conditions (**wind from, current to**)

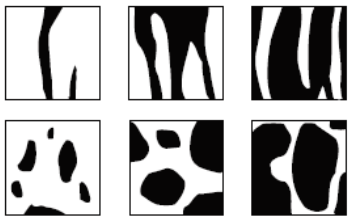
Wind (**from**) (indicate the direction the wind **comes from** with an arrow)	Wind speed (knots)	Marine current (**to**) (indicate direction the current **goes to** with an arrow)	Marine current Speed (knots)
	Wind speed (m/s)		Marine current Speed (m/s)

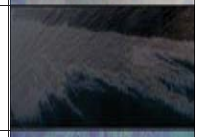
clear ☐ partly cloudy ☐ very cloudy ☐

Extent of the slick: _____(meters x meters)	Sea water temperature: _____(°C)_____(°F)

Oil Spill Modeling Data

Oil Data	Unit of Measurement	Value
Density	(SG/°API)	
Viscosity	(cP/Pa s/cSt)	
Pour Point	(°C/°F)	
Waxes	(%)	
Asphaltenes	(%)	

Coverage of the slick	Observations
 ☐ 25 % ☐ 50% ☐ 75%	_____ _____ _____ _____ _____ _____

Code	Appearance	Thickness (µm)	L / km²	Example
1	Sheen	0.04 – 0.30	40 – 300	
2	Rainbow	0.30 – 5.0	300 – 5,000	
3	Metallic	5.0 – 50	5,000 – 50,000	
4	Discontinuous true colour	50 – 200	50,000 – 200,000	
5	Continuous true colour	> 200	> 200,000	

Bonn Oil Agreement Appearance Code
Observations

	Emergency notification form 2nd level ☐ 3rd level ☐	☐ notification ☐ update ☐ close out	Page: 3 of 6
Mass Media	**Newspaper** Local ☐ specify_____ national ☐ specify_____ international ☐ specify _____		
	Television network local ☐ specify _____ national ☐ specify _____ international ☐ specify _____ other media organizations (specify) _____		
External Authorities and Bodies involved	Fire Brigade ☐ Police ☐ Coast Guard ☐ Civil Protection ☐ Public Health ☐ Burns Centre ☐ Poison Centre ☐		
Description of the Accident			
Actions taken			
Initial estimate of damage			
Initial requests			

	Emergency notification form 2nd level ☐ 3rd level ☐	☐ notification ☐ update ☐ close out	Page: 4 of 6

Blowout Scenario Characterization Data		
Parameter	Value/Range	unit of measurement
Water depth (for underwater blow-out)		m
Top Reservoir depth (see Note 1)		m sea level for offshore location, m RT for onshore location
Reservoir temperature (see Note 1)		°C
Static pressure (see Note 1)		Bar_g (see Note 2)
Static pressure datum		m sea level for offshore location, m RT for onshore location
Oil gravity (see Note 1)		°API
Bubble point (for crude oil wells) (see Note 1)		Bar_g at T reservoir (see Note 2)
Dew point (for dry gas and gas condensate wells) (see Note 1)		Bar_g at T reservoir (see Note 2)
Solution G.O.R. (for crude oil wells) (see Note 1)		Sm^3/m^3
Blow-out G.O.R. (see Note 1)		Sm^3/m^3
H_2S (see Note 1)		ppm
Surface gas molecular weight stock tank condition (see Note 1)		g/mole
Productivity index (for crude oil wells) (see Note 1)		$Sm^3/d/bar$
Bottom absolute open flow (BAOF for dry gas and gas condensate wells)		$MMSm^3/d$
Release point elevation with reference to:	Land level (for atmospheric onshore blow-out) ☐ Sea level (for atmospheric offshore blow-out) ☐ Sea bottom (for underwater blow-out) ☐	
Rotary table/Rig floor elevation with reference to:	Land level (for atmospheric onshore blow-out) ☐ Sea level (for atmospheric offshore blow-out) ☐	
Type of hydrocarbons:	crude oil ☐ dry gas ☐ gas condensate ☐	

Note 1) in case of uncertainty about the value please supply the range of possible variation
Note 2) barg is "gravitational" pressure that doesn't include atmospheric pressure

	Emergency notification form 2nd level ☐ 3rd level ☐	☐ notification ☐ update ☐ close out	Page: 5 of 6

Blow-out Scenario Characterization Data			
Event	Flow through	Description	Selection
During drilling	Casing	Well cased. Flow through open hole and internal casing/liner sections without drilling string inside	☐
	Annulus (including outside casing)	Well cased and with drilling string. Flow through the annulus generated between the drilling string and open hole/casing/liner sections or inside different casing/liner/gaps (outside casing)	☐
	Drilling string	Well cased and with drilling string inside pipe. Flow through drilling string only	☐
	Drilling string and annulus	Well cased with drilling string inside. Flow through the annulus between open hole/casing/liner sections and drilling string and inside drilling string itself	☐
During production	Tubing	Flow through liner section from the perforated intervals top to the tubing bottom and through the production tubing up to wellhead	☐
	Annulus	Flow through liner section from the perforated intervals top to the tubing bottom and through the annulus between the casing/liner sections and the tubing up to wellhead	☐
	Annulus and tubing	Flow through liner section from the perforated intervals top to the tubing bottom and both through the annulus and production tubing up to wellhead	☐

	Emergency notification form 2nd level ☐ 3rd level ☐	☐ notification ☐ update ☐ close out	Page: 6 of 6

Contents

- Depth data must be supplied both in Measured depth (MD) and True Vertical Depth (TVD)
- Diameter data must be expressed both in term of Inner Diameter (ID), Outer Diameter (OD)
- Component data must be supplied both in term of Nominal Diameter (ND) and Linear Weight (LW)
- Please specify measurement units (into round parentheses)
- Please specify the reference of the depth data (Rotary Table, Sea Level, Sea Bottom, Rig Floor, etc.) together the measurement units (into round parentheses)

The following list of data be supplied (in quoted well sketch) if present in the well:

- Casing/Liner shoes depth
- Top liner depth
- Top and Bottom depth each type of drill pipe composing the drilling string
- Top and Bottom of each tubing section
- ID and OD of each section
- Bit depth
- Open hole bottom depth and ID
- Perforation interval(s) top and bottom depth

TYPE	ND (“)	ID (“)	OD (“)	LW ( )	TOP DEPTH		BOTTOM DEPTH	
					MD ( ) [ ]	TVD ( ) [ ]	MD ( ) [ ]	TVD ( ) [ ]

QUOTED WELL SKETCH

D. Employer's Report relating to the Employment Injury

Rule 175 (a)
Form 37

Social Security Board

Employer's Report relating to the Employment Injury

(The report shall be sent in three copies during 24 hours after the occurrence of serious injury)

1. Name of the establishment _____ Registration No. of Establishmnet _____
2. Full address _____
3. Fax _____
4. Name of Insured _____ Social Security Insurance No. _____
5. Type of injury _____
6. How the injury was obtained ((To mention in detail.) _____
   _____
7. part of organ injured _____
8. Date and time of obtaining injury _____
9. He/ she has been treated as follows: _____
   Wage issued to him/her during last month when he/she did not contribute to the Social Security Boardis as follows:
   _____
10. Employer's Remark (e.g To mention briefly whether or not it was so happened in the course of duty and cause of Employment Injury)
    _____
    _____
    (e.g This injury had been obtained during operation of which machine)

Names and addresses of Witnesseses

1. _____ 2. _____

I take responsibility absolutely on the truth of the above-mentioned particulars.

Date ( ) Day ( ) Month ( ) Year

Signature of the in-charge of the establishment

Designation _____

Remark : Being responsible to report on the employment injury to the Social Security Office, it shall be prosecuted when it is failed to comply according to duty and if intentionally testifys falsely .

E. Head Office ERT and ERR Contact List

Head Office Emergency Response Team Contacts

Telephone numbers should only be provided to personnel/organisations who need to communicate directly with the ERT.

Eni Myanmar Organization	HOERT Functions	Name	Landline	Mobile	Email address
Managing Director	Emergency Response Manager	Stefano Carbonara	715504105	09 971 679 171	stefano.carbonara@eni.com
Exploration Manager		Ivan Staine	715504112	09 971 679 161	ivan.staine@eni.com
Exploration Manager	Head Office Emergency Response Coordinator (ERT Leader)	Ivan Staine	715504112	09 971 679 161	ivan.staine@eni.com
Geophysical Manager		Simone Baudo	715504119	09 971 679 168	simone.baudo@eni.com
Geophysical Manager	Emergency Response Team member	Simone Baudo	715504119	09 971 679 168	simone.baudo@eni.com
HSE Manager		Laura Consalvi	715504108	09 971 679 164	laura.consalvi@eni.com
HSE Manager	Emergency Response Team member	Laura Consalvi	715504108	09 971 679 164	laura.consalvi@eni.com
HSE Engineer		Khant Thaw Htoo	715504108	09 420 306 272	khant.thaw.htoo@eni.com
HSE Specialist	Emergency Response Team member	Aung Phone Myat	715504107	09 5098909	aung.phone.myat@eni.com
HR Manager	Emergency Response Team member	Giuseppe Velotti	715569830	+84902583669	giuseppeflavio.velotti@eni.com
HR Administrator		Wendy Moe Moe Win	715504106	09 5130 613	moe.moe.win@eni.com
Finance Manager	Emergency Response Team member	Danilo Dussizza	715504123	09 971679173	danilo.dussizza@eni.com
Accountant		Thu Thu Zaw	715504103	09 5160638	may.thu.thu.zaw@eni.com
Procurement Manager	Emergency Response Team member	Fabio Scarangella	715569860	+84934104646	fabio.scarangella@eni.com
Vendor Management Specialist		TBA	TBA	TBA	TBA

IT Administrator	Emergency Response Team member	Kyaw Min Than	715504116	09 420181986	kyaw.min.than@eni.com
HSE Specialist		Aung Phone Myat	715504107	09 5098909	aung.phone.myat@eni.com
Company Doctor	Emergency Response Team member	Zaw Mone Mone	715504114	09254074865	mone.mone.zaw@eni.com
Deputy		tbd	tbd	tbd	tbd

Emergency Response Room Contacts

EMERGENCY RESPONSE ROOM	
Address	"Sala Luigi" Meeting Room, Eni Myanmar b.v. - Yangon Branch 0602, Registered in SakuraTower, 339 Bogyoke Aung San Road KyauktadaTownship, Yangon, Myanmar
Land Phone Number	715504127 (Teleconference)
Video Conference ID	717029200@video.eni.it
Email address	
Satellite number	

F. Site Contact List

Site – MD-2 - Contact Details

Site MD-2 – Eni Myanmar Contact Details			
Position	**Name**	**Mobile**	**Email Address**
Eni Myanmar Superintendent on Site	Alessandro Esposito	*09 979 628 812*	alessandro.esposito@external.eni.com
Alternate Eni Myanmar Superintendent on Site	Daniele Marrocoli	09 977 034 334	daniele.marrocoli@external.eni.com
Eni Myanmar HSE Supervisor Coordinator	Andrew Pryce	09 971 679 176	andrew.pryce@external.eni.com
	Jeff Kallal		jeff.kallal@external.eni.com

G. External Contacts List

Authorities and Agencies

Position	Name	Address	Telephone (landline / mobile)	Fax
Fire Services Department				
	Fire Services Department	Swedawsayde Road, Mayangone Township, Yangon, Myanmar	01-664080	95-1-666154 or 656644
Police Station (Kyauktada)				
	Police	188, Sule Pagoda Rd, Between Bogyoke Aung San and Anawrahta Street Upper Block, Ward (1), Kyauktada, Yangon, Myanmar	01-371049 01-371054 09-450046336 09-31339411	

Medical Services

Position	Name	Address	Telephone (landline / mobile)	E-mail
Company Doctor, Ambulance, Hospitals				
Refer to the pro hse 020 2016 Eni Myanmar "Medical Emergency Response Plan for Permitting, Construction and Seismic Operations"				

H. Emergency Response Room Layout

I. Emergency Response Room Equipment

Arrangements and Fittings
Emergency Response Room located in a protected area
Emergency Response Room access allowed with badge
Security guard(s) at the main entrance of the building
Emergency Response Room well maintained
Adequate Room dimension
Round or horse-shoe table
Digital clock installed (day/date/24 hours)
White large board to record issues, strategy, actions
White large board to record a Central Log of Events
Video conference system (large HD video with PC connection)
Additional white boards or flip charts (plain or pre-printed) to record specific categories of status information such as personnel at site, casualties, external organisations notified
Emergency cupboard(s) to house items of equipment which must be available for use in this room
Break-out room

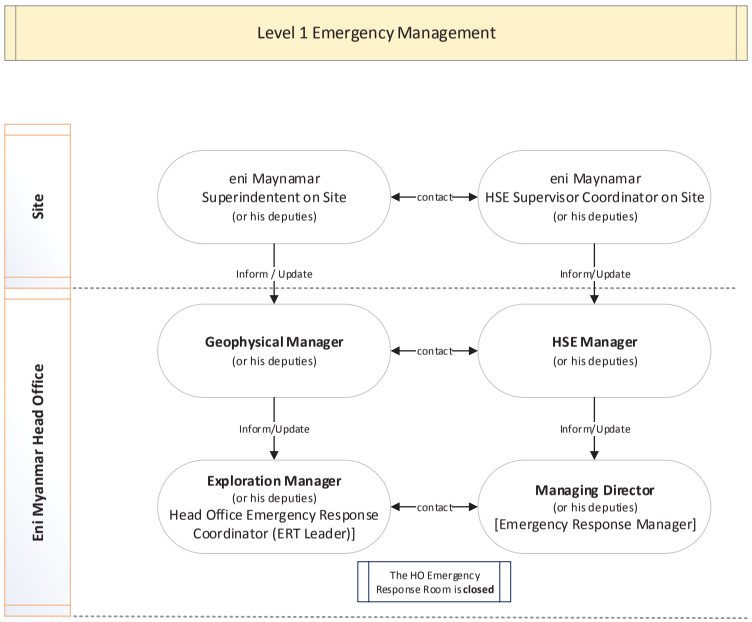
Communications
Telephone direct line (non-switchboard) “hot-line” for liaison with the incident site
Land and mobile telephone
Handsets which should have audio-visual ringers, loudspeaker and conference facilities (and ear set for each position)
Videoconference screen and facilities
Sufficient number of power connections

Documents and Stationery
Personal checklist
Personal Log Sheet
Event Log Sheet
Emergency Communications Directory
Internal Company Directory
Complete set of all Emergency/ Crisis Response Plans and Procedures
Long-term contractor and partner Emergency Plans
Organisation diagrams
Maps and diagrams at appropriate scales, e.g. topographic maps, aerial photos
Flow schemes, plant drawings, drainage diagrams, firewater and electrical diagrams
Spare paper, pens, pencils, markers, etc.
Material Safety Data Sheets (MSDS) for each of the substances involved/potentially involved in the emergency

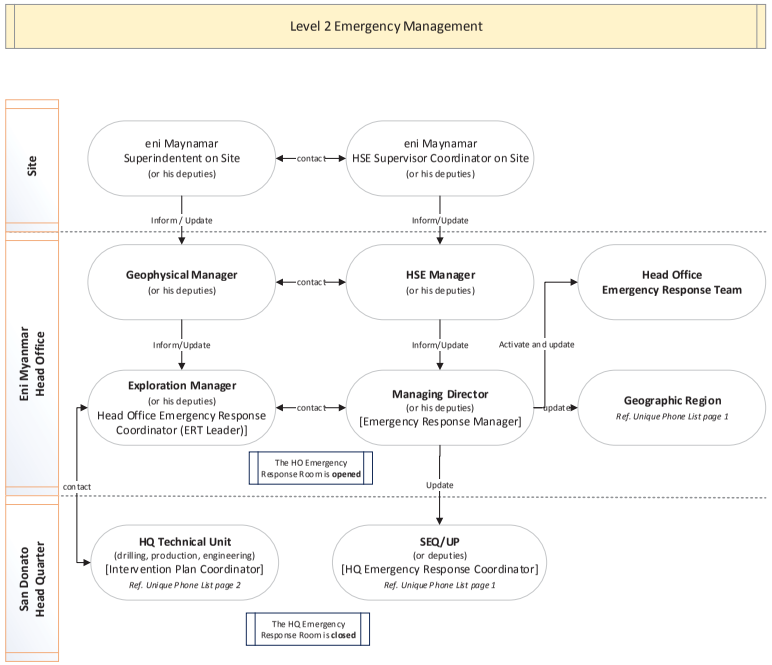
Status Boards
Incident Board to summarise and display the basic incident information reported by the ERT. A copy of the full Incident Information Checklist should be stored.
Weather Information Board to display periodically updates on weather conditions.
Emergency Diary Board to record significant information/events and key actions undertaken during emergency, such as: - The PoB (PAX/Crew) of the Site (Helicopter/Aircraft or Vessel); - The number of dead or missing personnel; - The number of serious injuries (probably sick) and accounted for (including minor injuries); - The number of personnel evacuated (injured/other); - The number of personnel arrived to hospital / hotels from the site; - The details of each aircraft or vessel (name, call-sign, etc.) should be entered on one line and information on destination, ETA written in this line to be deleted and amended as necessary.

J. Emergency Management Flowchart

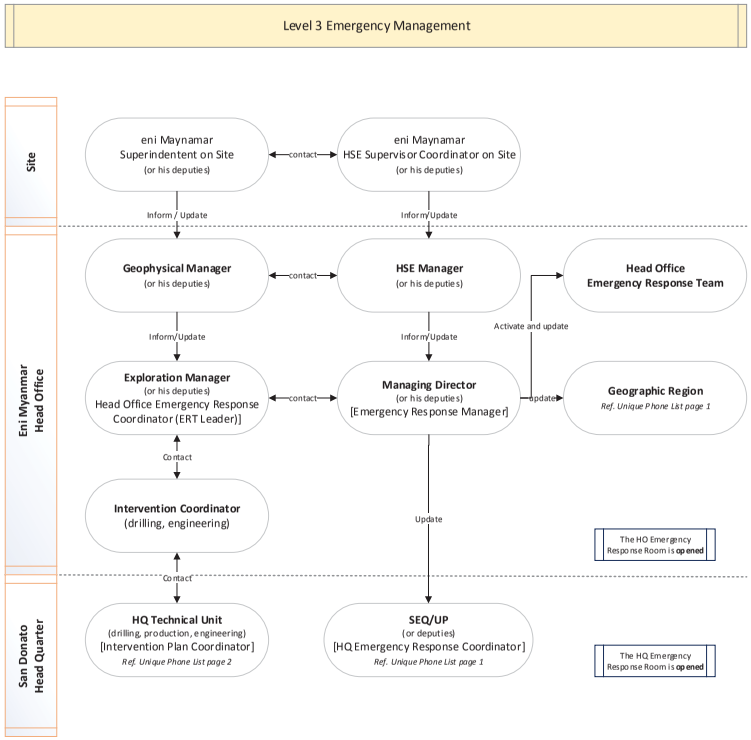
Level 1 Emergencies



Level 2 Emergencies



Level 3 Emergencies



K. External Stakeholders Notification Checklist

				External Stakeholders Notification Checklist						
KEY: U = Urgent I = Important R = Required notification A = Advisory – Information within 24 hours	**Fire Brigades**	**Police Station**	**International SOS**	**Myanma Oil & Gas Enterprises (MOGE) Ministry of Energy**	**Ministry of Social Welfare, Relief and Resettlement**	**Ministry of Natural Resources and Environmental Conservation**	**Ministry of Health**	**Ministry of Foreign Affairs**	**Military Body**	**Ministry of Labour**
Fatalities due to Eni Myanmar operational activities		U	U	R	I					U
Injury due to Eni Myanmar operational activities		U	U	R	I					U
Missing person(s)	U	U	A	R						
Toxic or Flammable Gas release	U		A	R	R	R				
Oil and chemicals Pollution				R		R				
Fire / Explosion	U			R						
Site Evacuation / Abandonment	A	U		R						
Loss of explosive materials	U	U		R		R			R	
Earthquake, tsunami, volcanic eruptions, flood, extreme precipitation, extreme weather (high temperature), etc.	U			R	R	R	R	I		

L. Eni Myanmar Emergency Response Duty Cards

Eni Representative on Site – Eni Superintedent

	DUTY CARD	
	ENI SUPERINTENDER ON SITE	**Form 1-A**
ROLE: **To make the liaison between the Contractor Representative on Site and the HOERC**		
ACTIONS		**CHECK**
Receive notification of the emergency situation from the Party Chief.		☐
Ask details to the Party Chief to understand the nature and severity of the emergency.		☐
Immediately notify the event to Geophysical Manager (or his deputy)		☐
Establish communication with the Geophysical Manager (or his deputy).		☐
Periodically obtain all available detail from the Party Chief.		☐
Keep informed the Geophysical Manager (or his deputy) on events development and the potential consequences.		☐
Maintain close liaison between the Geophysical Manager (or his deputy) and the Party Chief.		☐
Keep updated the Personal Log by recording Time and Event (briefly).		☐

Eni Representative on Site – Eni HSE Supervisor Coordinator

DUTY CARD	
ENI SUPERVISOR COORDINATOR ON SITE	**Form 2-A**
ROLE: **To make the liaison between the Contractor Representative on Site and the HOERC**	

ACTIONS	CHECK
Receive notification of the emergency situation from the HSE Advisor of the seismic contractor.	☐
Ask details to the HSE Advisor to understand the nature and severity of the emergency.	☐
Immediately notify the event to HSE Manager (or his deputy)	☐
Establish communication with the HSE Manager (or his deputy).	☐
Periodically obtain all available detail from the HSE Advisor.	☐
Keep informed the HSE Manager (or his deputy) on events development and the potential consequences.	☐
Maintain close liaison between the HSE Manager (or his deputy) and the Party Chief.	☐
Keep updated the Personal Log by recording Time and Event (briefly).	☐

Emergency Response Manager (ERM)

DUTY CARD	
EMERGENCY RESPONSE MANAGER (ERM)	**Form 3-A**
Emergency Level 2 – Notification (N), Management (M) and Close out (C)	

	ACTIONS	CHECK
N	Notify the emergency situation and its level by phone to competent Geographic Region.	☐
N	Notify the emergency situation and its level by phone to SEQ/UP or deputies (HQERC).	☐
N	Send the "Emergency Notification Form" (Annex C) to SEQ/UP or deputies (HQERC) email address.	☐
N	Send the "Emergency Notification Form" (Annex C) to Emergencies Liaison Unit (EMERG) email address: Eni.emergencySDM@eni.com	☐
N	Notify the emergency situation and its level by phone to Eni Rome switchboard: +39 02 598 25050	☐
N	Send the "Emergency Notification Form" (Annex C) to Major Emergencies Unit (EMRIL) email address: Eni.emergency@eni.com	☐
M	Mobilize the Subsidiary Emergency Response Team.	☐
M	Obtain updates of all available information from the HSE Manager and the Subsidiary HOERC (or his deputy) in terms of impacts on people, environment, property, liability and reputation.	☐
M	Proceed to the Emergency Response Room.	☐
M	In line with the input from the HSE Manager and the HOERC, prepare an assessment of the situation as the basis for a response strategy definition.	☐
M	Identify the actions to be performed by the Subsidiary Emergency Response Team.	☐
M	Identify the external Authorities / stakeholders to be contacted/notified.	☐
M	Manage the ongoing ERT response effort and delegate actions to control the Level 2 Emergency.	☐
M	Hold regular update sessions.	☐
M	Ensure security of offices.	☐
M	Ensure logs and records of events, actions and information are being kept.	☐
M	Establish appropriate authorization for expenditure as required.	☐

	DUTY CARD	
	EMERGENCY RESPONSE MANAGER (ERM)	**Form 3-A**
M	Assess possible escalations and continuation of the emergency, reviewing response strategy accordingly.	☐
M	Maintain an overview of the status of events and actions and update the HQERC.	☐
M	Update the competent Geographic Region for the entire duration of the emergency.	☐
M	Update the SEQ/UP or deputies (HQERC) for the entire duration of the emergency.	☐
M	Send the "Emergency Notification Form" (Annex C) update to SEQ/UP or deputies (HQERC) email address.	☐
M	Send the "Emergency Notification Form" (Annex C) update to Emergencies Liaison Unit (EMERG) email address: Eni.emergencySDM@eni.com	☐
M	Agree the DRAFT(s) of the press release(s) with the HQERC and with the DICO Representative, as reported in the pro sg hse 003 ups r02.	☐
C	Inform the competent Geographic Region on the end of the emergency.	☐
C	Inform the SEQ/UP or deputies (HQERC) on the end of the emergency.	☐
C	Send the "Emergency Notification Form" (Annex C) to report the closure of the emergency to the Emergencies Liaison Unit (EMERG) email address: Eni.emergencySDM@eni.com	☐
Emergency Level 3 – Notification (N), Management (M) and Close out (C)		
	ACTIONS	**CHECK**
N	Notify the emergency situation and its level by phone to the competent Geographic Region.	☐
N	Notify the emergency situation and its level by phone to SEQ/UP or deputies (HQERC).	☐
N	Send the "Emergency Notification Form" (Annex C) to SEQ/UP or deputies (HQERC) email address.	☐
N	Send the "Emergency Notification Form" (Annex C) to Emergencies Liaison Unit (EMERG) email address: Eni.emergencySDM@eni.com	☐
N	Notify the emergency situation and its level by phone to Eni Rome switchboard: +39 02 598 25050	☐
N	Send the "Emergency Notification Form" (Annex C) to Major Emergencies Unit (EMRIL) email address: Eni.emergency@eni.com	☐
M	Mobilize the Subsidiary Emergency Response Team.	☐

	DUTY CARD	
	EMERGENCY RESPONSE MANAGER (ERM)	**Form 3-A**
M	Obtain updates of all available information from the HSE Manager and the Subsidiary HOERC (or his alternate) in terms of impacts on people, environment, property, liability and reputation.	☐
M	Proceed to the Emergency Response Room.	☐
M	In line with the input from the HSE Manager and the HOERC, prepare an assessment of the situation as the basis for a response strategy definition.	☐
M	Identify the actions to be performed by the Subsidiary Emergency Response Team.	☐
M	Identify the external Authorities / stakeholders to be contacted/notified.	☐
M	Hold regular update sessions.	☐
M	Ensure security of offices.	☐
M	Ensure logs and records of events, actions and information are being kept.	☐
M	Establish appropriate authorization for expenditure as required.	☐
M	Assess possible escalations and continuation of the emergency, reviewing response strategy accordingly.	☐
M	Maintain an overview of the status of events and actions and update the HQERC.	☐
M	Manage the Level 3 emergency in agreement with the HQ ERC.	☐
M	Verify the Intervention Plan with the Intervention Plan Coordinator, the Geographical Area and the HQERC.	☐
M	Update the competent Geographic Region for the entire duration of the emergency.	☐
M	Update the SEQ/UP or deputies (HQERC) for the entire duration of the emergency.	☐
M	Send the "Emergency Notification Form" (Annex C) update to SEQ/UP or deputies (HQERC) email address.	☐
M	Send the "Emergency Notification Form" (Annex C) update to Emergencies Liaison Unit (EMERG) email address: Eni.emergencySDM@eni.com	☐
C	Confirm, in agreement with the IPC and the IC, the end of the response actions taken to resolve the emergency.	☐
C	Inform the competent Geographic Region on the end of the emergency.	☐
C	Inform the SEQ/UP or deputies (HQERC) on the end of the emergency.	☐

	DUTY CARD	
	EMERGENCY RESPONSE MANAGER (ERM)	**Form 3-A**
C	Send the "Emergency Notification Form" (Annex C) to report the closure of the emergency to the Emergencies Liaison Unit (EMERG) email address: Eni.emergencySDM@eni.com	☐

	DUTY CARD	
	EMERGENCY RESPONSE MANAGER (ERM)	**Form 3-A**
Crisis		
Whenever a crisis status is declared, the Emergency Response Manager or deputy takes part in the Eni Crisis Committee.		

Head Office Emergency Response Coordinator

	DUTY CARD	
	HEAD OFFICE EMERGENCY RESPONSE COORDINATOR (ERC)	**Form 4-A**
ROLE: **To maintain contacts between the Eni Representative on Site, the ERM and the other ERT Members** **To provide instruction to the Log Keeper in order to keep updated the Emergency Diary**		
ACTIONS		**CHECK**
Receive notification of the emergency from the Geophysical Manager (or his deputy) and establish nature and severity in agreement with the ERM.		☐
Proceed to the ERR.		☐
Establish communication (dedicated number) with site and obtain all available detail.		☐
Maintain close liaison with the Geophysical Manager in order to get any update of the Eni Superintendent on Site.		☐
Agree response actions with the ERT.		☐
Obtain all relevant technical information that may be necessary, e.g. maps, diagrams P&Is, well information, etc.		☐
Give instruction to the Log Keeper in order to update the timed log of events, communications, actions ("Emergency Diary").		☐

HSE

DUTY CARD	
HSE MANAGER	**Form 5-A**
ROLE: **To support the HOERC and ERM in managing the emergency**	
ACTIONS	**CHECK**
Obtain updates of all available information from the eni Myanmar HSE Supervisor Coordinator on Site, notifies ERM.	☐
Collaborate with the HOERC and the ERM to make an initial assessment of the situation.	☐
Contact the ERM and give full briefing on the situation. Assess the situation and, in agreement with the ERM and the HOERC, decide on the need for ERT mobilization.	☐
Mobilize other ERT members if requested by ERM.	☐
Review, identify and agree the required actions with the HOERC.	☐
Provide the ERM with all available information to fill the "Emergency Notification Form" (ref. Appendix C).	☐
Liaise with Geophysical Manager regarding mobilization of air / land transportation means.	☐
Liaise with the HR Manager on medical support requirements.	☐
Identify Government Departments and any other relevant agencies that need to be notified. Liaise with ERM on the actions required.	☐
Keep the HO Emergency Response Coordinator informed on actions taken and status.	☐
Liaise with Authorities on relevant HSE issues, which may need to be addressed in Press Releases.	☐
Maintain personal log of all communications and actions. Transmit relevant information to the Log Keeper.	☐

HSE

DUTY CARD	
HSE MANAGER	**Form 5-A**
ROLE: **To support the HOERC and ERM in managing the emergency**	
ACTIONS	**CHECK**
Obtain updating of all available information from the HOERC.	☐
Report to ERT members and receive the incident status updates from the HOERC.	☐
Review in collaboration with the Eni Superintendent on Site the need for logistical support.	☐
Establish contact (and provide briefing) as required with: - Air Service Contractor; - Land transportation Contractor; - Other alternative contractors for support services, equipment, transport, etc.	☐
Mobilize support services as required. (In case of Medevac, the site Company Representative may already have mobilized Helicopter/Aircraft).	☐
Monitor the on-going mobilizations through regular contacts and updates.	☐
Mobilizes other resources if necessary.	☐
Update the ERR Status Boards with all air / land transportation information – pass information to the Log Keeper.	☐
Obtain Weather Forecast and liaise with Log Keeper to update the Status Boards.	☐
Maintain personal log of all communications and actions. Transmit relevant information to the Log Keeper.	☐

Geophysical Operation Manager – deputy ERC

DUTY CARD	
Geophysical Operation Manager	**Form 6-A**
ROLE: **To support the HOERC and ERC in managing the emergency**	
ACTIONS	**CHECK**
Obtain updating of all available information from the HOERC.	☐
Report to ERT members and receive the incident status updates from the HOERC.	☐
Receive notification of the emergency from the Eni Myanmar SPT and establish nature and severity in agreement with the ERC.	☐
Establish communication (dedicated number) with site and obtain all available detail.	☐
Support and maintain close liaison with the Eni Superintendent in order to get any update of the on Site for the ERC.	☐
Agree response actions with the ERT.	☐

HR

DUTY CARD	
HR Manager	**Form 7-A**
ROLE: To support the HOERC and ERM in managing the emergency	
ACTIONS	**CHECK**
Obtain updating of all available information from the HOERC.	☐
When requested to mobilize, proceed to its Company ERR and connect with the Eni Myanmar ERR in videoconference	☐
Obtain a briefing on the nature and severity of incident from the HOERC	☐
Establish the extent to which personnel are affected by and involved in the incident	☐
Obtain the list of personnel on Site (via the Eni HSE Manager).	☐
Establish the number and the identity of casualties, missing persons, fatalities and ensure this information is properly controlled and not released outside the organization.	☐
If required, update the Personnel Status Board (PoB, Casualty Missing, Evacuation) or pass the information to the Log Keeper to do so.	☐
Establish personnel movements which may be required; the below format can be used to track these movements.	☐
Liaise with the HSE Manager on the current/possible need for Logistical support for evacuation of personnel and Medical services	☐
Contact the Medical Contractor, ensuring that the Duty Doctor is aware of the emergency and that the medical support is available to intervene for any urgency. Update the Medical Contractor. Confirm mobilization if required.	☐
Make arrangements for reception, transport and accommodation of personnel arriving from the site. Liaise with the HSE Manager on the requirement/availability of Medical support.	☐
Establish if medical checks for personnel are necessary and, if so, when; liaise with the HSE Manager.	☐
Obtain appropriate financial authorities for advances, travel, accommodation if required.	☐
Liaise with the ERM regarding information on Personnel.	☐
Requested update PoB information to the Eni Superintendent on Site trough HOERC.	☐
Establish arrangements and resources in the Company office to manage any external enquiries from relatives or Next of Kin (NoK).	☐
If required, liaise with Eni Upstream & Technical Services Division HR in Milan for advice and or support.	☐
Keep a personal log of all communications and actions. Pass information to Log Keeper as necessary.	☐

Finance

DUTY CARD	
FINANCE MANAGER	**Form 8-A**
ROLE: **To support the HOERC and ERM in managing the emergency**	
ACTIONS	**CHECK**
Obtain updates of all available information from the HOERC.	☐
Proceed to the ERR.	☐
Ensure assistance to the ERT in finance matters.	☐
Maintain contacts with the HQ Planning and Control in order to obtain support and advice on financial matters.	☐
If required by the ERM, arrange all required documentation for the economic commitment in order to manage the emergency.	☐

Procurement

DUTY CARD	
PROCUREMENT MANAGER	**Form 9-A**
ROLE: **To support the HOERC and ERM in managing the emergency**	
ACTIONS	**CHECK**
Obtain updates of all available information from the HOERC.	☐
When requested to mobilize, proceed to its Company ERR and connect with the Eni Myanmar ERR in videoconference.	☐
Ensure assistance to the ERT in procurement matters.	☐
Maintain contacts with the HQ APR in order to obtain support and advice on procurement matters.	☐
If required by the ERM, arrange all required documentation for the procurement commitment in order to manage the emergency.	☐

Company Doctor

DUTY CARD	
Company Doctor	**Form 10-A**
ROLE: **To support the HSE Manager in managing the emergency**	
ACTIONS	**CHECK**
Receive notification of the emergency from the Camp Senior Doctor.	☐
Liaise with the HR Manager on medical support requirements.	☐
Proceed to the ERR, once is activated if he is in the office, otherwise he reaches the office as soon as possible for him and not later than 90 minutes since he received the communication.	☐
Receive updates of the emergency from the Camp Senior Doctor and refer them to the ERT to keep updates the ERM and the HR manager and administrator.	☐

Log Keeper

DUTY CARD	
LOG KEEPER	**Form 11-A**
ROLE: **To activate the Emergency Response Room (ERR)** **To record and update remarkable information in Status Boards** **To be responsible for the accurate and legible display of the Emergency Diary (Event Log)**	
ACTIONS	**CHECK**
Obtain updates of all available information from the HOERC.	☐
Proceed to the ERR.	☐
Connect all equipment, including emergency communications such as direct/wireless telephones, and check their functioning.	☐
Ensure that the necessary Status Boards in the ERR are displayed, record and update the remarkable information.	☐
Consult with the ERT members to ensure that the actions taken, information received, etc. are recognized and transferred to the appropriate board as required.	☐
Ensure the information recorded on the boards are consistent. Point out any anomaly to the Emergency Response Manager.	☐
Ensure individual team member log sheet slips are placed into the filing tray.	☐
Ensure maps, plans, diagrams and other materials needed by the ERT are available.	☐
Ensure separate copies of the status boards are prepared for records/reference purposes.	☐

IT Engineer

	DUTY CARD	
	IT Adminstrator	**Form 12-A**
ROLE: **To support the HOERT in managing the emergency**		
ACTIONS		**CHECK**
Proceed to the ERR, once is activated.		☐
Connect with the Eni Vietnam ERR for the videoconference.		☐
Ensure assistance to the ERT in IT matters.		☐

HR Administrator

		DUTY CARD
	HR Administrator	**Form 13-A**
ROLE: **To support the HR manager in managing the emergency**		
ACTIONS		**CHECK**
Proceed to the ERR, once is activated.		☐
Replace the HR Manager in his duties until he cannot reach the videoconference.		☐
Ensure assistance to the HR manager in case of language barrier.		☐

Vendor Specialist

		DUTY CARD
	Vendor Specialist	**Form 14-A**
ROLE: **To support the Procurement Manager in managing the emergency**		
ACTIONS		**CHECK**
Proceed to the ERR, once is activated.		☐
Replace the HR Manager in his duties until he cannot reach the videoconference.		☐

M. Personal Log

Time: _____(Local)_____(UTC)

Place: _____

Author: _____

Time (local)	Contact telephone number of contacted person or external body	T/R[1]	Communication and Action

[1] T: Transmitted; R: Received

Time (local)	Contact telephone number of contacted person or external body	T/R[1]	Communication and Action

N. Emergency Diary

	Eni Myanmar Emergency Response Plan	EMERGENCY DIARY	
Day: / /		Sheet n°	
Time	**Name and telephone n° of person or external bodies or Contractors or means[2] contacted**	**Communication and Action**	**T/R[3]**

[2] Aero/Naval
[3] T: Transmitted; R: Received

Annex B2

Eni Grievance Mechanism

ANNEX C
Local Grievance Mechanism Instruction

ENI MYANMAR GRIEVANCE MECHANISM

IDENTIFICATION			FORMAT A
Eni Representative	**Phone number**		
Contractor Representative	**MOGE Representative**		
Complainant Name	**National Registration Card Number**		
Father Name	**Complainant Phone Number**		
Complaint Details (attach additional pages, photos and supporting evidence as needed)	*Include date, time, person(s) involved, witnesses, events, etc.*		
Complainant Expectations (What is the expected action(s) for resolution?)			
Complainant Signature		**Date:**	
Eni Representative Signature		**Date:**	
GT Representative Signature		**Date:**	
MOGE Representative Signature		**Date:**	
RESOLUTION			**FORMAT B**
Meeting Record (What was said…**)**			
Examination Findings (A brief explanation of findings, supporting documents, witness statements**)**			
Proposed Resolution			
Eni Superintendent Signature on Resolution		**Date:**	
GT Permitting Coordinator Signature on Resolution		**Date:**	
MOGE Party Chief Signature on Resolution		**Date:**	

POSSIBLE AMENDMENT RESOLUTION	FORMAT C

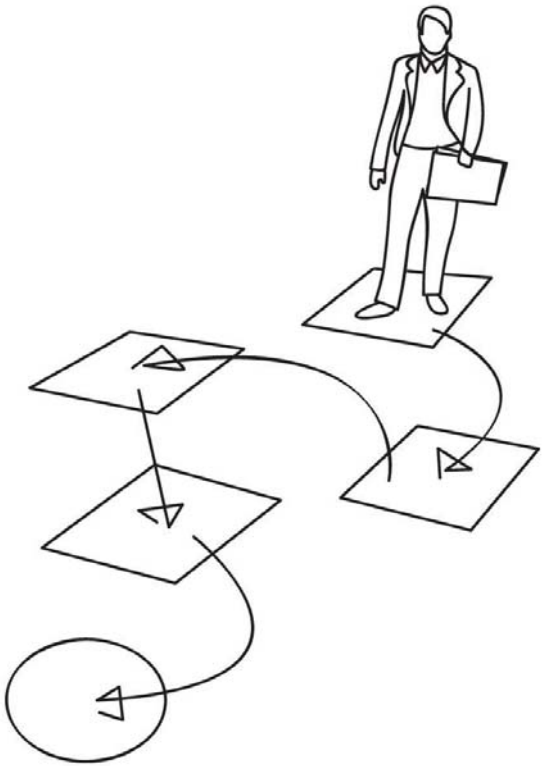
CLOSE OUT			FORMAT D
Action Implementation Date			
Action Close Out Date			
Complainant Signature on Compliant Close Out			
Eni Representative Signature		**Date:**	
GT Representative Signature		**Date:**	
MOGE Representative Signature		**Date:**	

Annex B3

Eni HSE Reporting

Professional Operating Instruction

HSE Reporting



REFERENCE MSG:
HSE

TITLE:		
HSE Reporting		
NOTES:		
DATE OF ISSUE:	**EFFECTIVE:**	
September 2016	September 2016	
ORIGINATED BY:	**CHECKED BY:**	**APPROVED BY:**
HSE Reporting	HSE Reporting Reference SGIAQ	HSE IMS Management Representative

opi sg hse 003 ep r03

1. Objective

The primary objective of this document is to provide guidance to define the basis for the HSE reporting process, including collating HSE data and contains the forms to be used for this purpose.

2. Scope of application

This Professional Operating Instruction has been developed in compliance with the HSE Management System Guideline and with Annex J, it applies to HSE professional family pertaining to the eni upstream area including also indirect subsidiaries (affiliated companies), in Italy or abroad.

It is related to the operated activities, irrespective of whether the company is the single operator, under a Service Contract or shares operatorship with other companies (i.e. where it forms a Joint Operating Venture).

3. Internal references

eni spa Code of Ethics available on website Myeni

eni spa Model 231, available on website Myeni

msg sn eni spa - MSG “Sistema Normativo”

msg hse eni spa -MSG “HSE” and relatives annexes

pro sg hse 001 e&p r01 “Management method for regulatory instruments of the HSE Integrated Management System of the e&p division”

“Gestione delle attività di comunicazione HSE all’Organismo di Vigilanza di eni spa ai sensi del D. Lgs. 231 del 2001” del 6 novembre 2015.

MSG Pianificazione e Controllo

opi hse 005 eni spa r03 “Metodologie di acquisizione degli indicatori HSE “

AMTE TG 015 “GHG emissions inventory, accounting and reporting for Upstream O&G Activities”

AMTE TG 007 “Management of Air Emissions in Upstream Oil & Gas Activities”

Professional Operating Instruction: “Health Reporting” opi hr 013 eni spa r01

Professional Operating Instruction: “Notification and investigation on events affecting health” opi hr 012 eni spa r01

4. External references

ISO 14001:2015 “Environmental Management System – Requirements with guidance for use”

OHSAS 18001:2007 “Occupational Health and Safety Management System. Requirements”

OGP - EPI User Guide 2015 “Environmental data collection user's guide (2015)”

IPIECA - Reporting Guidance “Oil and gas industry guidance on voluntary sustainability reporting (2010)”

IPIECA - Reporting Guidance “Water reporting (2013)”

American Petroleum Institute (API), Compendium of Greenhouse Gases Emissions Estimation Methodologies for the Oil and Gas Industry, 2009.

Global Gas Flaring Reduction Partnership Gas Flaring Definitions, 2015

European Union (2012). The EU Emissions Trading System (EU ETS)

5. Process Description

For operated activities, HSE reporting shall account for 100% of the data relating to fields, projects and activities, irrespective of the company's equity share in the Joint Ventures.

The HSE reporting shall not include data relating to non operated fields, projects and activities, except for Health and Safety data relevant to company personnel and HSE expenses.

5.1 Reporting software

The following table shows the HSE Reporting software already in use or under implementation, for each discipline:

Name	Software Ownership	Area
SHERPA	eni	• Environment • Industrial Hygiene • HSE management Systems • Radiation Protection • Odv (Organismo di Vigilianza) – “*Watch Structure Body*”
INDACO	eni	• Safety database for the reporting and management of accidents, near misses, man hours, oil and chemical spills and process safety events
NICE	eni	• Database for the collection of all eni HSE investments and expenses.
OPS GHG	eni	• Environmental data of largest Italian installations which comply with the EU ETS and PRTR legislation

SHERPA is a web based database which has been developed for the reporting and management of HSE data. SHERPA manages the following types of data:

- HSE data (Environment, Industrial Hygiene, Integrated Management System and Radiation protection and ODV data);
- GHG data.

All environmental and radiation protection data are managed in SHERPA on a site-by-site basis. A reporting site is defined as being either a fixed and significant installation or group of installations (e.g. a single oil/gas plant or a group of satellite platforms with their related processing facility). Drilling, construction and other activities that are not carried out at a fixed location, shall be reported as a single reporting site for a specific Subsidiary, to avoid continually changing the list of reporting sites.

For each Subsidiary and Affiliated Company, Health, IMS and HSE expense, the results of individual reporting sites are combined and reported together.

NICE is a web based database for the collection of expenses data.
NICE manages the following types of data:

- CAPEX (in the CAPEX section of NICE);
- Non CAPEX data (OPEX and Other Costs, in the Data entry HSE/Sustainability area).

INDACO is a web based database for the reporting and management of all safety data. This database collects the description, cause analysis and corrective actions of the following of accidents, near misses, oil and chemical spills and process safety events.

OpsGHG is a database for the management of GHG emissions and other environmental data in compliance with EU regulations (EU ETS and PRTR). The database has been developed to satisfy the reporting requirements of the EU regarding Competent Authorities.

The following tables list the sets of HSE data that must to be reported on a regular basis. The Attachments from A to F of this operating instruction, provide full details of the information to be submitted for each data set. They also contain the forms to be used for the data recording and transmission, and the instructions to be followed in the process.

SAFETY

Data to be reported	Form name
SAFETY DATA	HSE Incident – Accident / Near Miss/Spills/Process safety events
SAFETY DATA – MAN HOURS	Exposure Values / Man Hours

ENVIRONMENT

Data to be reported	Form name
ENVIRONMENT DATA - WATER WITHDRAWAL AND DISCHARGES	ENV 1
ENVIRONMENT DATA - WASTE	ENV 2
ENVIRONMENT DATA - RECLAMATION	ENV 4
ENVIRONMENT DATA – GHG	GHG
ENVIRONMENT DATA – GHG 4 Year Plan	GHG 4YP
ENVIRONMENT DATA – Environmental Objectives 4 Year Plan	Env Obj 4YP

HEALTH - Industrial Hygiene

Data to be reported	Form name
Industrial Hygiene	HEA 2

HSE MANAGEMENT SYSTEM

Data to be reported	Form name
HSE MANAGEMENT DATA - TRAINING	IMS 1 quarterly
HSE MANAGEMENT DATA	IMS 1 six monthly
HSE MANAGEMENT DATA	IMS 2
HSE OBJECTIVES DATA	IMS 3
HSE TABLEAU DE BORD – MAXIMISE SAFETY PROGRAM	HSE Tableau de Bord
QUANTITATIVE OBJECTIVES 4 YEAR PLAN	Qu Obj 4YP

RADIATION PROTECTION

Data to be reported	Form name
RADIATION PROTECTION DATA	RAD

HSE EXPENSES

Data to be reported	Form name
HSE OPEX AND OTHER COSTS	HSE/SUSTAINABILITY

Watch Structure - ODV

Data to be reported	Form name
Watch Structure/Organismo di Vigilanza	ODV

LIST OF ATTACHMENTS

A. **REPORTING FREQUENCY** (opi sg hse 003 ep r05 att A)

B. **HSE FORMS & INSTRUCTIONS** (opi sg hse 003 ep r07 att B)

C. **ART 2 EUROPEAN UNION –** COMMISSION DECISION (2000/532/EC) OF 3 MAY 2000 (opi sg hse 003 ep r01 att C)

D. **HSE Expenses** – NICE Tool (opi sg hse 003 ep r02 att D)

E. **OdV Form -** (opi sg hse 003 ep r02 att E) - which apply to the individual Employer Line of eni upstream :

- North-Central District (DICS)
- Southern District (DIME).

F. **Example of Watch Structure Form -** (opi sg hse 003 ep r01 att F)

Attachment A – Reporting Frequency

The HSE data sets are collected with different frequency, according to the subject.

In the following table the frequency of data collection is showed for each form.

SUBJECT	FORM NAME	REPORTING ENTITY		FREQUENCY			
		Site	Subsidiary / Affiliated Company	Other	Monthly	Six monthly	Annual
SAFETY	HSE Incident – Accident / Near Miss/Splill/Process Safety events	X		X	X		
	Exposure Values / Man Hours		X		X		
ENVIRONMENT	ENV 1	X			X		
	ENV 2	X				X	
	ENV 4	X				X	
	GHG	X			X		
	GHG 4YP	x					X (october)
	Env Obj 4YP	X					X (october)

attachment A – Reporting Frequency

REPORTING FREQUENCY

SUBJECT	FORM NAME	REPORTING ENTITY		FREQUENCY			
		Site	Subsidiary / Affiliated Company	Other	Monthly	Six monthly	Annual
INDUSTRIAL HYGIENE	HEA 2		X			X	
RADIATION PROTECTION	RAD	X				X	
HSE MANAGEMENT	IMS 1 quarterly		X	X (quarterly)			
	IMS 1 six monthly		X			X	
	IMS 2		X				X
	IMS 3		X	X (September_ December)			
	HSE Tableau de Bord		X		X		
	Qu Obj 4 YP		X				X (october)
HSE EXPENSES	HSE and SUSTAINABILITY OPEX		X	X (quarterly)		X	
ODV - Watch Structure (only for eni districts)	OdV		X			X	

Attachment B – HSE Forms and Instructions
HSE FORMS AND INSTRUCTIONS

Attachment B - HSE Forms and Instructions

General Criteria for HSE Reporting

- OPERATED AND JOINT OPERATED ACTIVITIES - HSE reporting shall account for 100% of the data relating to fields, projects and activities, irrespective of the Company's equity share in the Joint Venture.
- NON OPERATED ACTIVITIES - The HSE reporting shall not include data relating to non-operated fields, projects and activities, except for Total Recordable Injury Rate, Gas Flaring, Water injection and Oil Spill.

B.1 SAFETY DATA

Safety data shall be entered in INDACO.

All incidents with effects or potential effects on people, environment and assets shall be reported to SEQ Dept. & Regional Unit.

Events falling in the red zone of the real and potential consequences matrices and all other LTIs shall be reported in INDACO within ***24 hours*** after notifying to SEQ Dept. and Regional Unit. Incident reporting will be regulated by the opi sg hse 004 ep r01 *"Incident Notification, Investigation and Reporting"*

For other events, data entry into INDACO is required on a monthly basis, as well as man hours.

PROCESS SAFETY EVENTS (PSE TIER 1 & TIER 2)

New **Process Safety** "lagging" indicators will be collected starting from 2014 using INDACO as it will be specified in opi sg hse 007 ep r01 "Process Safety Indicators".
The process safety indicators are defined as follows:
Tier 1 Process Safety Events: Number of Loss of Primary Containment (LOPC) Incidents with the following greater consequence as defined by API Recommended Practice 754:

- ≥ 1 Lost Work Day Case or ≥1 Permanent Disability or ≥ 1 Fatality
- Fire or explosion or well blowout resulting in greater than or equal to 25,000 USD of direct cost to the Company
- Release of material exceeding:
  - In case of natural gas/liquefied gas: 500 kg (outdoor) – 250 kg (indoor) in any 1 hour period (approximately equivalent to a flange/fitting leaking for 10 min from a pressurized system).
  - In case of crude oil: 1000 kg or 7.4 bbl (outdoor) – 500 Kg or 3.7 bbl (indoor) in any 1 hour period

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  - In case of H2S: 25 kg (outdoor) – 12.5 kg (indoor) in any 1 hour period (approximately equivalent to a fitting leaking for 10-25 sec from a pressurized system) containing gas with 20% H2S content.

Tier 2 Process Safety Events: Number of Loss of Primary Containment incidents with one or more of the following consequences as defined in the API Recommended Practice 754:

- Employee or Contractor Restricted Work Day Case or Medical Treatment Case
- Fire or explosion resulting in greater than or equal to 2,500 but less than 25,000 USD of direct cost to the Company
- Release of material exceeding:
  - In case of natural gas/liquefied gas: 50 kg (outdoor) – 25 kg (indoor) in any 1 hour period (approximately equivalent to a flange/fitting leaking for 1 min from a pressurized system);
  - In case of crude oil: 100 kg or 0.74 bbl (outdoor) – 50 kg (indoor) in any 1 hour period;
  - In case of H2S: 2.5 kg (outdoor) – 1.3 kg (indoor) in any 1 hour period (approximately equivalent to a flange leaking for 10-25 sec from a pressurized system) containing gas with 20% H2S content.

For the purpose of recording a PSE, in case of drilling facilities and vessels, the following rules shall be applied:
Drilling facilities are considered to be a part of a process when operations are "in hole";
Land or marine vessel (trucks and ships) are considered to be part of a process when physically connected to a production facility.

OIL AND CHEMICAL SPILLS DEFINITIONS

All Spill events shall be reported in INDACO.

For the purpose of reporting, a spill is defined as any release from primary or secondary containment into the "environment", including land (permeable materials like soil, sand, silts, shells, gravel, etc) ice or water. Earthen bunds do not count as secondary containment unless they are engineered to be sufficiently impervious to prevent spilled oil from contaminating underlying soil and/or groundwater.

Spills include all releases from:

- Sabotage, theft, acts of terrorism, earthquakes or other accidental release due to events outside company operational control;
- Company-owned and operated transport;
- Oil/water mixtures (e.g. oil-water emulsions, tank bottoms sludge). In this case the hydrocarbon content shall be estimated;
- Ongoing aboveground or underground leakage over time, counted once at the time it is identified.

Oil spills to the environment include crude oil, condensate and petroleum-related products containing hydrocarbons that are used or manufactured, such as: gasoline, residuals, distillates, asphalt, jet fuel, lubricants, naphtha, light ends, bilge oil, kerosene, aromatics and petroleum-derivatives. Spills of produced water are to be reported as oil spills but should be reported only the quantity of hydrocarbon content (it's possible to estimate this quantity).

Spill data are reported for both: number of events and oil spill quantities. Spill typologies relevant to these ranges are linked to the causes that generated the spill and are described below:

- Company Incidents: spills due to incidents under the Company responsibility;
- Contractor Incidents: spills due to incidents under the Contractor responsibility;
- Other incidents: other spills due to incidents out of the Company responsibility. These spills are caused by incidents due to third party (excluded Contractors) or by exceptional events (landslides, earthquakes, etc).
- Spill due to corrosion;
- Sabotage/acts of terrorism: spill due to sabotages (including theft through bunkering), terrorism, attacks to the infrastructures.

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In the reporting of the spill onshore the destinations (water/soil) have to be specified.

It's necessary to report the quantity, in barrels, of recovered oil, the number of events closed after a clean-up activity, number of events for which it's necessary a remediation and the number of events closed when the remediation activities have been performed.

Chemical spills to the environment include:

- chemicals,
- workover fluids and synthetic, oil or mineral based drilling fluids, NADF
- solvents.

Spills of produced water or process wastewater are excluded by chemical spill.

Figures to be reported under this section are described in the following:

The total **number** of chemical spills, broken down into chemical spills greater than 1 bbl and smaller than 1 bbl;

The total **volume** of chemical spills, in bbls, broken down into chemical spills greater than 1 bbl and smaller than 1 bbl.

For onshore spills the final destination should be specified (water/soil).

B.2 ENVIRONMENT

General Information for all Environment Forms

Environmental data reporting shall only consider operational activities, thereby excluding any data regarding headquarters and offices.
All of the Environmental data modules are in the HSER section of the SHERPA database.
All GHG_form are in the GHG section of the SHERPA database.
They shall be completed by each site.
Please it's mandatory insert a comment regarding variation (increase/decrease) > 5% respect to previous reporting period for all type of environmental data.

Important note: completion of each module may require the input of individuals from different departments. Each site should determine which person/people would be best to supply each required piece of information and save any information as evidence in case of any type of verification.

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WATER DATA

ENV 1 WATER FORM

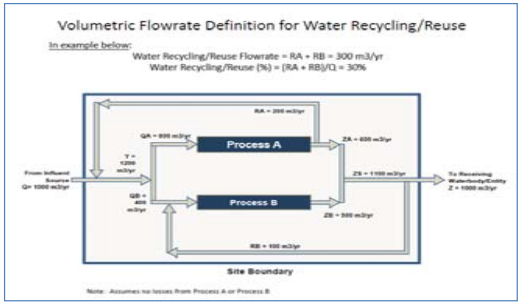
The water use section has two data collection parts: the first for data collection water withdrawal and the second one on discharges.

Water Withdrawal

With respect to **water withdrawal,** must be specified**:**

- **the type of withdrawal**: freshwater, brackish water and seawater,
- **the origin**: company owned water wells, surface water, municipal water supply,
- **its use** described selecting the following categories:
  - Domestic use,
  - Cooling systems,
  - Drilling,
  - Firefighting systems,
  - Injection, (brackish water and sea water used for injection into the reservoir for EOR),
  - Other industrial uses (e.g. steam generation, washing and cleaning activities), in case of significant quantities being used, the type of use should be specified in the notes,
  - Beneficial use: water addressed to local communities,
  - Water recycling.
  - Other uses, in case of significant quantities being used, the type of use should be specified in the notes.

Water recycling refers to the water involved in a first industrial process and then used again one or more than one time in another production cycle before the final discharge. The following scheme represents the definition given:



The definition of freshwater varies in accordance with local statutes and regulations. Where it is not defined by local regulations, fresh water is defined for reporting purposes as non-brackish water and may include drinking water, potable water, water used in agriculture, etc. The total dissolved solids (TDS) concentration of this water type is up to 2000 mg/l.

If there is no metering system to measure the domestic use of water can be used an average consumption per person per day.

Aqueous discharges and reinjected water

Aqueous discharges are defined as the quantity of controlled or regulated aqueous discharges that reach **surface environment** (both inland water bodies and sea). This includes:

Produced (Formation) water onshore and offshore: produced water associated with the oil and gas exploitation in wells onshore or offshore.

Other Effluent: **Freshwater, Brackish water and Seawater**, in this category are gathered washing water, sewage water, civil water, etc.

***Cooling water is excluded from discharged accounting*.**

The final destination of aqueous discharges in receptor body have to be specified selecting one of the following options:

- Sea,

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- Fresh Surface environment (e.g. : rivers, canals, fresh lakes, creeks,etc),
- Salt Surface environment (e.g.: salt lakes)
- Sewage / offsite water treatment,
- Offshore Reservoir (for EOR),
- Onshore Reservoir (for EOR),
- Other water wells onshore,
- Other water wells offshore,
- Evaporation ponds.

As **reinjected produced water** are considered the total amount of produced water injected in the reservoir for Enhanced Oil Recovery and produced water injected in other water wells for disposal.

Only for discharge to sea and surface environment (excluding water to evaporation ponds and reinjected produced water) Oil, BOD, COD, TSS, Nitrogen and Phosphorus content have to reported **in tonnes** using the last concentration available (**every month**), measured using test methods required by local regulatory authorities prior to final discharge to surface environment. For produced (formation) water effluent, total hydrocarbons discharged can be estimated by multiplying the discharged volume by the concentration of oil and grease (hydrocarbons).

Form ENV 1: Environment Data - Water Withdrawal and discharges

type of withdrawal	origin	use of addressing	quantity

			report only for discharge to sea and surface environment					
Type of discharge	Final destination	Quantity disharged	Oil content	BOD	COD	TSS	Total Nitrogen	Total Phosphorus

WASTE DATA

ENV 2 WASTE FORM

ENV 2 waste form has been revised according to the "waste census" which is required by Annex 1 of the "waste management plan standard", ref. 1.3.4.05. Data required for the "waste census" have been integrated with the existing ENV 2 form and this results in a revised form that requires, for every waste category and waste type, disposal method and waste quantities (hazardous/non-hazardous). The total quantity of waste (solids, liquids and sludge) belonging to drilling, completion & work over, construction/dismantling, production, maintenance, site reclamation, catering and sanitary categories and that is subsequently reused, treated, disposed of or temporarily stored shall be reported.

Waste are those materials which are classified as such by the Regulatory Authorities of the Country where the Company operates. Waste includes:

Any waste that is generated by the Company as a result of drilling or production operations and that is subsequently reused, treated, disposed of by the Company or any third party or temporarily stored at the end of the reporting period;

Waste generated by a contractor while working on Company premises or premises dedicated to Company activities and subsequently reused, treated, disposed of by the Company, the contractor or a subcontractor or temporarily stored at the end of the reporting period;

Waste resulting from extraordinary activities, such as remediation projects and plant demolition or decommissioning.

Waste shall be broken down into:

1. Waste produced during the reporting period;
2. Waste generated in previous years and temporarily stored at the end of the previous reporting period;
3. Waste generated in previous years and disposed or sent to temporary storage during the reporting period (this category may be used when some waste, typically drilling waste generated in previous years, are found abandoned and are disposed or sent to temporary storage during the reporting period).

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These waste categories help to identify waste production, waste that has been disposed, waste that is temporarily stored and waste that shall be disposed (this includes waste produced during the reporting period and waste to temporary storage including those waste generated in previous years and sent to temporary storage).

For these three typologies, the following information shall be specified:

- **Waste category** (according to its origin). This shall be selected from a pull down menu containing the following categories:
  - drilling, completion & work over,
  - construction/dismantling,
  - production,
  - exploration,
  - maintenance,
  - site reclamation,
  - catering,
  - sanitary
- **Type** of waste that are most frequently encountered in Oil & Gas operations are included in the pull down menu.

Present disposal method from the following pull down menu:

  - Internal use
  - Internal Treatment – Incineration
  - Internal Treatment - Other treatment (specify in notes)
  - 3rd Party Recycling
  - 3rd Party Incineration
  - 3rdP Treatment - Other treatment (specify in notes)
  - Disposal to landfill
  - Temporary storage
- **norm/tenorm** presence shall be indicated;
- **onshore/offshore** generation shall be indicated;
- **quantity** of hazardous/non hazardous waste;
- **contractor name** for both transport and disposal

Hazardous is the waste that is either listed as hazardous by the Local Regulatory Authorities or possess characteristics deemed hazardous. Waste may be classified as hazardous based on toxicity, flammability, corrosivity, or reactivity by local regulations. For the purpose of the present Standard, if an official classification is not available, waste shall be classified as hazardous when it contains toxic or noxious components in a concentration that make the waste itself toxic/noxious. For this purpose, reference can be made to the definitions on hazardous waste contained in the 'European Union – Commission Decision (2000/532/EC) of 3 May 2000'. In this European Directive as a general precautionary measure, all generated wastes having uncertain characteristics shall be classified, managed and disposed of as Hazardous Waste until their "non-hazardousness" is ascertained. The presence of TENORM is a further risk source that must be verified before classifying a waste, especially in a plant characterized by the presence of TENORM in production components. Unless otherwise specified by applicable legislation, "non-hazardousness" determination shall be carried out using the criteria set by Article 2 of EU Commission Decision of 3 May 2000 ([Ref. 4] –Attachment C) and according to the following options:

1. MSDS information (e.g.: spent chemicals, and lubricant oils usually preserve their original hazardous characteristics, or their degradation is described inside relevant MSDS).
2. Process knowledge (e.g.: a continuous waste source constituted by spent drilling mud containing the already analysed synthetic base).
3. Laboratory analysis to be carried out by the waste contractor upon eni request.

All laboratory analysis carried out to assess hazardousness waste class shall be carried out according to US EPA sampling, extraction and analytical methods or by corresponding methods set by applicable legislation, where explicitly required and different from those.

In Attachment C here is Article 2 of "European Union – Commission Decision (2000/532/EC) of 3 May 2000".

In any case, Oil Base muds and cuttings, as well all spent chemicals are considered hazardous waste. Also, all medical waste is to be considered hazardous.

Waste shall be quantified using methods required or recommended by Local Regulatory Authorities.

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The hierarchy below gives guidance on the methods of measurement and estimation that are recommended. The method for determining mass should be clearly documented and all records maintained in an auditable form:

- Direct measurement of mass at site of waste production;
- Direct measurement of mass by waste disposal contractor at the point of waste disposal or by transporters;
- Periodic measurement of waste mass to facilitate estimation by relation to volumes. Periodic measurement should be based on a wide range of waste types over a representative time period.

Length of drilled wells split for onshore and offshore facilities drilled using ADF and NADF have to be reported in this section.

Form ENV 2: Environment Data – Waste

WASTE PRODUCED DURING THE REPORTING PERIOD									
Waste category	Type of waste	Containing NORM/ TENORM ‡	onshore/ offshore	Waste treatment method	Hazardous [t]	Not Hazardous [t]	Contractor Name		Notes
							Transport	Disposal	
				Gross Total	0,00	0,00			

WASTE SENT TO TEMPORARY STORAGE AT THE END OF PREVIOUS REPORTING PERIOD									
Waste category	Type of waste	Containing NORM/ TENORM	onshore/ offshore	Waste treatment method	Hazardous [t]	Not Hazardous [t]	Contractor Name		Notes
							Transport	Disposal	
				Gross Total	0,00	0,00			

WASTE GENERATED IN PREVIOUS YEARS AND DISPOSED OR SENT TO TEMPORARY STORAGE DURING THE REPORTING PERIOD									
Waste category	Type of waste	Containing NORM/ TENORM ‡	onshore/ offshore	Waste treatment method	Hazardous [t]	Not Hazardous [t]	Contractor Name		Notes
							Transport	Disposal	
				Gross Total	0,00	0,00			

‡ NORM = Naturally Occurring Radioactive Material - TENORM = Technologically Enhanced Naturally Occurring Radioactive Material

Drilling information	Total	Onshore	Offshore
Total lenght of drilled wells	0	0	0
Lenght of wells drilled with ADF	0		
Lenght of wells drilled with NADF	0		

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RECLAMATION DATA

ENV4 RECLAMATION FORM

The management of environmental aspects related to actual or potential contamination of soil, subsoil and groundwater is based on the general criteria defined in the "HSE MSG prevention, protection, information, monitoring and control" and has the objective to eliminate or, in any case, mitigate direct and indirect impacts.

Please note that for all countries with existing local regulations, reference operating procedures and/or threshold concentration of contamination limit tables, related to the characterization and remediation of potentially contaminated sites, the local regulations must be applied, and may possibly be supplemented, but not replaced, by the specific eni Upstream technical guideline.

This form shall be filled for onshore sites only and is published for each Subsidiaries.

The form includes four main parts as described below:

- The first part is a list in table format including all the sites under reclamation process within the reporting period. It is required to provide information such as:
  - the name of each site and the specific phase of Reclamation Process Framework (Characterization, Remediation/Temporary or permanent safety measures, Risk Analysis, Assurance of compliance, Regulatory Final Certification of compliance, "Post-operam" monitoring, Restoration);
  - the date of commencement and expected completion date, the total expenditure of the project, the total surface and volume of soil under Reclamation Process, the Remediation techniques and if the Reclamation process concerns sites that fall into areas of National interest or Protected Area;
  - the reference of Notification activated according to Local Regulatory requirements (where applicable). Only for Italy ref. art.242, 245 and 249 of D.Lgs.152.
- The second part regards the volume of soil treated and/or disposed within the reporting period:
  - volume of soil (m3) treated in situ/on site: remediation occurs directly on site, with no need to transfers the soil to an external plant;

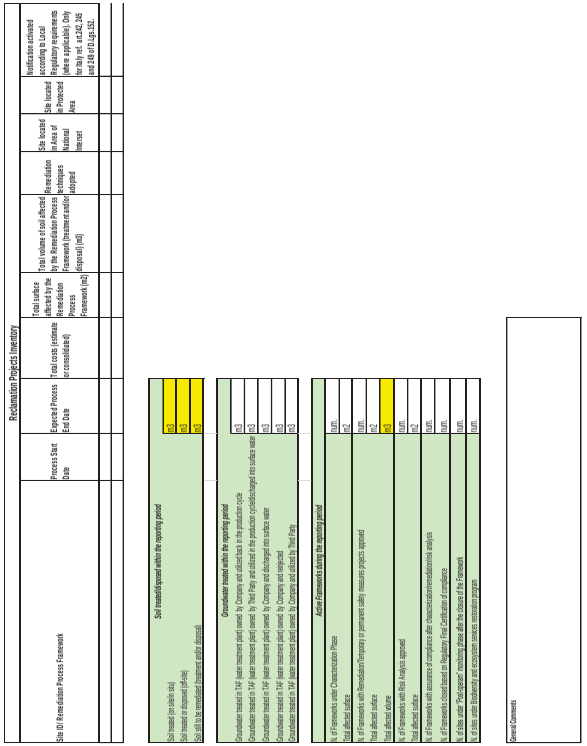
- volume of soil (m3) treated off site: remediation is carried out at an external plant, for treatment and/or final disposal;

- The third part regards the volume of Groundwater polluted and treated in TAF (water treatment plant) owned by Company or by Third Party within the reporting period.

- The fourth part regards the aggregate status of all the Reclamation Process Frameworks managed by each Subsidiary within the reporting period:

  - Characterization phase: number of sites and total affected surface (m2);
  - Remediation/Temporary or permanent safety measures projects approved: number of sites, affected surface (m2) and volume (m3);
  - Risk Analysis approved: number of sites and affected surface (m2);
  - Assurance of compliance after characterization/remediation/risk analysis: number of sites;
  - Closure phase based on Regulatory Final Certification of compliance: number of sites;
  - "Post-operam" monitoring phase after the closure of the site remediation process Framework: number of sites;
  - Biodiversity and ecosystem services restoration program: number of sites.

Form ENV 4: Environment Data – Reclamation



AIR DATA

Emissions to air shall be reported in a dedicated SHERPA section, named "**GHG", included flaring** data.

GHG DATA

Gases in the atmosphere that allow solar radiation to reach the earth's surface but trap thermal radiation leaving the earth's surface are called Greenhouse Gases (GHG). With the exception of water vapour, these gases are present in the atmosphere in trace concentrations. Greenhouse gases enter the atmosphere both as part of natural cycles and as the result of human activities. the main GHG pollutants associated to O&G industry are CO2, CH4 and N2O [1]. Fluorinated gases are not emitted in large quantities, and will not contribute significantly to the project GHG emissions inventory.

The "GHG" form shall be completed for each SHERPA reporting site and data shall be entered as 100% operated. The equity share is also required to allow calculation of eni's GHG emissions share. The "GHG" form contains a detailed on-line guide on how to fill it and enables automatic emissions calculation by entering data on gross production, fuel and diesel consumption, flaring, venting and gas composition. To better estimate gas emission it's strongly recommended to input the last available gas compositions data for gas flared and fuel. If the gas composition is not available, the module automatically calculates emissions based on default composition as per eni Group GHG Protocol.

[1] The other gases cited in the Kyoto Protocol - HFCs, PFCs and SF6 – are relatively insignificant for operations related to the hydrocarbon industry. Only N_2O may have a role in combustion gas emissions for which further evaluation may be necessary for accounting purposes.

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GHG_FORM

The Sherpa form is organised in seven sections:

1. Field General Information
2. Stationary combustion
3. Flaring/Incineration
4. Venting
5. Fugitive
6. Mobile combustion
7. Indirect Emissions from purchased energy

Field General Information:

CLICK HERE FOR INSTRUCTIONS			
Kind of agreement		Brief description of different possible agreements	
Equity share Eni of gas (%)		INFO	
Equity share Eni of oil (%)			
License / Contractual area			
Field		Definition of field (for example: please indicate the different fields which production is routed to the installation ...)	
Installation		Describe your installation (main platform, gas treatment plant, oil treatment plant, flow station, gathering station, etc.). Please mention also all related installations in the same field (e.g., 10 offshore platforms + 1 onshore gas treatment plant).	
Location of main activity			
Country			
Gas Production		Sm3	Automatically imported from BMS
Oil Production		bbl	Automatically imported from BMS
Is the cumulative power of all stationary combustion equipment (including flares) higher than 20 MWth?			

In this section shall be describe installation (flow station, gas treatment plant, platform, etc.), kind of agreement, license, eni equity share in gas and oil and main product.

The equity share of one site that treats hydrocarbons coming from different fields with different equities can be calculated as the weighted average of the equities with respect to production.

It's mandatory select Location of main activity (onshore/offshore) and Country.

Gas and Oil Production is imported from BMS (eni Upstream official database for gathering Hydrocarbons Production data).

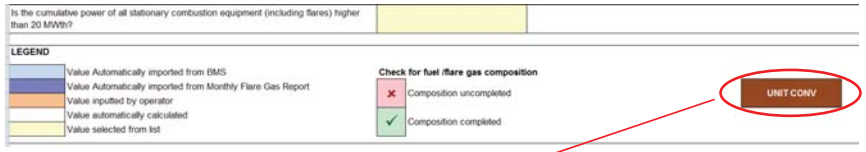
The production quantity **excludes**:

- quantities returned to the producing reservoir (recycling/re-injection);
- third party operated production.

For KPI Calculation (e.g. Flaring Intensity or GHG Intensity) is used the **gross production** that includes:

- hydrocarbon gas produced;
- hydrocarbon gas produced and deposited in geological structures other than the producing reservoir.
- hydrocarbon transferred (i.e. sold, Royalties, take);
- fuel used on site;
- flared and vented hydrocarbons;

It is recommended to identify if the cumulative power of all stationary combustion equipment (including flares) is higher than 20 MWth (flag YES/NOT):



The *Legend* helps to fill the form and the bottom UNIT CONV it is useful to convert Unit measure of Mass, Volume and Energy.

Stationary combustion (Direct Emissions):

This category includes emissions generated through the consumption of fuel gas and diesel from sources in which the Company has an interest or controls. The best method for calculating CO2 emissions for stationary combustion sources is based on a measurement program aimed at obtaining consumption of fuels and relative carbon contents. If continuous emissions monitoring systems are available and supported by rigorous data accuracy control procedures, the CO2 measurements can be used to support estimation of emissions obtained through the use of fuel consumption and corresponding carbon contents.

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These site specific approaches are often more accurate and facilitate identification of actions implemented to reduce emissions. If these systems or information are not available, alternative methods may be used which rely on data from the manufacturer, specific device tests or published emission factors.

Fuel Gas

Typical fuel consuming equipment types in Upstream operations are:

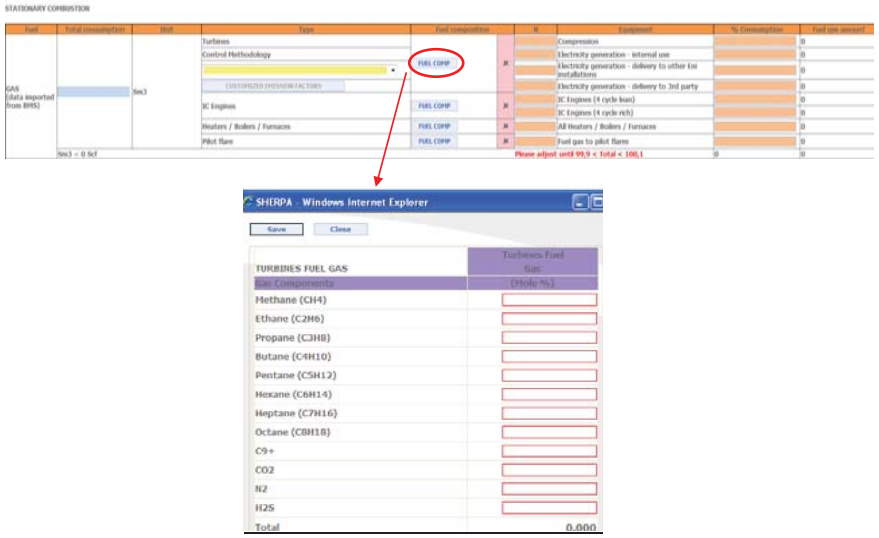
- Turbines (e.g., driving compressors, generators, pumps, etc.)
- Internal Combustion Engines (e.g., diesel engines, jet engines, rocket engines, stirling engines, etc.)
- Heaters
- Boilers / Reboilers
- Pilots of flares which are requested to maintain the flare system in operation for safety purpose (note: flared gas should not be report in this cell but there is a dedicated flaring section and value are visible after saving the form).

The total fuel gas consumption value is automatically imported from BMS (if this data is available), so the user has only to specify the **% of fuel consumed for each type of equipment** (turbines or Internal Combustion engines, etc.).

Note: Warning message will appear if the percentage is not inserted and the total is not equal than 100%.

Fuel gas average composition should be inputted, every months, clicking on FUEL COMP button per group of similar equipment; otherwise for the emissions calculation GHG_form automatically considers a default gas composition (API Compendium 2009). Warning messages will help user to proper compile required fields (e.g. fuel comp, % of fuel consumption). The user can also specify the control methodology and the customized emission factors for gas turbines if available.

The number of equipment it's aim to check only the emissions in the case of audit and not for calculation of air emissions.



Diesel

Fuel	Total consumption	Unit	Type	Fuel composition	N. of equipment	Equipment	Fuel use amount
DIESEL	0	tonnes	Turbines			Compression	
						Electricity generation	
			IC Engines			All IC Engines (except Drilling)	
			Heaters / Boilers / Furnaces			All Heaters / Boilers / Furnaces	
			Drilling			IC Engine - Drilling by Saipem	
						IC Engine - Drilling by 3rd party	
	0 tonnes = 0 bbl = 0 m3 = 0 gal(US)						*0*

User has to choose the proper unit of measure to report the diesel consumptions which have to be inputted for each type of equipment (orange cells); total diesel consumption will be automatically calculated and also percentage used from equipment.

Note: Only for diesel, gasoline and kerosene it's possible select unit of measure (bbl, tonnes, m^3, gal).

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Flaring

Flaring is the controlled burning of gases (or in some cases liquids) in a thermal destruction device such as flares, incinerators.

Flaring emissions can be grouped in three main types according to the relative flaring category, in line with the GGFR (Global Gas Flaring Reduction partnership) definitions:

Process flaring (Routine)

Means routine flaring of gas at oil and gas production facilities, gas processing plants or LNG liquefaction plants during normal production operations in the absence of sufficient facilities or amenable geology to re-inject the produced gas, utilize it on-site, or dispatch it to a market.

Process flaring also includes:

1) flaring from oil/gas separator and process units such as oil storage tanks, glycol dehydration and produced water treatment facilities, except where required for safety reasons;
2) flaring of gas production that exceeds existing gas infrastructures capacities;
3) waste Gas to incinerators including the volume of gas added to ensure good dispersion and combustion.

CO2 emissions related to process flaring are considered direct emissions.

Process flaring does not include the gas fueling the pilot flares which must be reported within the fuel gas consumption.

Emergency flaring (Safety – Non Routine flaring)

Safety flaring of gas is flaring to ensure safe operation of the facility.

Includes:

1. gas produced as a result of specific safety-related operations, such as safety testing, leak testing or emergency shutdown testing;

2. temporary (partial) failure of the facilities (e.g. compressors, pipeline), until their repair or replacement, that utilize the gas during normal operations;
3. flaring during start up before the process reaches steady operating conditions and /or during commissioning of facilities;
4. gas flared during scheduled maintenance/inspection;
5. gas stemming from an accident or incident that jeopardizes the safe operation of the facility;
6. blow-down gas following emergency shutdown to prevent over-pressurization of all or part of the process system;
7. gas required to maintain the flare system in a safe and ready condition (purge gas/make-up gas);
8. gas flared during reservoir or maintenance activities (such as acidification, wire line interventions, well testing);

CO2 emissions related to non routine flaring are considered direct emissions.

Within the scope of four-year planning and forecasting, emergency flaring must be included in the forecasts when is related to scheduled maintenance and operations and must be therefore planned.

Drilling flaring:

Drilling flaring is all gas flared following drilling of wells by third parties during exploration - appraisal – production activities.

CO2 emissions related to drilling flaring are considered indirect emissions.

Within the scope of four-year planning and forecasting, drilling flaring must be included in forecasts and budgets when is related to scheduled maintenance and operations and is therefore predictable.

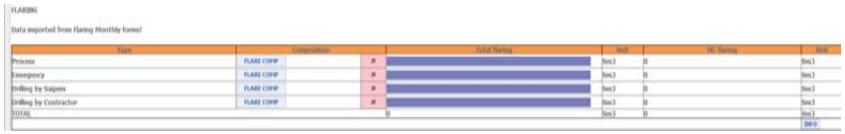
Hydrocarbon process flaring:

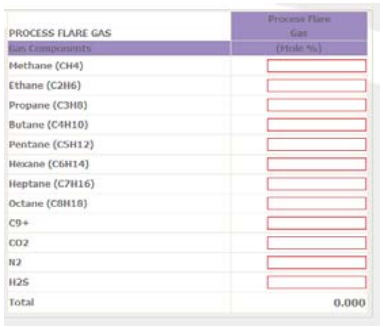
Hydrocarbon flared is the volume of hydrocarbons sent to flare and does not include inerts like CO_2 and H_2S.

This parameter is based on gas composition and is automatically calculated on compositional data that should be reported in GHG form every month.

If "Flare Gas Composition" is not reported in GHG form, the Hydrocarbon flared will be considered equal to Total flaring.

Shall be reported the Flare gas compositions every months (click on button Flare Comp).





Venting

This category includes emissions related to the controlled release of gases directly into the atmosphere, most typically through a vent pipe or duct. The gases might be natural gas or other

hydrocarbon gases, water vapor and other gases, such as carbon dioxide, separated in the processing of oil or natural gas.

Process venting includes:

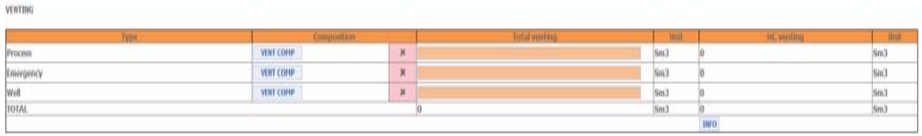
- Vent gas from glycol dehydrators, amine units, etc.;
- Cold process vents;
- Flashing Losses from Crude Oil;
- Vents gas from tanks, gas driven equipment, etc.;
- Maintenance, compressor starts.

Emergency venting includes:

Pressure Relief Valve (PRVs), Emergency Shutdown (ESD), Emergency Safety Blowdown (ESB), etc.

Well venting includes:

Test wells and Blowdown (when not flared)


VENTING

Type	Composition		Total venting	Unit	HC venting	Unit
Process	VENT COMP	✖		Sm3	0	Sm3
Emergency	VENT COMP	✖		Sm3	0	Sm3
Well	VENT COMP	✖		Sm3	0	Sm3
TOTAL			0	Sm3	0	Sm3
					INFO	

It's suggested report Venting gas compositions (click on button Vent Comp) if the difference with composition standard in SHERPA (80% CH4, 15% C2H6, 5% C3H8) is relevant (e.i. if gas composition includes inert gas like CO2 or H2S).

Emission of CO_2 can also arise from gas processing operations, where CO_2, after separation from gas, could be vented into the atmosphere.

Emission of CO_2 generated by gas vented are considered direct emissions.

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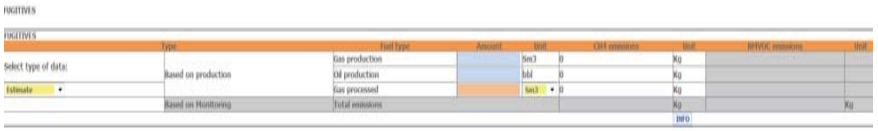
Fugitive

Oil & gas upstream facilities might emit large quantities of methane (CH4) and Volatile Organic Compound ("VOC") from leaking components such as valves, connectors, pumps, sampling connections, compressors, pressure-relief devices and open-ended lines. In a typical facility, most of these fugitive emissions are from valves and connectors because these are the most prevalent. The major cause of leak from valves and connectors is seal/gasket failure due to normal wear or improper maintenance.

Quantification of fugitive emissions can be carried out according to emission factors based on production data (***estimate***) or monitoring campaigns (***monitoring data***).

When the option ***estimate*** is selected, the form utilizes Facility-Level Average Fugitive Emission Factors based on production data, according to location of the plant (on/offshore) and produced fluids (oil/gas).

If the field has carried out a monitoring campaign in the year previous to the current reporting year the resulting quantification shall be inserted by choosing the option ***monitoring data***.


FUGITIVES

Type		Fuel type	Amount	Unit		Unit		Unit
Select type of data:	Based on production	Gas production		Sm3	0	Kg		
		Oil production		bbl	0	Kg		
Estimate		Gas processed		Sm3	0	Kg		
	Based on Monitoring	Total emissions				Kg		Kg
						INFO		

Emission of CO_2 generated by fugitives are considered direct emissions.

Mobile combustion

Mobile combustion sources include combustion of fuels in ships, barges, trains, trucks, automobiles and aircraft.

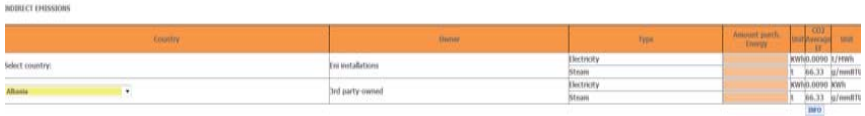
Type		Fuel type	Fuel use amount	Unit
Terrestrial and aerial mobile sources (vehicles, vessels, aircrafts/helicopters, etc)	owned by eni	Diesel - Marine Vessels		bbl
		Diesel - Other vehicles		bbl
		Gasoline - Other vehicles		bbl
		Kerosene - Aircraft		bbl
	3rd party-owned	Diesel - Marine Vessels		bbl
		Diesel - Other vehicles		bbl
		Gasoline - Other vehicles		bbl
		Kerosene - Aircraft		bbl

Emission of CO_2 generated by mobile sources of eni are considered direct emissions.

Emission of CO_2 generated by mobile sources of 3rd party are considered indirect emissions.

Indirect emissions from purchased energy

Emissions related to purchased and imported energy (electricity/steam) from outside the installation's boundary (e.g. national electricity grid). This section shall be filled with the amount of purchased energy (in kWh for Electricity and in t for Steam) and with the CO2, CH4 and N2O average Emission Factors for both electricity and steam generation (in t/MWh and in t/t respectively).


INDIRECT EMISSIONS

Country	Owner	Type	Amount purch. Energy	CO2 (tot)/Average GF	Unit
Select country:	Eni installations	Electricity		KWh 0.0990	t/MWh
		Steam		1 66.33	g/mmBTU
Albania	3rd party-owned	Electricity		KWh 0.0990	KWh
		Steam		1 66.33	g/mmBTU

INFO

It's mandatory select own Country in order to view the correct emission factor.

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ENVIRONMENTAL OBJECTIVE 4 YP

Environmental objective 4YP form is published on Sherpa database once per year (generally in September or October) in accordance with the timing of quantitative HSE objective 4 Year Plan form request.

The accounting is broken down on a site basis, for the following environmental significant information:

- Water: freshwater and brackish water withdrawal, total produced water and reinjected;
- Energy saving: on annual base for the energy efficiency projects;
- Waste: hazardous and not hazardous (**all types of waste excluded remediation/reclamation**) total and recycled;
- Oil spills: barrels spilled (spills due to sabotage/bunkering/terrorism are excluded) and recovered.

For each parameter, comments shall be provided to explain trend and the possible difference with the forecast data.

For GHG emission in terms of flaring, venting and diesel consumption is published on Sherpa database GHG 4YP form. As in GHG monthly form, production data and fuel gas consumption are imported automatically from BMS.

In GHG 4YP form all gas composition shall be reported only in the sheet related to Forecast Current Year and these composition will be copied for the next 4 years.

The Annual HSE Objective will be set up for each subsidiaries on the basis of the data provided in the "environmental objective 4 YP" form.

Form Env Obj: Environmental Objective 4 YP

Water	Forecast 2016	2017	2018	2019	2020	Note
Freshwater withdrawal						
Brackish water withdrawal						
Freshwater recycling						
Freshwater/Brackishwater consumption						
Produced water reinjected						
Total Produced Water						
Reinjected /Total Produced Water						
Energy Efficiency projects	**Forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
Annually energy saving						
Waste	**Forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
Hazardous Produced Waste from production activities						
Hazardous Produced Waste from production activities recycled						
Non Hazardous Produced Waste from production activities						
Non Hazardous Produced Waste from production activities recycled						
Total Waste from production activities						
Oil spill	**Forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
Oil spill due to incident and due to corrosion						
Oil spill due to incident and due to corrosion recovered						

Attachment B – HSE Forms and Instructions
HSE FORMS AND INSTRUCTIONS

B.3 HSE MANAGEMENT

GENERAL INFORMATION FOR ALL HSE MANAGEMENT FORMS

IMS 1 (quarterly and six monthly), IMS2 (annual), IMS3 (twice per year), HSE Tableau de Board (monthly basis) and Quantitative Objective form (annual) are present in the HSER section of SHERPA.

The data for each of those modules have been aggregated in only one contribution at subsidiary level.

Data to be reported are those related to all activities which fall under the management control of the reporting company (e.g. activities which take place within the premises of the Company) as well as activities which are carried out by Company personnel or personnel of contracted companies in those operations where the Company performs the role of single operator (including where it is the operator under a Service Contract) or shares operatorship with other companies.

IMS 1 Quarterly FORM

HSE Training

In this part is requested the "HSE Training Courses Attendance", the total number of training hours for each subject and the number of participants (split into Contractors and Company) shall be specified. Number of hours are calculated as Σ (No. of attendees to each course x course duration in hours) and total number of participants is calculated as Σ (No. of attendees to each course).

The contractor training for HSE (integrated) Health, Environment, Safety and Quality includes only training to contractors delivered by company.

The contractor medical training for "Medical and Paramedical Staff" shall include all training activities delivered by the Company (as for the above issues); moreover shall be also reported all data related to the medical training activities carried out by the contractors company in compliance with eni requirements.

Form IMS 1_Quarterly: HSE Training

HSE Training Courses Attendance	No. of hours		No. of Participants	
	Company	Contractors	Company	Contractors
HSE Integrated				
Health				
Health (medical and paramedical staff)				
Safety				
Environment				
Quality				
Total				
Planned for the year				
% Performed vs Budget				

GENERAL COMMENTS (i.e. significant changes from previous reporting period)

IMS 1 Six monthly FORM

Claims: Number of claims received from interested parties (stakeholders) related to the HSE discipline (Safety, Health, Environment, or integrated HSE), split on internal (employees, contractors, etc.) and external (local communities, lawsuits) and status in the reporting period (received, closed or outstanding).

HSE Training: number of courses with a "final examination" and the total number of HSE training courses. The percentage of HSE Training Courses including a "final examination" is automatically calculated.

Audits: Starting from 1st January 2016 all data related to Audit Activities (TA, Legislative Compliance Audit, etc.) are collected in INDACO (Sinergy modules)

Hazardous substances/chemicals:

- number of changes to the Risk Reports (including modifications to Italian DVR) following the newly identified presence in plant/site of hazardous substances/chemicals (including review of chemical's safety data sheet).
- number of hazardous substances and mixtures produced and relative Safety Data Sheets (SDS).
- number of hazardous substances and mixtures on the site (produced and purchased) and relative SDS.

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Emergency preparedness:

Level I Emergency Drills: total number of emergency drills tier I done in the current semester and planned for the year overall.

Type of Integrated Impact Assessment Studies:

- ESHIA (Environmental, Social and Health Impact Assessment): Process for predicting and assessing the potential environmental, social and health impacts of a proposed project, evaluating alternatives and designing appropriate mitigation, management and monitoring measures.
- PRE-ESHIA: screening/high level preliminary assessment of project related potential ESH impacts, carried out in the early project phase (feasibility).
- BASELINE ESH: It is the ante-operam picture of the environmental context, it is the characterization of the existing physical, biological, cultural and human conditions in the absence of the project, including relationships among them.
- EIA (Environment Impact Assessment): studies concerns only Environmental Impact carried out and not integrated in ESHIA.

Form IMS 1 Six Monthly: HSE Management Data

Claims		Received	Closed	Outstanding
	N. HSE internal Claims			
	N. HSE external Claims			
	Total			

HSE Training	
HSE Training Courses including a "final examination"	
Total HSE Training Courses	
% of HSE Training Courses including a "final examination"	

Hazardous substances/chemicals	
number of changes to the Risk Reports (including modifications to Italian DVR)*	
number of hazardous substances and mixtures produced and relative Safety Data Sheets (SDS)	
number of hazardous substances and mixtures on the site (produced and purchased) and relative SDS	

Emergency Preparedness	N. Planned on annual basis	N. Implemented on six monthly basis
number of Tier I emergency drills		

Type of study	Phase	Onshore/Offshore	Conventional/Unconv.	Project Description	Advisor who performed the study	Purpose Local Authorization

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HSE FORMS AND INSTRUCTIONS

IMS 2 FORM

Total number of employees as of 31 December.

Personnel employed in HSE: shall include all equivalent full time employees dedicated to HSE in the BUs.

Total number of internal auditors: shall include all Company Personnel who are normally utilised in such role, including those externally qualified.

of which (auditors) externally qualified: shall include those who hold an external qualification issued by a recognised qualification body.

Number of Managers with Business objectives assigned;

Number of Managers with HSE Objectives assigned.

Number of certified sites and relevant certifications: this shall include all certifications, valid on the end of the reference year, obtained in conformity with international standards (ISO, EMAS, OHSAS).

Table A, for each type of certification, indicates the total number of certifications applied to the Management System of the whole organization.

Table B collects the total number of certifications applied to the single operational sites/units, calculated by entering single data per sites/units, excluding certifications of those sites included in the Company certification, already reported in Table A.

Table C incorporates certifications not renewed/revoked applied to the whole organization or to the single operational sites/units as defined before.

Form IMS 2: HSE Management Data

HSE Personnel	Number
Total number of employees as of 31 December	
Personnel employed with specific HSE functions	
No. Internal Auditors	
of which, no. externally qualified	

HSE Objectives and Targets	Number
No. of Managers with HSE objectives assigned	

Specification of certifications: data entry instructions

If certification applies to management system(s) of the company please enter number of certifications per type (ISO 14001, OHSAS, etc.) in table A. If certification only applies to single operational site or unit, please enter site/unit name and enter type of certification per site/unit in table B. The Management System Certifications of the Company, even if they involve the whole organization, must be reported just once, only in table A.

HSE Management Systems Certifications

Table A: HSE Management Systems Certifications	Certifications				
	ISO 14001	EMAS	OHSAS	Others	Total
Total					0

Table B: HSE Certifications of Operative	Certifications				
Certified name site	ISO 14001	EMAS	OHSAS	Others	Total
					0
					0
					0
					0
					0
					0
					0
					0
					0
					0
					0
					0
Total of certified sites	0	0	0	0	0
Total (Management Systems and sites)	0	0	0	0	0

Table C: Certifications not renewed or revoked	Certifications				
Company/site name	ISO 14001	EMAS	OHSAS	Others	Total
					0
					0
					0
					0
					0
					0
Total	0	0	0	0	0

GENERAL COMMENTS (i.e. significant changes from previous reporting period):

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IMS 3 FORM

The purpose is the monitoring of HSE objectives assigned to each subsidiaries by the HQ.

Objective: description (name) of the Objective

Assigned objective: Central value assigned as MBO

Progress @ 30th September: result at 30th September

Forecast @ 31st December: expected result @ 31st December. In case December Forecast is different from the assigned objective provide explanation in notes.

Progress @ 31st December: result at 31st December.

Form IMS 3: HSE Objectives Form

Objective	Assigned objective(central)	Progress @ 30th September	Forecast @ 31st December	Progress @ 31st December	Notes*

HSE TABLEAU DE BORD

Number of unsafe act/condition: the total number of unsafe acts and conditions that do not match minimum standard requirement. In this category are included:

Unsafe behaviours, e.g.: operator not using PPE, no respect of procedures, removal of safety protection equipment, execution of unauthorized operations, etc.

Hazardous situations, e.g.: lack of fencing below scaffolding, PPE not adequate, instrumentation or materials or equipments not compliant to safety standards, etc.

A source of danger which if not adequately controlled or if suitable precautions are not taken, could create an unsafe condition. (ref. OGP Report No. 6.29/189).

Each year the minimum ratio of unsafe conditions vs. TRIR that shall be achieved by the Subsidiaries will be communicated by HQ.

HSE Site visits: Only the site visits performed during the reporting month using the toolkit or equivalent tool (e.g. checklists) shall be reported with the following detail:

GU's eni HSE Manager: site visits carried out by the Company's HSE Manager;

Eni MDs: site visits carried out by the Company's Managing Director;

Eni Technical Line Managers (e.g. exploration, drilling, construction, etc): site visits carried out by the Company's Technical Line Managers;

Eni Staff Line Managers (e.g. HR, procurement, Finance etc): site visits carried out by the Company's Staff Line Managers.

Each year the minimum target visits for each manager will be communicated by HQ.

The visits have to be recorded and traceable.

Implementation of risk mitigation actions: The KPI intend to monitor all the actions included in the last 2014 High Level Risk Report due to be closed in 2015. Possible actions carried over from last year shall also be included and monitored.

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Permit to Work: 5% of the permits issued during our operations/activities (including the subcontracted ones) have to be assessed and compliance against our procedures verified. Compliance means "full conformity" or improvement actions in place to achieve it. PTWs auditing/assessment activities have to be recorded and traceable.

- No. PTW – Issued: number of Permit To Work that have been issued during the current reporting month
- No. PTW – Audited : number of Permit To Work that have been audited during the current reporting month
- No. PTW – Compliant: number of Permit To Work that have been audited during the current reporting month resulting compliant

Training: Implementation of HQ HSE Training Package (HSE Golden Rules training).

A "HSE Training Package" on "HSE Golden Rules" will be provided by HQ to be implemented in each GU.

Review/elaboration of the HSE training matrix as per opi_sg_hse_035_ups_r01

An HSE Training Matrix shall be reviewed (if already available) or elaborated ex-novo, in accordance to the opi_sg_hse_035_ups_r01 "HSE Training, Internal Communication and Information Management".

Emergency Preparedness:

- Level II Emergency Drills: total number of emergency drills tier II done in the current month
- Level III Emergency Drills: total number of emergency drills tier III done in the current month.

Contractors Management:

- HSE Feedback Form issued (in accordance with Company C&P procedures): number of HSE Feedback Form issued for Contracts closing/reviewing in the year during the current reporting month.

- Company HSE Forum with Main Contractors (as identified by each GU): Main Contractors as identified by each GU and crosschecked with the Procurement Dept. The KPI is intended to monitor only HSE Forums held amongst Company Management (at least contract holders and HSE) and Contractors Senior Management. All the Forums shall be recorded and traceable.

Driving Safety:

- N. of overspeed violations: number of overspeed violations registered in the reporting month, as recorded from the In Vehicle Monitoring System in Company vehicles.
- Km driven: total Km driven in the month by Company vehicles with IVMS installed.

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HSE TdB Form

			YTD											
	TARGET	TOTAL	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Safety Indicators														**Notes**
Unsafe Act/Conditions														
Managers' HSE Site Visits using the toolkit or equivalent tool (e.g. checklists)														**Notes**
MD														
HSE Manager														
Technical Line Manager														
Staff Line Manager														
High Level Risk Report														**Notes**
Risk mitigation actions foreseen by 2015 HLRR closed in the current reporting month														
Permit To Work														**Notes**
No. PTW - Issued														
No. PTW - Audited														
No. PTW - Compliant														
Training														**Notes**
HSE Golden Rules training														
HSE training matrix (as per opi_sg_hse_035_ups_r01)														
Emergency Preparedness														**Notes**
Level II Emergency Drills														
Level III Emergency Drills														
Contractors Management														**Notes**
HSE Feedback Forms issued (in accordance with Company C&P procedures)														
Company HSE Forum with Main Contractors (as identified by each GU)														
Driving Safety														**Notes**
Overspeed Violations (Company vehicles)														
Km driven (Company vehicles)														

Quantitative HSE Objective 4 YP FORM

Quantitative HSE Objective is published on SHERPA database once per year (generally in October) in accordance with the timing of Environmental Objective 4YP Form request.

The accounting is at subsidiary level. For each parameter, comments shall be provided to explain trend and the possible difference with the forecast data.

The annual HSE objective will be set up for each subsidiaries on the basis of the data provided in the "Quantitative HSE Objective 4 YP" Form.

Safety

- Employees – number of worked hours
- Contractors – number of worked hours

Process Safety Audits: Audit aimed at assessing process safety. This includes process safety audits against the standard OSHA 1910 Process Safety Management (PSM) or compared to other equivalent standards internal or external.

Certifications ISO 14001, EMAS, OHSAS 18011, ISO 50001 and ISO 9001 valid at the end of the year.

HSE Training hours: this data can be evaluated multiplying the number of participants per the number of hours for each course.

Health (Industrial Hygiene): the number of environmental surveys planned for the 4YP.

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HSE FORMS AND INSTRUCTIONS

Form Qu Obj: Quantitative Objective 4 YP

Audit	forecast 2016	2017	2018	2019	2020	Note
Process safety audit						
HSE Management System Certifications for the organization	**forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
Number of ISO 14001 - valid certifications at the end of year						
Number of EMAS - valid certifications at the end of year						
Number of OHSAS 18001 - valid certifications at the end of year						
Number of ISO 50001 - valid certifications at the end of year						
Number of ISO 9001 - valid certifications at the end of year						
HSE Training	**forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
HSE training total hours						
Type of study	**forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
Number of Pre ESHIA						
Number of Baseline ESH						
Number of ESHIA						
Number of EIA not integrated in ESHIA						

Health

Industrial Hygiene	forecast 2016	2017	2018	2019	2020	Note
Environmental Surveys (Industrial Hygiene)						

Safety

Employees	forecast 2016	2017	2018	2019	2020	Note
N° worked hours						
Contractors	**forecast 2016**	**2017**	**2018**	**2019**	**2020**	**Note**
N° worked hours						

B.4 HEALTH - INDUSTRIAL HYGIENE

SHERPA will continue to collect data related to Industrial Hygiene.

Data will be collected every six months: 1st semester (from January to June) and 2nd semester (from July to December).

INSTRUCTIONS FOR FILLING HEA 2 FORM

ENVIRONMENTAL (WORKPLACE) SURVEY (Industrial hygiene surveys)	Number
chemical/cancerous agents	
noise and vibrations	
ionizing radiation	
non ionizing radiation	
microclimate and lighting	
particulate matter	
biological agents	
VDT position ergonomics	
Analysis of operations involving materials handling	
electromagnetic fields	
Total Number of Environmental Surveys	0
N. Environmental Surveys planned in the year (YEARLY PROGRAM)	
Sampling with dosimetry	
Number of campaigns	

Industrial Hygiene

As part of Industrial Hygiene programs carried out by Subsidaries shall be reported data related to the environmental workplace surveys.

Environmental (Workplace) Surveys

Shall be included all the environmental surveys (workplace surveys) carried out in Italy and abroad according to the local applicable law, indications resulting from the workplace health risk

assessments and activities developed as part of HSE plans with the objective of continual improvement.

Data shall be collected for the following indicators:

- chemical/cancerous agents
- noise and vibrations
- ionizing radiation
- non ionizing radiation
- microclimate and lighting
- particulate matter
- biological agents
- VDT position ergonomics
- analysis of operations involving materials handling
- Electromagnetic fields

A single survey means all the processes, carried out all at one time, for the screening of a single risk agent in a single area or in a building/office, independently of the number of measures, parameters and monitoring. For example:

- Climate measurements (temperature, humidity, airing, etc.) carried out during a certain period, in various offices and at different areas of a building (e.g. floors) will be accounted for as one survey. The following repetition carried out during another period will be accounted for as a new survey;
- Radon measurements carried out through dosimeters located for a year in various rooms of the same building will be accounted for as one survey;
- Noise or chemical measurements at various points of the same area will be accounted for as a single survey.

For LD DICS and DIME, data on the number of environmental (workplace) surveys shall be compliant to the eni's Circ. N° 376 "Gestione delle attività di comunicazione H&S all'Organismo di Vigilanza ai sensi del D Lgs 231/2001".

For the subsidiaries adopting the eni's 231 Model, data definitions and reporting to the related "Organismo di Vigilanza" shall be ensured according to specific requirements, that will be developed in line with the above mentioned circ. N° 376.

Sampling with Dosimetry

Report the number of sampling with individual dosimetry. Consider the procedures for the screening of a single risk agent for a specific task (not for each single worker). **Examples of detection: Benzene / single task = 1; detection of Benzene – Toluene - MTBE / single task = 3.**

Number of campaigns

The number of campaigns including a series of environmental surveys correlated and carried out in a specific reference period for one or more risk agents. Examples of detection: a series of measurements of various chemicals (Benzene + Toluene + Styrene) made within a defined period.

Number of Environmental Surveys planned in the year

Number of environmental surveys that have been planned and included within ANNUAL programs.
Making an exception to general criteria adopted in this standard, numbers will be accounted on annual basis (from January to December) for each semester, by including the number of surveys planned at the beginning of the year.
For LD DICS and DIME, data shall be compliant to the eni's Circ. N°376 "Gestione delle attività di comunicazione H&S all'Organismo di Vigilanza ai sensi del D Lgs 231/2001".
For the subsidiaries adopting the eni's 231 Model, data definitions and reporting to the related "Organismo di Vigilanza" shall be ensured according to specific requirements, that will be developed in line with the above mentioned circ. N° 376.

For others HEALTH DATA starting from March 2016 new professional operating Health instructions are effective (see references).

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HSE FORMS AND INSTRUCTIONS

B.5 RADIATION PROTECTION FORM

This form is published on six monthly basis at site level.

Percentage of plants inserted in a radiation protection planned monitored program

That means a planned program from an internal unit or a Company with clearly radiation protection knowledge (if the country defines the figure of Qualified Expert, the internal unit or Company have to include that figure in its staff).

Number of radiation protection audit carried out during the specified period.

Number of open findings related to radiation protection

Number of findings related to radiation protection, opened during the specified period.

Total number of flow or density-meters using radioactive sources

installed in the company facilities (including broken or stored equipment).

Total number of smoke detector using radioactive sources

Total number of smoke detectors using radioactive sources (generally Am-241 sources) installed or stored in the company facilities.

Number of instrumentation with radiogenic tubes or radioactive sources

located inside laboratories and health centres, including: X-Ray difractometer XRD, X-Ray spectrometer XRF, electronic microscopes, CAT, radiology devices, etc.

Number of Non Destructive Control using radioactive sources

Number of exposures during Non Destructive Control test using radioactive sources carried out during the reference period. The number of exposures is the number of times the radiographer cranks the source out of the exposure device.

Number of Non Destructive Control using X-Ray

Number of Non Destructive Controls using X-Ray sources carried out during the specified period.

Number of Gamma Log - Ce-137

Number of Gamma Logs (using a Cesium source) carried out during the specified period.

Number of Neutron Log - Am-Be

Number of Neutron Logs (using an Americium-Berillium source) carried out during the specified period.

Number of Neutron Log – Minitron

Number of Neutron Logs (using a Minitron) carried out during the specified period.

Number of marker inserted in the well (pig tail) during the specified period.

Percentage of radioactive sources lost in the well over the total number of radioactive sources used

Use of radioactive tracers

Indicate if radioactive tracers have been used.

Percentage of plants subjected to a radiometric control

Percentage of plants subjected to a radiometric control at least ones during the reference period over the total number of plants

Has been implemented a radiometric control of industrial waste?

That means a survey from an internal unit or a Company with radiation protection knowledge.

If YES: quantity of industrial waste controlled

Tons of industrial waste subjected to a radiometric control during the specified period.

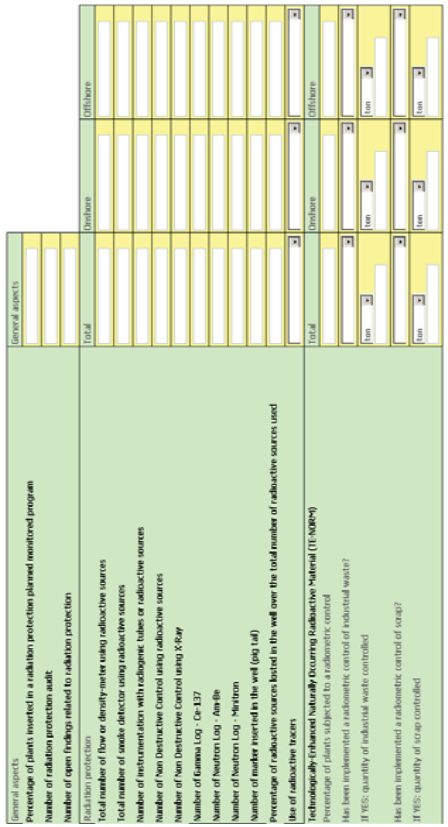
Has been implemented a radiometric control of scrap?

This means a survey from an internal unit or a Company with radiation protection knowledge.

If YES: quantity of scrap controlled

Tons of scrap subjected to a radiometric control during the specified period.

RADIATION PROTECTION FORM



General aspects			
Percentage of plants inserted in a radiation protection planned monitored program			
Number of radiation protection audit			
Number of open findings related to radiation protection			
Radiation protection	Total	Onshore	Offshore
Total number of flow or density-meter using radioactive sources			
Total number of smoke detector using radioactive sources			
Number of instrumentation with radiogenic tubes or radioactive sources			
Number of Non Destructive Control using radioactive sources			
Number of Non Destructive Control using X-Ray			
Number of Gamma Log - Ce-137			
Number of Neutron Log - Am-Be			
Number of Neutron Log - Minitron			
Number of marker inserted in the well (pig tail)			
Percentage of radioactive sources losted in the well over the total number of radioactive sources used			
Use of radioactive tracers			
Technologically-Enhanced Naturally Occurring Radioactive Material (TE-NORM)	Total	Onshore	Offshore
Percentage of plants subjected to a radiometric control			
Has been implemented a radiometric control of industrial waste?			
If YES: quantity of industrial waste controlled	ton	ton	ton
Has been implemented a radiometric control of scrap?			
If YES: quantity of scrap controlled	ton	ton	ton

Attachment C

Art 2 European Union – Commission Decision (2000/532/EC) of 3 May 2000

Wastes classified as hazardous are considered to display one or more of the properties listed in Annex III to Directive 91/689/EEC and, as regards H3 to H8, H10 (1) and H11 of the said Annex, one or more of the

following characteristics:

- flash point ≤ 55 ºC,

- one or more substances classified (2) as very toxicat a total concentration ≥ 0,1%,

- one or more substances classified as toxic at a total concentration ≥3%,

- one or more substances classified as harmful at a total concentration ≥ 25%,

- one or more corrosive substances classified as R35 at a total concentration ≥ 1%,

- one or more corrosive substances classified as R34 at a total concentration ≥ 5%,

- one or more irritant substances classified as R41 at a total concentration ≥ 10%,

- one or more irritant substances classified as R36, R37, R38 at a total concentration ≥ 20%,

- one substance known to be carcinogenic of category 1 or 2 at a concentration ≥ 0,1%,

- one substance known to be carcinogenic of category 3 at a concentration ≥ 1%

- one substance toxic for reproduction of category 1 or 2 classified as R60, R61 at a concentration ≥0,5%,

- one substance toxic for reproduction of category 3 classified as R62,R63 at a concentration ≥ 5%,

- one mutagenic substance of category 1 or 2 classified as R46 at a concentration ≥ 0,1%,

- one mutagenic substance of category 3 classified as R40 at a concentration ≥ 1%.

Attachment D – Health, Safety and Environmental Expenses

NICE is the eni database for the collection of all eni group HSE expenses. This system is used to report all HSE expenses (including Actual, Forecast and Budget). HSE Investments shall be reported in the CAPEX section of NICE, while HSE non CAPEX (OPEX and other costs) shall be reported in the "Sustainability – HSE Data entry/Sustainability" section of NICE.

In order to monitor the improvements as result of HSE Expenses, NICE shall be completed, for every expense item, with the relevant KPI and relative value. For example, an expense related to gas pipeline maintenance for fugitive reduction shall be associated to the following KPI: reduction of fugitive emissions and the related quantity of CH4 reduction shall be reported.

HSE expenses shall be divided according to the final destination for Environment, Safety, Health (only for Industrial Hygiene), HSE Integrated and Fines/Insurances/Taxes.

HSE expenses shall be reported in NICE on a quarterly basis (Forecast), in June and December for Actual data related the previous semester and in October for input HSE 4YP Budget of expenditures.

Attachment D – HSE Expenses

HSE EXPENSES

ENVIRONMENTAL EXPENSES:

For environment, the following 10 codes have been identified.

Purpose 1	Purpose 2	Examples
1. Air Protection	• Plant modifications • Pollutants monitoring/analysis • Pollutants treatment/reduction • Other	**Plant modifications** ➢ New production technologies aimed at reducing polluting emissions (excluding GHG emissions, to be indicated in the dedicated section "Energy efficiency and climate change"). ➢ Modification to plant in order to improve combustion processes or to allow for the use of less polluting fuels. **Pollutants treatment/reduction** ➢ Measures to reduce the dispersion of air pollutants in the product transport, storage or processing phases. ➢ Reduction of emissions (excluding GHG emissions, to be indicated in the dedicated section "Energy efficiency and climate change"). **Pollutants monitoring/analysis** ➢ Measuring, control and laboratory operations connected with monitoring air pollutants (excluding GHG emissions, to be indicated in the dedicated section "Energy efficiency and climate change"). ➢ Systems for monitoring air emissions (excluding GHG emissions, to be indicated in the dedicated section "Energy efficiency and climate change"). **Other** ➢ Installation of meteo control units to measure meteorological parameters ➢ Other expenses for the protection of the air (excluding those for energy efficiency and climate change to be indicated in the dedicated section "Energy efficiency and climate change) not included in the preceding categories.

2. Water resources and discharges	• Collection and transport systems • Analysis for waste water quality monitoring • Cooling systems • Maintenance / regular performance / modification of sewer networks • Improvement/adaptation of system effluent • Liquid waste treatment in company plant or plant of third parties • New plant or modifications to reduce water consumption • New plant or modifications for water recycling • Water Injection • Other	**Collection and transport systems** Collection and transport systems for rain and for civil and industrial waste water **Analysis for waste water quality monitoring** ➢ Installation of systems for monitoring the quality of the water discharged ➢ Measuring, control and laboratory, chemical-physical and biological analyses connected with the monitoring of water pollutants and sediment ➢ On-site analyses, near offshore installations, connected with water and sediment monitoring **Cooling systems** ➢ The purchase of waste water cooling (heating) systems Cooling towers, measures to increase the dispersion of the discharged cooling water, closed cooling (heating) circuits, etc. **Maintenance / regular performance / modification of sewer networks** ➢ Construction and maintenance of sewer networks, storm drain networks, industrial water collection networks. ➢ Recovery of waste civil waters (e.g. phyto-purification) **Improvement/adaptation of system effluent** **Liquid waste treatment in company plant or plant of third parties** ➢ The purchase systems for the treatment (purification) of water before discharge mechanical (decantation tanks, grills, etc.), biological, chemical or advanced treatments ➢ Management of biological systems ➢ Bilge water ➢ Management and cleaning of mechanical treatment systems ➢ Acquisition of pre-treatment systems ➢ Adaptation of final finishing systems

Attachment D – HSE Expenses

HSE EXPENSES

		➢ Preparation of systems for treatment/disposal of solid or semisolid water extracts (salts, SST, scales, etc.) ➢ Acquisition of systems for the treatment of water with high presence of Tenorm **New plant or modifications to reduce water consumption** ➢ New technologies and systems to reduce water consumption, allow for recycling or the replacement, also partial, of the consumption of high quality water with lower quality water. ➢ Costs for modifications to the production process to reduce the pollution of discharged waters **Water Injection** ➢ Projects for the reinjection of produced water associated to oil production ➢ Reservoir studies for produced water reinjection and for the creation of wells for water disposal **Other** ➢ Other expenses to reduce the consumption of water resources and for the management / improvement of water discharge not included in the above categories.
3. Waste manag.	• Treatment • Waste deposit, disposal, recovery and transport • Modifications to production processes to reduce quantities • Removal of asbestos • Other	**Treatment** ➢ Waste treatment systems (physical, chemical, biological and heat treatments) ➢ Measuring, control and laboratory operations connected with monitoring waste production and storage. **Waste deposit, disposal, recovery and transport** ➢ Systems for waste disposal or temporary storage (dumps, incinerators, other). ➢ Collection and transport of waste (except sanitary wastes if managed directly by the health facility with dedicated contracts, to be registered as expenses for Industrial Health and Hygiene, Purpose 2 health care). ➢ Waste treatment and disposal (incineration, dumping, other)

		➢ Classification, storage and disposal of wastes containing TENORM (maintenance wastes, drilling wastes). ➢ Adaptation of areas for waste storage ➢ Recovery of waste produced (catering, reclamation, by-products, …) **Modifications to production processes to reduce quantities** ➢ New technologies and systems to reduce the production of waste. ➢ Modifications to the production process to prevent the formation of waste. ➢ Measures which allow for waste recycling, when such activities are aimed mainly at reduction and are not activities of the company's main or secondary market. **Removal of asbestos** ➢ Costs linked to the removal and disposal of asbestos **Other** ➢ Implementation of Waste Management Plans ➢ Other waste management expenses not included in the above categories
4. Spill prevention	• Improvement of transport systems • Improved containment/storage • Soil Sealing • Other	**Improvement of transport systems** ➢ Works to improve systems for the transport of hydrocarbons and chemical products **Improved containment/storage** ➢ Doubling of containment systems ➢ Installation and overhauling of underground tanks ➢ Works to improve containment of underground tanks and transport means **Soil Sealing** ➢ Soil sealing works, surface banks, collection trenches, containment walls and drainage systems

Attachment D – HSE Expenses

HSE EXPENSES

		Other ➢ Other spill prevention expenses not included in the above categories
5. Noise and vibration reduction	• Noise reduction • Noise level measuring and control • Other	**Noise reduction** ➢ Production process modifications to reduce noise ➢ Construction of noise barriers and anti-vibration devices (roads, railways, airports) ➢ Construction of anti-noise and anti-vibration systems at the factories (covering and soundproofing of equipment and plant, anti-vibration foundations, etc.) **Noise level measuring and control** ➢ Equipment to measure and control external noise levels ➢ Noise monitoring activities **Other** ➢ Other noise and vibration reduction expenses not included in the preceding categories
6. Landscape protection and protection of ecosystems and biodiversity	• Creation of green areas • Assessment of impacts on ecosystems and on biodiversity • Landscape monitoring and restoration • Biodiversity monitoring and restoration • Actions to reduce light pollution • Actions to reduce impact • Other	**Creation of green areas** ➢ Creation of green areas near operations / head offices or other green areas, favouring, where possible, the use of native flora. **Assessment of impacts on ecosystems and on biodiversity** ➢ Identification and assessment of the impact of the operating activities (primary and secondary, perceived and accumulative) on biodiversity, ecosystems and ecosystem services by specific surveys. ➢ Preparation of action plans to mitigate such impact and, in the case of residual impact, the execution of environmental offsetting actions. ➢ Assessment of company footprints to distinguish between impact caused by other human activities (O&G and non-O&G) **Landscape monitoring and restoration** ➢ Environmental restoration (habitats and ecosystems)

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		by the use of native flora after excavations for laying conduits and pipes or after mining activities. ➢ Landscape protection activities ➢ Restoration and cleaning of surface waters. ➢ Offshore decommissioning after specific studies relative to minor impact **Biodiversity monitoring and restoration** ➢ Activities for the conservation and improvement of the natural local species, habitats and ecosystems. ➢ Studies to assess impact due to natural or human phenomena, but independent of our activity, which alter or could alter the biodiversity of the area in question. **Actions to reduce light pollution** ➢ Works to limit light pollution **Actions to reduce impact** ➢ Action to reduce impact on the landscape, the ecosystems and the biodiversity (excluding the reduction of light pollution and the creation of green areas, which must be indicated under the dedicated items). **Other** ➢ Other expenses for the landscape, ecosystems and biodiversity protection, not included in the preceding categories ➢ Participation in external projects (in partnership with research institutes, NGOs, etc.) to conserve sensitive species, habitats and ecosystems of the area concerned by the O&G operations.
7. Research and development	• Patents • New technologies • Research projects • Site reclamation • Other	**Patents** ➢ Expenses for patents in the environmental field **New technologies** ➢ Development of new techniques/technologies to prevent, control and monitor the potential environmental pollution in the following ecosystems: Air, water, sediment, soil, subsoil, water table

Attachment D – HSE Expenses

HSE EXPENSES

		Research projects ➢ Environmental research projects based on the following issues: conservation of biodiversity, improvement of environmental monitoring techniques, prevention of oil spills at sea, assessment and mitigation of potential effects caused by e&p operations on the ecosystems. **Site reclamation** ➢ Use of new techniques for the reclamation of contaminated sites / experimental projects / pilot projects for the reclamation of contaminated sites **Other** ➢ Other research and development not included in the preceding categories
8. Environment management	• Assessment of environmental and social impact • Compliance with prescriptions and monitoring • Training and communications • Information systems • Environmental mitigation measures in non oil projects • Other	**Assessment of environmental and social impact** ➢ Expenses for EIA, ESIA and ESHIA ➢ Environmental analyses carried out by third parties ➢ Data acquisition and interpretation by remote sensing techniques **Compliance with prescriptions and monitoring** ➢ Expenses for the adaptation of monitoring systems to the prescriptions of the competent authorities **Training and communications** ➢ Expenses for training and on-site environmental communications, expenses for environmental communications addressed outside and inside the company (balances and environmental reports) **Information systems** ➢ Expenses for maintenance and upgrading of specific software ➢ Expenses for the purchase and implementation of specific software **Environmental mitigation measures in non oil projects** ➢ Expenses for mitigation measures in non oil projects in Tar Sands, Shale gas, Coal-Bed Methane (CBM) projects

		Other ➢ Other environmental management expenses not included in the preceding categories
9. Energy efficiency and climate change	• Energy saving • Heat recovery • Renewable sources • Sustainable management of head offices • Sustainable mobility • Flaring down • Venting and fugitive emissions • Other	**Energy saving** ➢ Expenses for energy saving projects **Heat recovery** ➢ Expenses for projects which contemplate hear recovery (e.g. combined cycle systems) **Renewable sources** ➢ Expenses for the exploitation of renewable sources (solar, biomass, wind, etc.) **Sustainable management of head offices** ➢ Expenses for initiatives aimed at energy efficiency and energy saving at head offices. **Sustainable mobility** ➢ Expenses linked to sustainable mobility initiatives **Flaring down** ➢ Expenses connected to projects for the reduction/recovery of gas volumes first burnt in torches. **Venting and fugitive emissions** ➢ Expenses to reduce/eliminate venting/fugitive emissions ➢ Studies for the quantification of venting and fugitive emissions **Other** ➢ Other expenses for energy efficiency and climate change not included in the preceding categories
10. Soil and groundwater reclamation	• Reclamation • Disposal • Soil treatment systems • Water table treatment	**Reclamation** ➢ Expenses for environmental reclamation after contamination by pollutants ➢ Expenses for the replacement of vegetation in a well or plant area after decommissioning

	systems • Installation of permanent safety measures • Implementation of operating safety measures • Environmental monitoring and post-opera risk analysis • Decommissioning • Other	➢ Expenses for environmental compensation works in abandoned areas **Disposal** ➢ Expenses linked to waste disposal after reclamation/recovery works **Soil treatment systems** ➢ Expenses for soil treatment systems **Water table treatment systems** ➢ Expenses for water table treatment systems **Installation of permanent safety measures** ➢ Expenses for providing permanent safety measures **Implementation of operating safety measures** ➢ Expenses for the implementation of operating safety measures **Environmental monitoring and post-opera risk analysis** ➢ Expenses for direct and indirect characterisation surveys aimed at defining the extension and degree of soil/subsoil, water and sediment contamination, including sampling and laboratory analysis operations. **Decommisioning** ➢ Decommissioning expenses **Other** ➢ Other soil and water table reclamation expenses not included in the preceding categories

SAFETY EXPENSE

For safety expense, three codes have been identified as follows.

Purpose 1	Purpose 2	Examples
1. Plant and equipment	• Fire protection and fire fighting facilities and equipment • Rescue equipment / evacuation means • Safety and rescue signs • Passive protection / fire proofing • Personal Protective Equipment • Fire & gas systems • Transport means and modifications for safety purposes • Non-routine plant/safety equipment maintenance • Plant modifications • Design • Emergency flares • Other	• Fire protection and fire fighting facilities and equipment ➢ Costs for hiring/purchase of fire protection/fire fighting equipment • Rescue equipment / evacuation means ➢ Costs for hiring/purchase of rescue equipment / evacuation means • Safety and rescue signs ➢ Costs for hiring/purchase of safety and rescue signs • Passive protection / fire proofing ➢ Costs for hiring/purchase of passive protection / fire proofing • Personal Protective Equipment ➢ Costs for hiring/purchase of Personal Protective Equipment • Fire & gas systems ➢ Costs for fire & gas systems • Non-routine plant/safety equipment maintenance ➢ Expenses for non-routine maintenance of safety plant/equipment (e.g. extinguishers, gas detection devices, safety tools and relevant spare parts for operating equipment).

Attachment D – HSE Expenses

HSE EXPENSES

Purpose 1	Purpose 2	Examples
		• Plant modifications ➢ Cost for modification / adaptation of safety plant; including, in particular, costs for modifications to: ○ Passive defences / fire proofing ○ Emergency exits / assembly points ○ Lock system and depressurisation ○ Control rooms and accommodation modules ○ Fire protection/fire fighting facilities ○ Fire&gas systems ○ Alarm systems ○ Emergency flares • Planning ➢ Costs for planning of modifications / refurbishment to safety equipment • Emergency flares ➢ Cost for new / additional emergency flares • Other ➢ Other safety plant and equipment expenses not included in the above categories
2. Maintenance	• Plants and safety equipment Maintenance	

Purpose 1	Purpose 2	Examples
3. Safety management	• Fire-fighting • Advisory services and external costs • Coordination • Emergency management • Inspections/testing/audits • Specific studies on safety, procedures and standards	• Information systems ➢ Expenses for the purchase and implementation of specific software ➢ Expenses for maintenance and upgrading of specific software • Fire-fighting ➢ Expenses for fire-fighting management • Advisory services and external costs ➢ Expenses for advisory services linked to safety management • Training and communications ➢ Expenses for training and on-site safety communications, expenses for safety communications addressed outside and inside the company (balances and safety reports) • Coordination ➢ Expenses for safety management coordination Costs pertinent to the unit responsible for safety matters • Emergency management ➢ Costs for emergency plan development and for emergency management ➢ Costs for the preparation of the Emergency Response Strategy documents ➢ Costs relative to Emergency Response Strategy Review ➢ Costs relative to drills • Inspections/testing/audits

Attachment D – HSE Expenses

HSE EXPENSES

Purpose 1	Purpose 2	Examples
		➢ Costs linked to safety inspections / testing / audits • Specific studies on safety, procedures and standards ➢ Costs sustained for risk assessment, the preparation of safety plans and safety analyses carried out by third parties • Risk assessment ➢ Expenses for the development of specific procedures and standards regarding safety • Other ➢ Other safety management expenses not included in the preceding categories
4. Research and development	• Patents • New technologies • Research projects	• Patents ➢ Expenses for patents in the field • New technologies ➢ Development of new techniques/technologies in order to improve the safety of plant and of persons • Research projects ➢ Research projects in the field of safety

HEALTH EXPENSE

Health expenses are broken down into three codes.

Purpose 1	Purpose 2	Examples
1. Health and hygiene management	Industrial hygiene	For the definitions relative to industrial hygiene, see eni E&P standard Doc. n. 1.3.1.36 "Industrial Hygiene" Examples of expenses classified under industrial hygiene: • Consulting and professional services (e.g. industrial hygienist). • Planning, implementation and management of industrial hygiene programmes. • Execution of "Health risk assessment" studies, according to the eni E&P sanitary standards and the provisions of reference. • Compliance with legislation and other regulations (e.g. anti-alcohol tests, drug addiction tests, etc.) • The development of specific company surveillance programmes (e.g. hearing protection programme, health inspections in refectories, etc.) • Costs for the stipulation of service contracts with external structures or professional services, aimed at industrial hygiene activities, including those for the selection and qualification of suppliers. • Other expenses strictly linked to industrial hygiene and which are not included in the above examples.

Attachment D – HSE Expenses

HSE EXPENSES

HSE INTEGRATED EXPENSES

HSE Integrated expenses consists in one code only.

Purpose 1	Purpose 2	Examples
1. Integrated HSE	• Transversal HSE activities	• Implementation – certification of HSE management systems ➢ expenses for the implementation, maintenance and certification of HSE management ~~systems~~ • Technical Audit, internal audit, legal audit . • Training Health, Environment, Safety and Integrated HSE • Information systems

FINES/INSURANCES/TAXES

These expenses consist in three code only.

Purpose 1	Purpose 2	Examples
1. Safety Fines	• Fines and penalties	Fines paid to Public Authorities for infringements of administrative laws and Safety directives.
2. HSE insurances	• HSE insurances	• Safety insurances • Environmental insurances

Attachment E

Dati specifici per l'Organismo di Vigilanza di ENI spa

In ottemperanza alla Circolare eni 376 del 10 novembre 2009 e successive modifiche sulla "Gestione delle attività di comunicazione periodica Health & Safety all'Organismo di Vigilanza ai sensi del D.lgs 231 del 2001", che definisce il processo di reporting all'Organismo di Vigilanza (OdV) di Eni S.p.A. di dati e indicatori in tema di salute e sicurezza, occorre raccogliere nell'apposita scheda denominata ODV di SHERPA i seguenti indicatori corredati da Firma del Datore di Lavoro. L'attività di comunicazione periodica degli indicatori HSE rivolta agli OdV delle società eni è finalizzata a fornire evidenza del buon funzionamento per gli aspetti HSE del Modello 231 di eni e offrire elementi di giudizio ai fini dell'espletamento del ruolo di vigilanza dell'OdV.

L'elenco degli indicatori può essere modificato su proposta della funzione HSE, della funzione Salute o dell'OdV per tenere conto di nuovi elementi derivanti da mutamenti organizzativi o normativi, previa informativa all'OdV.
Tutti gli indicatori sono classificati secondo:

- l'ambito e il riferimento legislativo;
- il riferimento allo standard di controllo specifico 231;
- l'unità di misura.

Per gli indicatori in materia di salute e sicurezza si fa riferimento a quanto riportato al comma 1 dell'art. 30 del D. Lgs. n. 81 del 2008:

- elementi relativi al rispetto degli standard tecnico-strutturali di legge relativi ad attrezzature, impianti, luoghi di lavoro, agenti chimici, fisici e biologici;
- elementi relativi alle attività di valutazione dei rischi e di predisposizione delle misure di prevenzione e protezione conseguenti;
- elementi relativi alle attività di natura organizzativa, quali emergenze, primo soccorso, gestione degli appalti, riunioni periodiche di sicurezza, consultazioni dei rappresentanti dei lavoratori per la sicurezza;

Attachment E – Form OdV

FORM ODV

- elementi relativi alle attività di sorveglianza sanitaria;
- elementi relativi alle attività di informazione e formazione dei lavoratori;
- elementi relativi alle attività di vigilanza con riferimento al rispetto delle procedure e delle istruzioni di lavoro in sicurezza da parte dei lavoratori;
- elementi relativi all'acquisizione di documentazioni e certificazioni obbligatorie di legge;
- elementi relativi alle periodiche verifiche dell'applicazione e dell'efficacia delle procedure adottate.

Gli indicatori in materia ambientale si riferiscono a quanto previsto nelle seguenti disposizioni normative:

- D. Lgs. n. 152 del 2006;
- D. Lgs. n. 202 del 2007, artt. 8 e 9, commi 1 e 2;
- L. 549 del 1993, art. 3;
- C.P. art. 727-bis e 733-bis;
- L. 268 del 22 maggio 2015

e coprono le ipotesi di reato relativamente a:

- sversamento di sostanze inquinanti da navi e bonifica dei siti;
- scarichi di acque reflue industriali;
- attività di gestione dei rifiuti non autorizzata;
- traffico illecito di rifiuti;
- emissioni in atmosfera;
- impiego di sostanze lesive dell'ozono;
- aree protette;
- due diligence ambientali.

La comunicazione all'OdV avviene trimestralmente, attraverso la seguente reportistica:

- due relazioni (aprile e ottobre);
- due flash report (gennaio e luglio).

L'Unità HSE di linea datoriale o, in sua assenza, il RSPP provvede alla raccolta, consolidamento e verifica dei dati HSE e li trasmettono per approvazione al datore di lavoro di competenza.

In caso di linee datoriali con più siti, è responsabilità del datore di lavoro, attraverso la propria unità HSE o, in sua assenza, attraverso il RSPP, provvedere alla richiesta dei dati ai singoli siti, alla loro raccolta e al consolidamento a livello di linea datoriale, conservando evidenza dei dati di provenienza.
È responsabilità del datore di lavoro il rilascio, attraverso l'applicativo informatico Banca Dati HSE Integrata, dei valori inseriti per gli indicatori HSE della propria linea datoriale e delle eventuali successive loro rettifiche. Ogni eventuale rettifica od integrazione dei predetti dati è valida soltanto ove rilasciata nella Banca Dati.
Il rilascio da parte del datore di lavoro degli indicatori raccolti ed aggregati a livello di linea datoriale costituisce trasferimento formale dei dati alla propria funzione HSE di BU, per le attività di competenza di quest'ultima.
Oltre all'invio dei dati le linee datoriali trasmettono alla propria funzione HSE di BU una nota di accompagnamento ai dati redatta secondo i contenuti minimi indicati nell'Allegato 2 "*Nota di accompagnamento ai dati*" della Opi "*pro hse 012 eni spa r01" di novembre 2015.*
I dati inseriti dalle linee datoriali nella Banca Dati HSE Integrata devono essere verificati dalla funzione HSE di BU. In caso di difformità o di incongruenze, è cura della funzione HSE di BU procedere ad una richiesta di chiarimenti da parte della linea datoriale e, qualora opportuno, effettuare un sopralluogo di verifica in campo dei dati raccolti dalla linea datoriale stessa.
Oltre all'invio dei dati le linee datoriali trasmettono alla propria funzione HSE di BU una nota di accompagnamento ai dati redatta secondo i contenuti minimi indicati nell'Allegato 2 "*Nota di accompagnamento ai dati*" alla *pro hse 012 eni spa r01* "Gestione delle attività di comunicazione HSE all'Organismo di Vigilanza di eni spa ai sensi del D. Lgs. 231 del 2001" del 6 novembre 2015.

DEFINIZIONI

Parametro	Personale impiegato nei Servizi di Prevenzione e Protezione
Definizione	Numero totale di persone facenti parte dei servizi di prevenzione e protezione presenti presso l'unità di business alla fine del periodo di reporting. Per Servizio di Prevenzione e Protezione (di seguito SPP), ai sensi dell'art. 2, comma 1, lettera 1 del D. Lgs. 81/08 si intende l'insieme delle persone, sistemi e mezzi esterni o interni all'azienda finalizzati all'attività di prevenzione e

	protezione dai rischi professionali per i lavoratori.
Formula	N° di RSPP + N° di Addetti SPP.
Unità di misura	Numero.
Tipologia di rilevazione	Calcolo.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 52, 53, 54.

Parametro	Responsabili del Servizio di Prevenzione e Protezione
Definizione	Numero totale di Responsabili del Servizio di Prevenzione e Protezione (RSPP) presenti presso l'unità di business alla fine del periodo di reporting. Per Responsabili del Servizio di Prevenzione e Protezione si intendono (art. 2, comma 1, lettera f) del D. Lgs. 81/08) le persone in possesso delle capacità e dei requisiti professionali di cui all'articolo 32 del D. Lgs. 81/08, designate dal datore di lavoro, a cui rispondono, per coordinare il servizio di prevenzione e protezione dai rischi (si veda la definizione di "*Personale impiegato nei Servizi di Prevenzione e Protezione*").
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Metodologia di riferimento	Il dato da riportare si riferisce al numero di nomine a RSPP presenti nell'unità di business e non al numero fisico di persone che ricopre tale ruolo nell'unità di business.
Esempi e casi particolari	Se una stessa persona ricopre il ruolo di RSPP in due unità operative dell'unità di business, il numero da riportare è 2 e non 1.

Standard di controllo 231	St. 231 n. 52, 53, 54.

Parametro	**Addetti al Servizio di Prevenzione e Protezione**
Definizione	Numero totale di Addetti ai Servizi di Prevenzione e Protezione (Addetti SPP) presenti presso l'unità di business alla fine del periodo di reporting. Per Addetti al Servizio di Prevenzione e Protezione si intendono (art. 2, comma 1, lettera g) del D. Lgs. 81/08) le persone in possesso delle capacità e dei requisiti professionali di cui all'articolo 32 del D. Lgs. 81/08, facenti parte del Servizio di Prevenzione e Protezione (si veda la definizione di "*Personale impiegato nei Servizi di Prevenzione e Protezione*").
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Metodologia di riferimento	Il dato da riportare si riferisce al numero di nomine ad ASPP presenti nell'unità di business e non al numero fisico di persone che ricopre tale ruolo nell'unità di business.
Esempi e casi particolari	Se una stessa persona ricopre il ruolo di ASPP in due unità operative dell'unità di business, il numero da riportare è 2 e non 1.
Standard di controllo 231	St. 231 n. 52, 53, 54.

Parametro	**Addetti prevenzione incendi ed emergenze**
Definizione	Numero totale di addetti alla prevenzione incendi ed emergenze presenti presso l'unità di business alla fine del periodo di reporting. Per Addetti prevenzione incendi ed emergenze si intendono i lavoratori, designati dal datore di lavoro (ai sensi dell'art. 18, comma 1, lettera b) del D. Lgs. 81/08), incaricati

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	dell'attuazione delle misure di prevenzione incendi e lotta antincendio, di evacuazione dei luoghi di lavoro in caso di pericolo grave e immediato, di salvataggio e comunque, di gestione dell'emergenza.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 52, 53, 54.

Parametro	**Emergenze**
Definizione	Numero totale di emergenze di 1°, 2° e 3° definite secondo l'Allegato "Piano di emergenza" della MSG HSE, occorse nel periodo di reporting.
Formula	N° di emergenze di 1° livello + N° di emergenze di 2° livello + N° di emergenze di 3° livello.
Unità di misura	Numero.
Tipologia di rilevazione	Calcolo.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

Parametro	**Emergenze di 1° livello**
Definizione	Emergenze di 1° livello definite secondo l'Allegato "Piano di emergenza" della MSG HSE, occorse nel periodo di reporting all'interno dei siti/unità operative. L'emergenza di 1° livello è gestibile a livello locale dalle Divisioni/Società con il personale ed i mezzi in dotazione in loco.

Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

Parametro	**Emergenze di 2° livello**
Definizione	Emergenze di 2° livello definite secondo l'Allegato "Piano di emergenza" della MSG HSE, occorse nel periodo di reporting all'interno dei siti/unità operative. L'emergenza di 2° livello è gestibile con l'assistenza da parte delle funzioni centrali di sede di Divisioni/Società o da autorità ed amministrazioni pubbliche a livello periferico (es. Vigili del Fuoco, Strutture Sanitarie, ecc.).
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

Parametro	**Emergenze di 3° livello**
Definizione	Emergenze di 3° livello definite secondo l'Allegato "Piano di emergenza" della MSG HSE, occorse nel periodo di reporting all'interno dei siti/unità operative. L'emergenza di 3° livello è gestibile con risorse interne o esterne messe a disposizione da altre Divisioni/Società o da autorità ed amministrazioni pubbliche a livello centrale.

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Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

Parametro	Notifiche ai sensi dell'art. 242 del D. Lgs. 152/2006
Definizione	Numero di notifiche emesse al verificarsi di un evento (ad esempio spill) che abbia causato una potenziale contaminazione di un sito o all'atto di individuazione di contaminazioni storiche che abbiano potuto ancora comportare rischi di aggravamento della situazione di contaminazione, ai sensi e con le modalità descritte nella procedura individuata dagli art. 242, 245 e 249 del D. Lgs. 152/2006.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Esempi e casi particolari	Nella nota di accompagnamento ai dati, fornire dettagli per ciascuna notifica effettuata (descrizione dell'evento, superficie interessata, localizzazione del sito/area, destinazione d'uso dell'area, matrice ambientale impattata, tipologia di inquinante, eventuale volume sversato, tipologia d'intervento d'urgenza applicato).
Standard di controllo 231	St. 231 n. 64, 73, 108 e 117.

Parametro	**Interventi di manutenzione programmata sugli elementi critici per la sicurezza**
Definizione	Gli elementi critici per la sicurezza (parti di impianto il cui malfunzionamento può causare o contribuire a un evento incidentale significativo o il cui scopo é prevenire o limitare

	le conseguenze di un evento incidentale significativo) sono individuati da ciascun sito/società in accordo alle norme vigenti e all'elenco minimo definito a livello di unità di business. Per le unità di business che non hanno attività operativa viene riportata una lista utile alla definizione dell'elenco minimo: • *Sistema blocchi di emergenza* • *Sistema di alimentazione elettrica* • *Sistema di controllo* • *Sistema di rilevamento incendio & presenza gas* • *Sistema antincendio* • *Sistema di diffusione allarme*
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale. Annuale per l'indicatore "*Interventi di manutenzione programmata sugli elementi critici per la sicurezza pianificati*".
Standard di controllo 231	St. 231 n. HSE18, HSE26, HSE27, HSE36 e HSE45.

Parametro	**Interventi di manutenzione a guasto sugli elementi critici per la sicurezza**
Definizione	Interventi di manutenzione a guasto sugli elementi critici per la sicurezza. Ciascuna unità di business individua gli elementi cui riferire il parametro.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

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Parametro	**Verifiche periodiche di attrezzature PED (Pressure Equipment Directive)**
Definizione	Numero di verifiche periodiche (funzionamento e integrità) previste dalla legge alle attrezzature a pressione (recipienti, forni, generatori di vapore, accessori di sicurezza, tubazioni), presente nel piano annuale (scadenziario) di verifiche (messa in servizio, taratura, ispezione, controlli non distruttivi).
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Annuale.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

Parametro	**Certificazioni-verbali rilasciati per attrezzature PED da enti di controllo esterni**
Definizione	Verifiche certificate-verbalizzate da Enti di controllo esterni a seguito di avvenuta messa in servizio, taratura, ispezione, controllo non distruttivo sulle attrezzature.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Annuale.

Esempi e casi particolari	Un certificato può contenere più attrezzature: riportare il numero delle attrezzature certificate e non il singolo certificato.
Standard di controllo 231	St. 231 n. 64, 73, 74, 108 e 117.

Parametro	**Ditte appaltatrici potenzialmente auditabili su tematiche HSE**
Definizione	Numero totale di persone giuridiche che hanno un contratto di fornitura di beni e servizi/prestazioni specialistiche con l'unità di business e che hanno prestato la loro opera durante il periodo di reporting, potenzialmente auditabili su tematiche HSE durante la gestione contrattuale, secondo i criteri stabiliti nei Sistemi di Gestione HSE.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Esempi e casi particolari	L'indicatore fa riferimento a quei fornitori che erogano prodotti e servizi che impattano su aspetti HSE. Possono essere esclusi quei fornitori che prestano servizi intellettuali.
Standard di controllo 231	St. 231 n. 69, 114, 115.

Parametro	**Ditte appaltatrici auditate durante la gestione contrattuale**
Definizione	Numero di ditte appaltatrici che hanno subito almeno una verifica/audit secondo i criteri stabiliti nei Sistemi di Gestione HSE dell'unità di business durante la gestione contrattuale.

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Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Esempi e casi particolari	Nella nota di accompagnamento ai dati specificare se le verifiche sono state effettuate su tutti gli aspetti HSE o su elementi specifici.
Standard di controllo 231	St. 231 n. 69, 114, 115.

Parametro	**Ditte appaltatrici con feedback negativo rispetto agli aspetti HSE**
Definizione	Numero totale di ditte appaltatrici che hanno ricevuto feedback negativi a seguito di verifica/audit in merito alla gestione degli aspetti HSE durante la gestione contrattuale.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Esempi e casi particolari	Nella nota di accompagnamento ai dati specificare le cause della sospensione/revoca.
Standard di controllo 231	St. 231 n. 69, 114, 115.

Parametro	**Ore di formazione per i soggetti obbligati ai sensi del D. Lgs. 81/08**
Definizione	Ore di formazione fruite dai soggetti obbligati dipendenti dell'unità di business ex D. Lgs. 81/08 operanti nei siti localizzati in Italia. Le ore di formazione pianificate per i soggetti obbligati sono quelle individuate nei programmi annuali.

Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale. Annuale per l'indicatore "*Ore di formazione pianificate per i soggetti obbligati ai sensi del D. Lgs. 81/08*".
Metodologia di riferimento	Fonte: unità di business.
Standard di controllo 231	St. 231 n. 67.

Parametro	**Siti certificati (OHSAS 18001,ISO 14001, EMAS, ISO 50001, ISO 9001)**
Definizione	Numero totale di unità operative, di distretti/sedi e di società per le quali è stata rilevata almeno una delle certificazioni OHSAS 18001, ISO 14001, EMAS, ISO 50001 e ISO 9001 valida alla fine del periodo di reporting.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Standard di controllo 231	St. 231 n. 50.

Parametro	**Siti con Autorizzazione Integrata Ambientale (A.I.A.)**
Definizione	Siti che ricadono nell'ambito di applicazione della Direttiva IPPC (Integrated Pollution Prevention and Control) e per i quali è previsto il rilascio dell'Autorizzazione Integrata Ambientale, necessaria per poter esercitare le attività specificate nell'Allegato VIII alla parte seconda del D. Lgs. 152/06.

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Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Annuale.
Standard di controllo 231	St. 231 n. 50.

Parametro	**Rilievi da ispezioni periodiche A.I.A.**
Definizione	Numero di non conformità riscontrate durante le ispezioni periodiche eseguite dall'ente preposto (nazionale o regionale o provinciale) atte a verificare il rispetto delle prescrizioni riportate nel provvedimento autorizzativo di A.I.A.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.
Esempi e casi particolari	L'indicatore fa riferimento alle non conformità rilevate durante le verifiche ispettive svolte per la valutazione della conformità alle prescrizioni A.I.A., con riferimento ai diversi comparti ambientali: emissioni in atmosfera (ad es. controllo Sistemi di Monitoraggio in continuo emissioni, campionamento sui punti di emissioni), scarichi acque reflue industriali (ad es. ispezione atta a verificare, all'interno degli scarichi industriali, la presenza di sostanze pericolose elencate nelle tabelle 5 e 3/A dell'Allegato 5 alla parte terza del Codice dell'Ambiente), suolo-aree di stoccaggio (ispezioni sui contenitori, sui bacini di contenimento e sugli eventuali accessori al servizio dei depositi temporanei), rifiuti (ad es. ispezioni su tipologia e quantità di rifiuti prodotti, smaltiti e recuperati). Nella nota di accompagnamento ai dati fornire la descrizione delle non conformità rilevate.

Standard di controllo 231	St. 231 n. 50.

Parametro	**Punti di scarico di acque reflue industriali autorizzati**
Definizione	Numero totale di punti di scarico autorizzati delle acque reflue industriali. Sono esclusi gli scarichi di acque di raffreddamento e civili. I punti di scarico da considerare sono quelli gestiti direttamente dalla LD e per i quali è garantito il rispetto dei limiti e delle prescrizioni, anche se afferiscono a reti di consorzi multi societari o a fognature di altre società.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Annuale.
Standard di controllo 231	St. 231 n. 76, 104, 105 e 106.

Parametro	**Campionamenti-analisi su scarichi di acque reflue industriali**
Definizione	Numero totale di campionamenti-analisi su scarichi di acque reflue industriali effettuati per la verifica quali-quantitativa degli scarichi, ai fini di: • accertamento del rispetto dei valori limite di emissione consentiti dalla Legge, nonché dalle prescrizioni contenute nelle autorizzazioni rilasciate dall'autorità competente; • accertamento di routine e/o di verifica del corretto funzionamento del proprio ciclo produttivo. I "*Campionamenti-analisi su scarichi di acque reflue industriali programmati*" sono quelli individuati nel piano annuale.
Unità di misura	Numero.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Semestrale.

	Annuale per l'indicatore "Campionamenti-analisi su scarichi di acque reflue industriali programmati".
Standard di controllo 231	St. 231 n. 76, 104, 105 e 106.

Parametro	**Rifiuti gestiti tramite intermediazione**
Definizione	Quantità totale di rifiuti (pericolosi e non pericolosi da attività produttive e da bonifica) gestiti attraverso attività di intermediazione.
Unità di misura	Tonnellate.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Annuale.
Esempi e casi particolari	Nella nota di accompagnamento ai dati specificare se il servizio di intermediazione è realizzato da syndial e in quale percentuale.
Standard di controllo 231	St. 231 n. 76, 110, e 112.

Parametro	**Rifiuti pericolosi conferiti all'estero come destino definitivo**
Definizione	Quantità totale di rifiuti pericolosi (da attività produttive e da bonifica) gestiti attraverso spedizioni transfrontaliere finalizzate al recupero o smaltimento di rifiuti, con riferimento al periodo di reporting.
Unità di misura	Tonnellate.
Tipologia di rilevazione	Misura.
Periodicità di rilevazione	Annuale.
Standard di controllo 231	St. 231 n. 113.

Parametro	Punti di emissione in atmosfera autorizzati
Definizione	Numero totale di punti di emissione in atmosfera autorizzati.
Unità di misura	Numero.
Tipologia di rilevazione	Misurata.
Periodicità di rilevazione	Annuale.
Standard di controllo 231	St. 231 n. 76,104, 105 e 106

Parametro	Punti di emissione con analizzatore in continuo (SME)
Definizione	Numero totale di punti di emissione presenti in ciascun sito dotati di analizzatori per il monitoraggio in continuo delle emissioni in atmosfera (SME).
Unità di misura	Numero.
Tipologia di rilevazione	Misurata.
Periodicità di rilevazione	Annuale.
Esempi e casi particolari	Vengono rendicontati tutti i punti di emissione dotati di sistemi di monitoraggio delle emissioni (di caratteristiche tecniche adeguate, secondo quanto previsto dalle norme tecniche e dalla normativa in materia) che consentono di misurare in continuo e quindi di registrare i valori di concentrazione degli inquinanti soggetti a limiti in uscita dal camino, che sono disperdersi in atmosfera e di altri parametri caratteristici dei fumi (temperatura, pressione, umidità, ecc.).
Standard di controllo 231	St. 231 n. 76,104, 105 e 106

Parametro	Centraline di monitoraggio della qualità dell'aria (QA) autogestite

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Definizione	Numero totale di centraline di monitoraggio della qualità dell'aria autogestite, installate per monitorare la qualità dell'aria e per verificare i superamenti dei limiti per gli inquinanti emessi durante l'esercizio dell'impianto.
Unità di misura	Numero.
Tipologia di rilevazione	Misurata.
Periodicità di rilevazione	Annuale.
Standard di controllo 231	St. 231 n. 76,104, 105 e 106

Parametro	Superamenti dei limiti di QA registrati presso centraline di monitoraggio autogestite
Definizione	Numero di superamenti registrati per ciascun inquinante analizzato, in riferimento ai valori dei limiti di qualità dell'aria locali, e rilevati presso le centraline di monitoraggio autogestite, con riferimento a quanto previsto dalla normativa vigente (ai sensi del comma 5 dell'art.279 del D. Lgs. 152/2006) nel corso dell'esercizio degli impianti di ciascun sito.
Unità di misura	Numero.
Tipologia di rilevazione	Misurata.
Periodicità di rilevazione	Semestrale.
Esempi e casi particolari	Nella nota di accompagnamento ai dati fornire dettagli in merito a ciascun superamento rilevato (durata, possibili cause, inquinanti per i quali si sono verificati superamenti con riferimento ai valori tabellari indicati nella normativa di riferimento).
Standard di controllo 231	St. 231 n. 76,104, 105 e 106

Parametro	Asset aziendali contenenti sostanze ozono lesive per i quali è stata effettuata la sostituzione
Definizione	Numero totale di asset aziendali contenenti sostanze lesive dell'ozono stratosferico e dannose per l'ambiente, per i quali si è provveduto alla cessazione dell'utilizzo, alla dismissione e quindi alla sostituzione nel periodo di reporting. Gli "*Asset aziendali contenenti sostanze ozono lesive per i quali è programmata la sostituzione*" sono quelli rientranti nel programma di sostituzione definito ad inizio anno.
Unità di misura	Numero.
Tipologia di rilevazione	Misurata.
Periodicità di rilevazione	Semestrale. Annuale per l'indicatore "Asset aziendali contenenti sostanze ozono lesive per i quali è programmata la sostituzione".
Esempi e casi particolari	Considerare tutti gli asset contenenti le sostanze lesive di cui alle tabelle A e B allegate alla Legge n. 549/1993.
Standard di controllo 231	St. 231 n. 72 e 107

Parametro	Siti presso aree protette e sensibili
Definizione	Numero totale di siti ubicati all'interno o in prossimità di aree protette e sensibili (in riferimento all'Art.4 92/43/CE e 2009/147/CE).
Unità di misura	Numero.
Tipologia di rilevazione	Misurata o stimata.
Periodicità di rilevazione	Annuale.
Esempi e casi particolari	Sono da considerare aree protette o sensibili quelle soggette a qualsiasi forma di tutela ambientale (ad esempio parchi, oasi, Natura 2000).
Standard di controllo 231	St. 231 n. 103 e 104.

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ISTRUZIONI PER LA COMPLIAZIONE DEL FORM ODV

Il form ODV al momento viene pubblicato solo per le Linee Datoriali DICS, DIME e HR Business Partner e si trova nella sezione "Gestione Dati HSER".

La frequenza è semestrale.

Form OdV

APPLICAZIONE D.LGS. 81/08 (Report a OdV)	
ORGANIZZAZIONE DEL SISTEMA DI PREVENZIONE E PROTEZIONE	Totale
Servizi di prevenzione	n
RSPP	n
Addetti SPP	n
Addetti Prevenzione Incendi e emergenze	n
Emergenze	n
I Livello	n
II Livello	n
III Livello	n
Notifiche ai sensi dell'art. 242 del D.Lgs. 152/2006	n
Interventi di manutenzione programmata sugli elementi critici per la sicurezza pianificati (per l'anno intero)	n
Interventi di manutenzione programmata sugli elementi critici per la sicurezza realizzati (nel semestre)	n
Interventi di manutenzione a guasto sugli elementi critici per la sicurezza	n
Verifiche periodiche di attrezzature PED e ISPESL	n
Certificazioni-verbali rilasciati ad attrezzature PED e ISPESL da enti di controllo esterni	n
Ditte appaltatrici potenzialmente auditabili su tematiche HSE	n
Ditte appaltatrici auditate durante la gestione contrattuale	n
Ditte appaltatrici con feedback negativo rispetto agli aspetti HSE	n
Ore di formazione pianificate (per l'anno intero) per i soggetti obbligati ai sensi del D.lgs 81/08(*)	n
Ore di formazione erogate (nel semestre) ai soggetti obbligati ai sensi del D.lgs 81/08(*)	n
Numero di siti coperti da certificazione (ISO14001, ISO 9001, Emas, OHSAS, altre)	n
Siti con Autorizzazione Integrata Ambientale (A.I.A.)	n
Rilievi da ispezioni periodiche A.I.A.	n

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Verifiche di conformità normativa HS pianificate (per l'anno intero)	n
Verifiche di conformità normativa HS effettuate (nel semestre)	n
Verifiche di conformità normativa ambientale pianificate (per l'anno intero)	n
Verifiche di conformità normativa ambientale effettuate (nel semestre)	n
Verifiche di conformità normativa HSE pianificate (per l'anno intero)	n
Verifiche di conformità normativa HSE effettuate (nel semestre)	n
Punti di scarico di acque reflue industriali autorizzati	n
Campionamenti-analisi su scarichi di acque reflue industriali programmati (per l'anno intero)	n
Campionamenti-analisi su scarichi di acque reflue industriali effettuati (nel semestre)	n
Rifiuti gestiti tramite intermediazione	ton
Rifiuti pericolosi conferiti all'estero come destino definitivo	ton
Punti di emissione in atmosfera autorizzati	n
Punti di emissione con analizzatore in continuo (SME)	n
Centraline di monitoraggio della qualità dell'aria (QA) autogestite	n
Superamenti dei limiti di QA registrati presso centraline di monitoraggio autogestite	n
Asset aziendali contenenti sostanze ozono lesive per i quali è programmata la sostituzione (per l'anno intero)	n
Asset aziendali contenenti sostanze ozono lesive per i quali è stata effettuata la sostituzione (nel semestre)	n
Siti presso aree protette e sensibili	n
COMMENTI GENERALI (es. modifiche significative rispetto al periodo precedente)	

Attachment F - Example of Watch Structure Data

Following is an example of HSE data set to collect for the periodical reporting (on six monthly base) to eni's Watch Structure. This attachment is only guide for each subsidiaries to gather and report HSE indicator for own Watch Structure.

DEFINITIONS

Parameter	Personnel employed in the Prevention and Protection Service
Definition	The total number of prevention and protection service personnel in the business unit at the end of the reporting period. The Prevention and Protection Service (hereinafter SPP), is defined as the group of people, systems and equipment, either internal or external to the company, whose purpose is the prevention of and protection of workers from occupational risks.
Formula	No. H&S Manager + No. Safety personnel
Unit of measure	Number.
Type of survey	Calculation.
Regularity of survey	Every six months.

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	Prevention and Protection Service Managers
Definition	The total number of *H&S Manager* in the business unit at the end of the reporting period. The *H&S Manager* are defined (in accordance with Art. 2, paragraph 1, letter f of Italian Legislative Decree 81/08) as those persons in possession of the professional skills and requirements stipulated in Article 32 of Italian Legislative Decree 81/08, appointed by the employer, to whom they answer, to coordinate the service for the prevention of and protection against risk (see the definition "*Personnel employed in the Prevention and Protection Service").*
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.
Reference methodology	The information to be reported refers to the number of *H&S Manager* appointments in the business unit and not the actual number of people covering this role in the business unit.
Examples and case studies	If the same person covers the role of *H&S Manager* in two operational units of the business unit then the number to be reported is 2 and not 1.

Parameter	Prevention and Protection Service Personnel
Definition	The total number of Prevention and Protection Service Personnel (Safety Personnel) in the business unit at the end of the reporting period. Prevention and Protection Service Personnel are defined (in accordance with Art. 2, paragraph 1, letter g of Italian Legislative Decree 81/08) as those persons in possession of the professional skills and requirements stipulated in Article 32 of Italian Legislative Decree 81/08, who are part of the Prevention and Protection Service (see the definition "*Personnel employed in the Prevention and Protection*

	Service").
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.
Reference methodology	The information to be reported refers to the number of Safety personnel appointments in the business unit and not the actual number of people covering this role in the business unit.
Examples and case studies	If the same person covers the role of safety personnel in two operational units of the business unit then the number to be reported is 2 and not 1.

Parameter	**Fire prevention and emergency personnel**
Definition	The total number of fire prevention and emergency personnel in the business unit at the end of the reporting period. Fire prevention and emergency personnel are those workers designated by the employer (in accordance with Art. 18, paragraph 1, letter b) of Italian Legislative Decree 81/08), to implement fire prevention and fire fighting measures, evacuating the work place in the event of serious and immediate danger, mounting rescue operations and generally managing the emergency.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	**Emergencies**
Definition	The total number of level 1, 2 and 3 emergencies, defined in accordance with the Annex "Emergency Plan" of the HSE MSG, that have occurred during the reporting period.
Formula	No. of level 1 emergencies + no. of level 2 emergencies + No. of level 3 emergencies.
Unit of measure	Number.
Type of survey	Calculation.
Regularity of survey	Every six months.

Parameter	**Level 1 emergencies**
Definition	The level 1 emergencies, defined in accordance with the Annex "Emergency Plan" of the HSE MSG, that have occurred at the operational site/unit during the reporting period. Level 1 emergencies can be dealt with locally by the Division/Company using the personnel and equipment available on site.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.

Parameter	Level 2 emergencies
Definition	The level 2 emergencies, defined in accordance with the Annex "Emergency Plan" of the HSE MSG, that have occurred at the operational site/unit during the reporting period. Level 2 emergencies are managed with the assistance of the central functions of the Division/Company head office or the local authorities and administrations (e.g. the Fire Service, the Health Authority, etc.).
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.

Parameter	Level 3 emergencies
Definition	The level 3 emergencies, defined in accordance with the Annex "Emergency Plan" of the HSE MSG, that have occurred at the operational site/unit during the reporting period. Level 3 emergencies are managed with internal or external resources provided by other Divisions/Companies or by central government authorities and administrations.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	Scheduled maintenance on safety critical elements
Definition	Scheduled maintenance (maintenance carried out at scheduled intervals or based on defined criteria, aimed at reducing the probability of any fault or functional deterioration of the equipment - standard UNI 13306) on those safety critical elements carried out during the reporting period. The "*Scheduled maintenance on safety critical elements*" is shown in the maintenance plans.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months. Annually for the indicator "*Scheduled maintenance on safety critical elements*".

Parameter	Reactive maintenance on safety critical elements
Definition	The critical elements for safety (the parts that malfunction can cause or contribute to a significant or incidental event whose purpose is to prevent or limit the consequences of an accidental event significant) are selected from each site/company in accordance with the regulations and the minimum list defined at the business unit level.For the business units that have no operational activity shows a list useful to defining the minimum list: • emergency blocks system • power supply • control system • fire detection system • Fire protection system
Unit of measure	Number.

Type of survey	Measurement.
Regularity of survey	Every six months.

Parameter	**Periodic checks on PED equipment (Pressure Equipment Directive)**
Definition	The number of legally required periodic checks (on functioning and integrity) on pressure equipment (containers, ovens, steam turbines, safety accessories and tubing), included in the annual plan (schedule) of checks (commissioning, calibrating, inspections and non destructive tests).
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Annually.

Parameter	**Certificates/reports issued for PED equipment by external control bodies**
Definition	Checks on the certificates/reports issued by external control bodies following commissioning, calibration, inspections and non destructive tests on the equipment.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Annually.
Examples and case studies	A certificate can cover more than one piece of equipment: show the number of pieces of equipment certified and not the number of individual certificates.

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	**Contractors potentially subject to HSE audits**
Definition	The total number of legal persons that have a supply contract for goods and services/specialist services with the business unit and that have provided their products or services during the reporting period, potentially subject to HSE auditing during the contract period, in accordance with the established HSE Management System criteria.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.
Examples and case studies	The indicator refers to those suppliers that provide products and services that have an impact on HSE aspects. Suppliers of intellectual services may be excluded.

Parameter	**Contractors audited during the contract period**
Definition	The number of contractors that have been subject to at least one audit in accordance with the criteria established in the HSE Management Systems of the business unit during the contract period.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.
Examples and case studies	In the accompanying notes specify if the audit was carried out on all HSE aspects or only on specific elements.

Parameter	Contractors with negative feedback on HSE aspects
Definition	The total number of contractors that, following an audit, have received negative feedback on their management of HSE aspects during the contract period.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.
Examples and case studies	In the accompanying notes specify the cause of the suspension/revocation.

Parameter	Training hours for responsible parties under Italian Legislative Decree 81/08
Definition	The training hours taken up by the responsible parties employed by the business unit under Legislative Decree 81/08 operating at sites in Italy. The training hours scheduled for responsible parties are defined in the annual schedules.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months. Annually for the indicator "*Scheduled training hours for responsible parties under Italian Legislative Decree 81/08*".
Reference methodology	Source: Business Unit.

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	Certified sites (OHSAS 18001, ISO 14001, EMAS, ISO 50001, ISO 9001)
Definition	The total number of district/head office and company operational units holding a valid certificate in at least one of the standards (OHSAS 18001, ISO 14001, EMAS, ISO 50001 and ISO 9001) at the end of the reporting period.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.

Parameter	Sites with Integrated Environmental Authorization
Definition	Sites that fall within the scope of the IPPC (Integrated Pollution Prevention and Control) Directive, meaning that the issue of an Integrated Environmental Authorization is required in order to carry out the activities specified in Annex VIII of Section 2 of Italian Legislative Decree 152/06.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Annually.
	St. 231 no. 50.

Parameter	Results of periodic inspections in site with environmental authorizations
Definition	The number of nonconformities found during the periodic inspections carried out by the appointed body (national, regional or provincial) in order to check compliance with the provisions set forth in the A.I.A. authorization regulation.

Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months.
Examples and case studies	The indicator refers to the nonconformities found during the inspections carried out to check compliance with the A.I.A provisions, with reference to various environmental aspects: atmospheric emissions (e.g. checking continuous emissions monitoring systems, taking samples at the emission point sources), industrial wastewater discharge (e.g. inspections aimed at checking inside the industrial drainage pipes for the presence of the hazardous substances listed in tables 5 and 3/A in Annex 5 of section three of the Environmental Code), storage areas (inspections of containers, reservoirs and any ancillary [facilities/equipment] used for temporary storage), waste (e.g. inspections of the type and quantity of waste produced, disposed of and recycled).In the accompanying notes provide a description of the nonconformity detected.

Parameter	**Authorized industrial wastewater discharge points**
Definition	Total number of authorized industrial wastewater discharge points. Cooling water and water for domestic use are excluded. The discharge points to be considered are those managed directly by the LD and which are guaranteed to be within the legal limits, even if they latch onto multi-company consortia networks or to the drainage systems of other companies.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Annually.

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	**Sampling-analysis of industrial wastewater discharge**
Definition	The total number of sample-analyses carried out on industrial wastewater discharge in order to make a qualitative-quantitative assessment of the drainage pipes, for the purposes of: • assessing compliance with the emission limits permitted by law and with the provisions of the authorizations granted by the competent authorities; • routine assessment and/or checking of the correct functioning of the productive cycle. The "*Planned sampling-analyses of industrial wastewater discharge*" are defined in the annual schedule.
Unit of measure	Number.
Type of survey	Measurement.
Regularity of survey	Every six months. Annually for the indicator "Planned sampling-analyses of industrial wastewater discharge".

Parameter	**Waste managed by intermediation**
Definition	Total quantity of waste (hazardous and non-hazardous) managed through intermediation activities.
Unit of measure	Tonnes.
Type of survey	Measurement.
Regularity of survey	Annually.
Examples and case studies	In the accompanying notes specify whether the intermediation service is carried out by Syndial and in what percentage.

Parameter	Hazardous waste transferred definitively abroad
Definition	The total quantity of hazardous waste (from productive and remediation activities) managed by sending the waste abroad in order to recycle or dispose of it, with reference to the reporting period.
Unit of measure	Tonnes.
Type of survey	Measurement.
Regularity of survey	Annually.

Parameter	Authorized atmospheric emission point sources
Definition	The total number of authorized atmospheric emission point sources.
Unit of measure	Number.
Type of survey	Measured.
Regularity of survey	Annually.

Parameter	Point sources of continuous emissions with analyser
Definition	The total number of emission point sources in each site that are equipped with analysers for continuous emissions monitoring
Unit of measure	Number.
Type of survey	Measured.
Regularity of survey	Annually.
Examples and case studies	All the emission point sources equipped with continuous emissions monitoring systems that are technically adequate and compliant with the technical regulations and other relevant legislation are taken into account. (temperature, pressure, humidity, etc.).

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

Parameter	Self-managed air quality (AQ) monitoring control units
Definition	The total number of self-managed air quality monitoring control units installed to monitor the air quality and to check whether emissions produced by plant operations exceed the legal limits.
Unit of measure	Number.
Type of survey	Measured.
Regularity of survey	Annually.

Parameter	Exceedance of AQ limits recorded by the self-managed monitoring control units
Definition	The number of times the local air quality limit is exceeded, for each pollutant analysed, during the course of plant operations at each site. The exceedance is recorded by the self-managed monitoring control units, with reference to the provisions of the legislation in force (under paragraph 5 of Article 279, Italian Legislative Decree 152/2006)
Unit of measure	Number.
Type of survey	Measured.
Regularity of survey	Every six months.
Examples and case studies	In the accompanying notes give details regarding the exceedance recorded (duration, possible causes and the pollutant that has registered excessive values compared with those indicated in the applicable legislation).

Parameter	Company assets containing ozone-depleting substances which have been replaced
Definition	The total number of company assets containing ozone-depleting substances that are harmful to the environment, which are consequently no longer used, have been decommissioned and replaced during the reporting period. The "*Company assets containing ozone-depleting substances which are scheduled to be replaced*" are those included in the replacement programme at the start of the year.
Unit of measure	Number.
Type of survey	Measured.
Regularity of survey	Every six months. Annually for the indicator "Company assets containing ozone-depleting substances which are scheduled to be replaced".

Parameter	Sites in protected and sensitive areas
Definition	The total number of sites located in or close to protected and sensitive areas (with reference to Art. 4 92/43/EC and 2009/147/EC).
Unit of measure	Number.
Type of survey	Measured or estimated.
Regularity of survey	Annually.
Examples and case studies	Areas to be considered as protected or sensitive are those areas subject to any type of environmental protection (e.g. parks, oases, and the Nature 2000 network).

Attachment F – Watch Structure HSE Data Set

Watch Structure Data Set

EXAMPLE OF WATCH STRUCTURE FORM

Watch Structure Form	
ORGANIZATION OF PREVENTION AND PROTECTION SYSTEM	Total
Number Prevention Service	N°
H&S manager	N°
Safety Personnel	N°
Fire prevention and emergency personnel	N°
Emergencies	N°
Scheduled maintenance on safety critical elements (for the entire year)	N°
Scheduled maintenance on safety critical elements realized (for the 6 month period)	N°
Reactive maintenance on safety critical elements	N°
Periodic checks on Pressure Equipment	N°
certificate-registration issued for pressure equipment by external control bodies	N°
Contractors potentially subject to HSE audits	N°
Contractors audited during the contract period	N°
Contractors with negative feedback on HSE aspects	N°
Training hours (for the entire year) for responsible parties under Legislative	N°
Training hours (in the 6 month period) provided for responsible parties under Legislative Safety	N°
Number of sites certified to ISO14001, ISO 9001, Emas, OHSAS or other standards	N°
Sites falling within in Integrated pollution prevention and control (IPPC)	N°

Results of periodic inspections on thi sites	N°
Authorized industrial wastewater discharge points	N°
Scheduled sampling-analyses of industrial wastewater discharge (for the entire year)	N°
Sampling-analysis of industrial wastewater discharge carried out (in the 6 month period)	N°
Waste managed by intermediation	ton
Hazardous waste transferred definitively abroad	ton
Authorized atmospheric emission point sources	N°
Continuous monitoring system of emissions sources	N°
Self-managed air quality (AQ) monitoring control units	N°
Exceedance of AQ limits recorded by the self-managed monitoring control units	N°
Company assets containing ozone-depleting substances which are scheduled to be replaced (for the entire year)	N°
Company assets containing ozone-depleting substances which have been replaced (in the 6 month period)	N°
Sites in protected and sensitive areas	N°

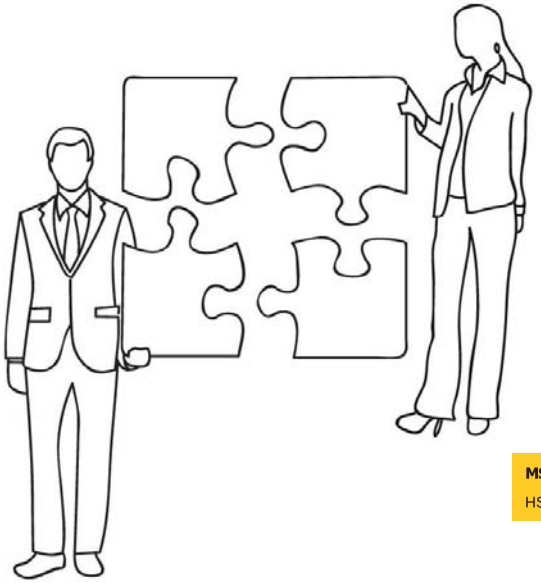
GENERAL COMMENTS (e.g. significant changes compared with the previous period)

Annex B4

Eni Incident Notification and Reporting

Procedure

Incident notification, investigation and reporting



MSG OF REFERENCE:
HSE

TITLE:		
Incident notification, investigation and reporting		
NOTES:		
This document is part of the HSE Integrated Management System of Eni Myanmar.		
ISSUE DATE:	**START DATE:**	
November 2016	November 2016	
PREPARED BY:	**VERIFIED BY:**	**APPROVED BY:**
Khant Thaw Htoo **HSE Engineer** Aung Phone Myat **HSE Specialist**	Laura Consalvi **HSE Manager**	Stefano Carbonara **Managing Director**

pro HSE 007 2016 Eni Myanmar r01

1. Objectives

The primary scope of the procedure is to define operating modalities and associated responsibilities for the effective and methodical investigations conducted for all incidents, accidents and near-misses associated with Eni Myanmar (hereinafter referred to as “Eni Myanmar” or “the Company”) activities (including contractors and subcontractors) that did, or could, result in harm to people and/or damage to the environment, company reputation, asset (loss), or third parties.

The results of the process of analysis of accidents, incidents and near-misses contribute to supply reviews/integrations to the HSE management system adopted, including the risk assessment process.

The procedure defines operating modalities of the following:

- detection, recording, classification and investigation and analysis of accidents, incidents and near-misses (using dedicated software tools, INDACO);
- notification and reporting to the appropriate and/or competent authorities, Eni Upstream and in case of significant cross-Eni corporate event.;
- implementing appropriate improvement actions and lessons learned to prevent the recurrence of similar events and spread them within Eni Myanmar (including contractors/subcontractors);
- monitoring the events occurred and follow-up of the improvement actions undertaken, verifying their effectiveness.

2. Field of application

The present procedure is applicable to the "Incident notification, investigation and reporting process" carried out by Eni Myanmar.

The procedure is applicable to all Eni Myanmar sites, projects and operations and involves the whole Company structure, including contractors and subcontractors, that work within Eni Myanmar sites or in transit to or from such sites in company mandated transport.

The event is considered work-related if the work environment caused or contributed to the resulting condition or if it significantly aggravated a pre-existing injury, unless one of the following exceptions applies in its entirety:

- occurs when an employee or contractor is present in the work environment as a member of the general public (in case of a fatality, it is included in the 3rd party statistics);
- results from voluntary participation (also if the activity is Eni sponsored) in a wellness program or in a medical, fitness or recreational activity (e.g. blood donation, physical examination, flu vaccination, exercise class, racquetball, baseball);
- involves signs or symptoms that arise at work but result solely from a non work-related event or exposure;
- is solely the result of doing personal tasks (e.g. personnel grooming, self medication) for a non work-related condition or is intentionally self-inflicted;
- occurs during a commute from the home to the place of work unless it is company-mandated transport;
- is due to exceptional events (e.g. landslides, earthquakes) outside Eni Myanmar operational control.

2. Field of application

Incident notification, investigation and reporting

The procedure is also applicable for all work performed by contractor/subcontractor personnel under the following contractual modes 1 and 2:

- *Mode 1:* The contractor/subcontractor provides people, processes and tools for the execution of the contract under the supervision, instructions and HSE IMS of Eni Myanmar. The contractor has a management system to provide assurance that the personnel for whom they are responsible are qualified and fit for the work and that the processes, tools, materials and equipment they provide are properly maintained and suitable for the contract.
- *Mode 2:* The contractor/subcontractor executes all aspects of the contract under their own HSE IMS, providing the necessary instructions and supervision and verifying the proper functioning of their HSE IMS. Eni Myanmar is responsible for verifying the overall effectiveness of the HSE management controls put in place by the contractor, including its interface with subcontractors, and assuring that both the Eni Myanmar's and the contractor's HSE IMS are compatible. It includes also the case of contractor/subcontractor manufacturing yards in which contractors are working exclusively for Eni Myanmar and the Company is responsible for HSE supervision.

3. References

3.1 Internal References

- Code of Ethics, available on website Myeni;
- Model 231, available on website Myeni;
- Eni spa and Eni Myanmar Policies
- Eni spa HSE Management System Guideline and related annexes in particular annex S-B, "Investigation (accidents and near misses)" and appendices.
- opi sg hse 001 Upstream - HSE Risk Management and Reporting
- opi sg hse 003 Upstream r02 - HSE Reporting
- opi sg hse 004 Upstream r01 - Incident Notification, Investigation and Reporting and attachments
- opi hse 001 Eni spa "Instructions for managing incidents using the Incident Database System (INDACO)"
- pro HSE 005 2015 Eni Myanmar r00 – HSE Risk management and Risk Reporting

3.2 External References

- ISO 14001:2004 "Environmental Management System – Requirements with guidance for use"
- OHSAS 18001:2007 "Occupational Health and Safety Management System – Requirements"
- OGP: "Health & Safety incident reporting system users' guide, 2010 data" - Report No.433, November 2010;
- Myanmar regulation: "THE FACTORIES ACT ,1951"

To ensure correct application of this procedure, for each reference listed above any subsequent revisions, updates, or additions also apply.

4. Definitions and abbreviations

Accident: any unexpected event which causes damage to people (injury) and/or to the environment and/or to assets and/or to Eni Myanmar reputation. An accident may result in an emergency.

ALARP (As Low AS Reasonably Practicable): The point at which the effort to introduce further reduction measures become unreasonably disproportionate to the additional risk reduction that will be obtained, The concept of ALARP may be qualitative or quantitative and, where necessary, guidance notes issued by the Authorities for application should be adopted;

BPEO: Best Practicable Environmental Option;

Commuting Incident: occurs during transfer from the employees' place of residence (permanent or temporary, company-provided or personal) and normal place of work (including Company parking lot and access roads), by company-mandated transport; company-provided means that the Operating Company arranged and paid for transportation in its own vehicles/vehicles owned by a contractor, and company/contract employees are expected to use the transportation as a condition of their work assignment; company provided transport excludes commercial (public) transportation that the Company reimburses but does not arrange.

Contractor: Individual or organization performing work for the reporting Company, following verbal or written agreement. "Sub-Contractor" is synonymous with "Contractor".

Corrective Action: action(s) to eliminate the cause(s) of detected non-conformities or other undesirable situation in order to prevent recurrence.

Damage: any unexpected event upsetting the normal work process, which results indamage to Environment, Asset and reputation (land, air, water and sea);

Upstream: exploration & production division of eni;

Emergency: a specific kind of incident not limited to a restricted time and definite consequences, but originating a situation (scenario) with a protracted evolution in time, with the potential to develop into a sequences and stop the chain of events;

FAC: First Aid Case

Fatality: term to define a death as a result of an accident, regardless of the time intervening between the injury and the death. Fatalities are included when calculating the number of Lost Time Injuries (LTI) and the LTI Frequency Rate.

FGLLID: Factories and General Labour Law Inspection Department

HSE Integrated Management System (HSE IMS): part of the overall management system that enables the management of the HSE risks associated with the business of the organization. This includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the organization's HSE Policy.

Incident: work-related event(s) in which an injury or ill health (regardless of severity) or fatality occurred, or could have occurred (OHSAS 18001:2007); an accident or a near-miss according to their definitions.

INDACO: Incident Data Collector

Injury: any accident occurring during operations which causes physical damage or hurt to employees.

Lost Time Injury (LTI): a fatality or a lost workday case (LWDC) according to their definitions, .Permanent Total Disabilities are included in the calculation of the total number of Lost Time Injuries and LTI frequency Rate,

LWDC: Lost Workday Case

MTC: Medical Treatment Case

Near-Miss: abnormal event likely to affect operations and, in adverse circumstances, might have caused an incident. It is different from an accident as it does not produce any damage due to favorable and fortuitous circumstances or the mitigating action of technical and/or organizational protection systems.

Preventive Action: action(s) to eliminate the cause(s) of a potential non-conformity or other undesirable potential situation in order to prevent occurrence.

RWDC: Restricted Workday Case

5. Roles and Responsibilities

The ***Managing Director*** shall:

- evaluate and approve event severity level, in collaboration with the HSE Manager and the Line Manager;
- notify the Competent Authority based on the Myanmar Legislation;
- approve and appoint the Investigation Team, identified with the collaboration of the HSE Manager;
- approve the corrective/preventive action plan from the investigation process;
- Review with HSE Manager the completion status of recommended actions from investigation.
- ensure technical, organizational, professional and financial resources for the accomplishment of corrective/preventive actions.

The ***Line Manager*** shall:

- If necessary, immediately communicate a state of emergency to the MD according to the Company Emergency Response Plan and procedures;
- report to the HSE Manager any abnormal situation that has caused an accident or that may compromise the safety and health of personnel or the environment and assets (near-miss) and, if necessary, activate the Eni Myanmar emergency procedures;
- cooperate with the HSE Manager for the classification and evaluation of the event;
- cooperate with the HSE Manager to complete notification reports (including notification report to the Authority as per the relevant legislation);
- participate, when required, in the investigation process;
- ensure the implementation of the corrective/preventive actions from the investigation process.
- Comply with the reporting requirements of local legislation.

The ***HSE Manager*** shall:

- collect information/data necessary to fill the incident notification report and classify the event as accident, incident or near-miss, with the support of the Line Manager;

- Complete the necessary paperwork before forwarding any report to the Authority as per the relevant legislation (Initial notification report may be used for this purpose);
- record the incident event in INDACO within the fixed deadline and monitor its follow-up;
- propose to the Managing Director the composition of an Investigation Team, taking into account the seriousness of the event;
- support the Investigation Team in issuing the Incident Investigation Report and record it in INDACO;
- analyze corrective/preventive actions recorded in the Incident Investigation Report and submit a dedicated action plan to the Managing Director;
- follow the implementation of corrective/preventive actions;
- maintain records of incidents, accidents and near-misses to meet the reporting requirements of founders and local legislation;
- use outputs of incident as learning experience and communicate lessons learnt to Eni Myanmar organization and to contractors;
- process the safety statistics summary;

The ***HR Manager or HR Administrator*** shall:

- Liaise with HSE Department for MEDEVAC arrangements;
- Participate when required in Investigation and impletement defined recommended actions;
- Comply with the reporting requirements of local legislation.

The ***Investigation Team*** shall:

- ensure that the data and information of the incident is collected;
- guarantee a clear and concise Incident Investigation Report based on logical deductions to identify direct and root causes;
- ensure that corrective and preventive actions for each direct and root cause are clearly identified;
- communicate the Incident Investigation Report to the HSE Manager, so that it is recorded in INDACO.

Incident notification, investigation and reporting

The ***Employee*** shall:

- report to their Line Manager any abnormal situation that has caused an accident or that may compromise the safety and health of personnel or the environment and asset (near-miss);
- if necessary activate Eni Myanmar emergency response plan

6. Process description

The process of incident, investigation and analysis is fundamental for the prevention of accidents and near-misses and to identify opportunities for improvement and to enhance sensitivity on issues of health and safety at work and on the environment.

The process of incident investigation provides a mechanism for Eni Myanamr to continually improve its HSE management system and to improve its HSE performance.

The process is divided into the following steps:

- "Incident notification": classification and evaluation of the gravity of the event, notification to Eni Upstream and to Eni corporate and if necessary, to the appropriate authorities and/or the competent authorities;
- "Incident Investigation" with the issuing of an Incident Investigation Report and action plan with improvement and preventative actions;
- "Follow-up" of the action plan and management of lessons learned.

6.1 Incident Notification

Each employee having detected during the normal working hours an abnormal situation that has caused an accident or that may compromise the safety and health of personnel or the environment and assets (near-miss), is required to report it to his/her Supervisor or the Line Manager who has the responsibility to inform the HSE Manager and the Managing Director. At the same time the detector (whether directly concerned, or the person who found the event/incident) activates Eni Myanmar emergency response plan if appropriate.

The HSE Manager shall collect all information received by the Line Manager and all personnel involved in the event (including contractors and/or subcontractors) and record the events in INDACO (according to opi hse 001 Eni spa "Instructions for managing incidents using the Incident Database System - INDACO") for subsequent investigation and root cause analysis.
All reported events are documented in a report by HSE Department and recorded by HSE Department in INDACO for subsequent investigation and root cause analysis, collecting all information needed by the department involved in the events.

All incidents, accidents and near-misses occurred to employees or contractors personnel, the environment and the assets shall be reported to the MD.

This event must be reported to the HSE Manager which provides to its corporate registration in the registry Accidents and notify the authorities and competent bodies in accordance with local regulations.

The Managing Director notifies the Competent Authority, if applicable in accordance with local regulations.

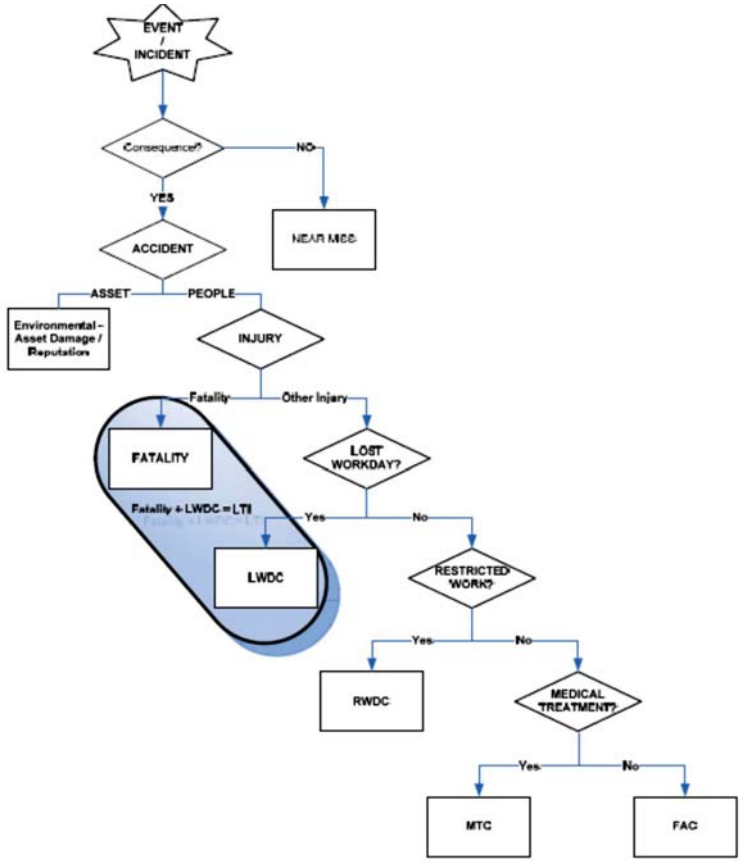
The event/incident is classified, according to the following chart, as:

- *Near-Miss*: An unplanned or uncontrolled event or chain of events that has not resulted in a recordable injury, illness or physical damage or environmental damage but had the potential to do so in other circumstances.
- *Accident*: An unplanned, unforseen, and therefore unwanted or undesired event that may or may not result in physical harm and/or property damage;

any unplanned event that interrupts or interferes with the orderly progress of a production activity or process.

If the accident causes damage to people (injury), it is classified as:

- *Fatality*: term to define a death as a result of an accident, regardless of the time intervening between the injury and the death. Fatalities are included when calculating the number of Lost Time Injuries (LTI) and the LTI Frequency Rate.
- *Lost Workday Case (LWDC)*: injury which renders the injured person temporarily unable to perform any regular job or restricted work on any day/shift after the day on which the injury occurred (in this case "any day" includes rest day, weekend and holiday).The day of occurrence is not accounted when calculating Lost Workdays. LWDC and Fatalities are LTIs;
- *Restricted Workday Case (RWDC)*: any work-related injury not resulting in days away from work but in a person being unfit for full performance of his/her regular job on any day after the occupational injury. Work performed may be an assignment to a temporary job, part-time work at a regular job or full-time in the regular job but not performing all the full range of usual duties required by the job.
- *Medical Treatment Case (MTC)*: any work-related injury (e.g. infected wounds, application of stitches, embedded foreign bodies in the eyes, second and third degree burns etc.) that involves neither lost workdays nor restricted workdays but which requires repeated treatment by, or under the specific order of a physician or could be considered as being in the area of a physician. Medical Treatment does not include First Aid even if this provided by a physician or registered professional personnel.
- *First Aid Case (FAC)*: any minor work-related injury that requires one time treatment that does not require medical care by a physician (i.e. scratches, cuts, burns, splinters, not embedded foreign bodies in the eyes etc.) and its eventual subsequent visits. Only work related FACs shall be reported;



The event is also evaluated to define its severity level using only consequence data in case of a real event and potential consequence and annual frequency data for the potential event (see matrixes in **Appendix A**). In case of more consequences (real or potential) the major severity level is selected.

Investigation levels are classified based on the following list, from the least to the most critical:

- Investigation level A: green area
- Investigation level B: yellow area
- Investigation level C: red area

Any accident classified as an accident of 2nd to 5th level severity (significant accident and LTIs) is reported at its occurrence, within ***24 hours***, to the HSE Upstream function and to the Geographic Area recording it in INDACO with at least compulsory information in the "Facts" and "Classification" screen. After initial notification, causes are identified and reported in INDACO in the "Causes" screen within ***3 days***.

Furthermore, any accident classified as of 4th and 5th severity level is reported at its occurrence, within ***24 hours***, to Eni corporate ticking "*inform Eni corporate*" in the INDACO sheet.

The Submission of notice of certain accidents (death and/or bodily injury etc…) shall be submitted to the **FGLLID Factories and General Labour Law Inspection Department)** under **The Ministry of Labour, Immigration and Population.** Where in any an accident occurs which causes death, or which causes any bodily injury by reason of which the person injured is prevented from working for a period of forty-eight (48) hours or more immediately following the accident, or which is of such nature as may be prescribed in this behalf, the manager of the company shall submit notice thereof to such authorities, and in such from and within such time as may be prescribed.

6. Process description

Incident notification, investigation and reporting

6.2 Incident Investigation

All incidental events reported and recorded in INDACO are subject to immediate corrective action, managed by the HSE Manager with the support of the competent units, to resolve/mitigate the consequences.

The Managing Director activates the incident investigation process in order to:

- identify the direct contributing and root cause/s of the event;
- prescribe and implement the actions to prevent recurrence of similar event;
- ensure that legal and Eni Myanmar requirements on incident reporting are met.

The Managing Director, with the support of the HSE Manager, appoints for each incident an Investigation Team with a Team Leader, nominated as per the following level of investigation (see Appendix A):

- **Level A** (1st and 2rd severity level accident): team composed by Eni Myanmar personnel at the site where the incident occurred;
- **Level B** (3rd severity level accident): team composed by Eni Myanmar personnel at the site where the incident occurred and/or personnel from other Eni Myanmar sites and/or the Upstream division;
- **Level C** (4th and 5th severity level accident) team composed by Eni Myanmar personnel at the site where the incident occurred and/or personnel from other Eni Myanmar sites and/or the Upstream division and/or technical experts, also external.
  In this case, one component of the Investigation Team is trained to conduct a Root Cause Analysis. The root causes are the most basic causes (e.g. specific reasons why an incident occurred that enable recommendation to be made) and underlying issues that can reasonably be identified, that the management has a control to fix, and for which effective corrective actions for preventing recurrence can be generated.

The following table provides an example of the three investigation levels with the identified investigation team and methodology.

Level	Team Leader (TL)	Deputy TL**	Team Members	Methodology
A	Site Manager	Site Superintend	Technical Dept (HSE, Drilling, Production, Construction, Exploration, ...)	Root Cause Analysis
B	HSE Manager (Company)	Discipline Coordinator	"	Root Cause Analysis
C ***(real)***	Employer and/or SDSEQ/E&P*	Line Manager*** / SDSEQ/E&P	"	Root Cause Analysis with training certificate****
C ***(potential)***	Employer	Line Manager***	"	Root Cause Analysis with training certificate****

* Managers reporting to upstream Upstream structure.
** The Deputy Team Leader shall be appointed according to event severity and case by case by the Team Leader
*** Line Manager directly reporting to the Employer and responsible of the activities where the incident occurred (operation manager, exploration manager, technical manager ...)
**** At least one member of the team is suitably trained to conduct the investigation using Root Cause Analysis.

The Investigation Team shall ensure that:

- objectives are clear and include identification of direct and root causes of the event;
- the investigation methodology is identified;
- data and information of the incident is collected, including any documents which facilitate the understanding of the incident dynamics and of the causes

Incident notification, investigation and reporting

of the occurrence (e.g. co-workers statements, witnesses of the event, sketches of the incident location);

- the investigation report is clear, concise and contains factual evidence (possibly, a chronological list of events) and is based on logical deductions to identify direct and root causes (cause that, if corrected, would prevent recurrence of the event and of any other similar occurrences);
- lessons learned are reported;
- corrective and preventive actions for each direct and root cause are clearly identified with the indication of the responsible person for implementation of each action and deadline;
- the investigation report and dedicated "Action Plan" is completed, approved and recorded in INDACO ("Action" sheet) within 1 month from the date of occurrence.

The duties of the investigation team and the methodology used for the investigation are outlined in the "Incident Notification, Investigation and Reporting" professional operating instruction of the Eni Upstream (opi sg hse 004 ep).

The incident investigation process is recorded in the "Incident Investigation Report" (see **Attachment**) which:

- provides a method for recording essential facts about personnel injuries;
- organises the information gathered during the investigation in a structure which facilitates the understanding of the pattern of accident occurrence;
- indicates the areas, conditions or circumstances so that accident prevention measures taken are more effective.

6.3 *Follow-up*

Based on the conclusions of the investigation and related need for corrective/preventive actions, the HSE Manager shall follow up the actions identified in the "Action Plan" and record them in INDACO. Where applicable, the "Management of non-conformity, corrective and preventive actions" procedure shall be implemented.

If the corrective/preventive actions identify possible deficiencies in the HSE IMS, the HSE Manager shall activate the procedure for change management in order to verify that the proposed change does not result in an increase of risk and assesses any need for updating processes and documentation of the HSE IMS.

Within one month from the date of occurrence of the event, the case is closed in INDACO by the HSE Manager. If there are outstanding actions, the HSE Manager shall inform and update the HSE Upstream on the status, on a monthly basis: the case will be closed as soon as all actions are completed.

Based on the conclusions of the investigation process, the HSE Manager processes the safety statistics summary of the events recorded and provides the dissemination of lessons learned within Eni Myanmar organization (including contractor/subcontractor) with the purpose of enhancing the level of HSE awareness.

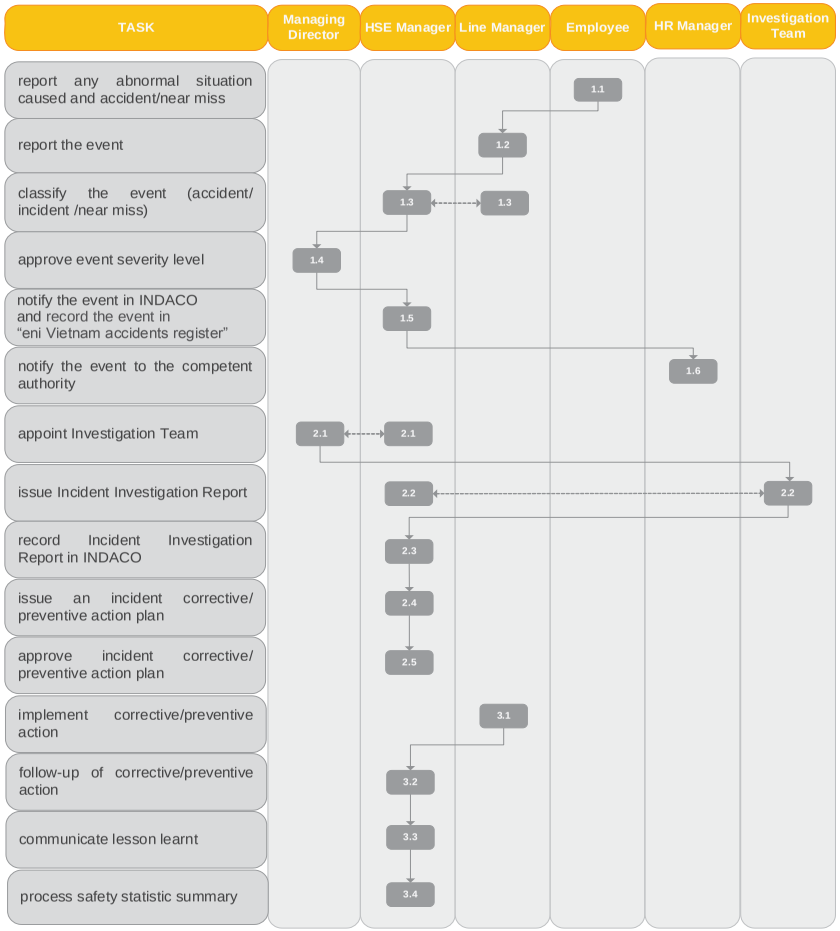
Generally, the following situations are included in the safety statistics:

- Eni Myanmar personnel who are working within the site boundaries of Eni Myanmar;
- Eni Myanmar personnel who are working in another site/company;
- contractors/subcontractors who are working within the Eni Myanmar site boundaries;
- contractors/subcontractors who are transporting equipment or goods on behalf of Eni Myanmar within the site boundaries;
- Eni Myanmar personnel, contractors/subcontractors during transport which has been provided by Eni Myanmar, inside or outside the site boundaries (except where it can be shown that a third party is completely in fault).

The following events are notified but will not be included in the statistical analysis (case is reported in INDACO and "Cancelled" status is selected):

- Eni Myanmar personnel, contractors/subcontractors who are travelling on company business in non-company-provided transport (e.g. Taxis, commercial aircraft, trains etc.);
- Eni Myanmar personnel, contractors/subcontractors who are making non work-related activities (e.g. gym, rest time) inside the site boundaries;
- commuting accident (from place of residence and workplace and vice-versa and during lunch time), unless it is in Eni Myanmar-mandated transport;
- off-duty accident (in-out procedure);
- accidents due to exceptional events (such as landslides, earthquakes etc.) outside Eni Myanmar operational control;
- if the event concerns an injury caused by Eni Myanmar to a third party (i.e. vehicle accident involving 3rd parties, run over a pedestrian etc.) during working hours (whether in or outside site boundaries).

6.4 *Process Flow Chart*



6. Process description

Incident notification, investigation and reporting

Responsible	Task	Description
Employee	1.1	Report to the Line Manager any abnormal situation that has caused an accident or that may compromise the safety and health of personnel or the environment and assets (near-miss). If necessary activate Eni Myanmar emergency response plan.
Line Manager	1.2	Report the event to the HSE Manager and the Managing Director.
HSE Manager	1.3	Collect information/data related to the event with the support of the Line Manager and everybody involved in the event (including contractors/subcontractors). Evaluate the event severity level and propose the classification to the Managing Director.
Managing Director	1.4	Evaluate and approve the event severity level.
HSE Manager	1.5	Fill in the "Incident Notification Report" (including notification report to the Authority: **Factories and General Labour Law Inspection Department (FGLLID)**) as per relevant legislation according to the Eni Myanmar Regulation. Report the event in INDACO within the fixed deadline.
Managing Director	1.6	Report the event to the Competent Authority according to the Myanmar legislation.
Managing Director	2.1	Approve and appoint the Investigation Team, identified with the collaboration of the HSE Manager and nominated as per identified level A, B, C.
Investigation Team	2.2	Issue the Incident Investigation Report (see Attachment A) in collaboration with the HSE Manager and send it to the Managing Director.
HSE Manager	2.3	Record the Incident Investigation Report in INDACO.
HSE Manager	2.4	Analyze and evaluate corrective/preventive actions recorded in the Investigation Report and submit a dedicated corrective/preventive action plan to the Managing Director.

Managing Director	2.5	Formally approve the corrective/preventive action plan.
Line Manager	3.1	Assure the implementation of the corrective/preventive actions.
HSE Manager	3.2	Make the follow-up of the corrective/preventive actions recording it in INDACO and activating, where necessary, the "Management of non-conformity, corrective and preventive actions" procedure. Within 1 month from the date of occurrence of the event, close the case in INDACO. If there are some outstanding actions, every month inform and update the HSE Upstream on the status of the actions. Close the case in INDACO as soon as all actions are completed.
HSE Manager	3.3	Communicate lessons learnt to Eni Myanmar organization and to contractors.
HSE Manager	3.4	Process the safety statistics summary.

7. Updating responsibilities

The HSE Manager is the custodian of this procedure. Therefore any suggested changes or queries about the applicability should be addressed to him.

The HSE Manager is also responsible for coordinating periodic reviews of this procedure, which will take place every two years.

8. Storage, record keeping and traceability

The functions involved in the process described herein arrange, each for their competence and also by the information systems used, the traceability of data and information and ensure the preservation and archiving of documentation produced, printed and/or electronic so as to enable the reconstruction of the various phases of the process itself.

9. List of Appendix

- Appendix A: Matrix consequences/investigation level

Matrix including real consequences/investigation level

APPENDIX 1: REAL CONSEQUENCES/INVESTIGATION LEVEL INTEGRATED MATRIX					INVESTIGATION
LEVEL OF SEVERITY	Incidents' Real consequences				
	people	environment	assets	image	LEVEL
1 Lowest	**Slight effect on health/ minor injury** •First aid. •On-site medical treatment. In both cases absence from work is limited to the day of the accident.	**Slight impact** •Temporary impact, limited to (<0,1 Ha) spaces, plant sections or specific areas on site/plant or in a non sensitive external area. •Affects temporarily only one environmental element. •No discomfort caused to the personnel/population (odours/noise/light pollution.) •No substantial measures need to be taken and the cost is negligible.	**Slight damage** •No operations/activities interruption. •Financial damages up to € 25,000*. *note: eBp and saipem will define their own applicable financial damage thresholds to add in this table.	**Slight impact** •Known by part of the local population, but did not cause concern. •No press coverage.	A
2 Limited	**Minor effect on health Minor injury** •Single LTI with < 30 calendar days of absence from work (first prognosis). •Reversible health affects. •Medical treatment (off-site).	**Minor impact** •Affects the whole site even if contained in a limited area (0,1 Ha ≤ S < 1 Ha) or in a non sensitive external area. •Affects temporarily several environmental elements, without potential permanently affects. •Discomfort to personnel/population (odours/noise/light pollution with reports coming from individuals within and outside of the site). •The event requires a coordinated response with limited commitment in term of resources and length (< 2 weeks).	**Minor damage** •Damage to the assets that do not require any repairs or replacement in order to return to normal operations. •Short period of reduced production (< 1 week). •Financial damages from € 25,000 to €100,000*. *note: same as above.	**Limited impact** •Local public concern. •Limited negative press coverage. •Slight local political attention.	A
3 Medium	**Greater effect on health Injury** •Multiple LTI. •Single LTI with ≥30 calendar days of absence from work (first prognosis). •Irreversible health effects •Partial permanent disability.	**Modest impact** •Affects not only the site but also the surrounding area (1 Ha ≤ S < 10 Ha). •Affects several environmental elements, even without persisting effects (e.g. groundwater). •Discomfort to personnel/population (odours/noise/light pollution with repeated reports coming within and outside of the site and from Authorities). •Requires a coordinated response with significant resource commitment to site/operating unit costs and in term of length duration (< 1 month) to get back to previous conditions.	**Local damage** •Repairs/replacement needed to restore equipment and plants. •Period of reduced production between 1 week and 1 month. •Production stopped/interrupted <1 week. •Financial damages from € 100,000 to €1,000,000*. *note: same as above.	**Considerable impact** •Regional public concern. •Local extensive negative press coverage. •Some attention from national press and/or local/regional political attention. •Local politicians and militant groups take a stand on the event.	B
4 High	**Total permanent disability** **Fatality** •Total, permanent disability. •Single fatality. •Single occupational disease. •Reserved prognosis.	**Significant impact** •Affects large areas (including sensitive ones) outside the site (10 Ha ≤ S < 100 Ha). •Affects the ecosystem (air, soil, groundwater, surface water, species and protected habitats) with potential persistant effects . •Discomfort to personnel/population (odours/noise/light pollution with repeated reports coming within and outside the site and from Authorities). •Requires massive, multidisciplinary and prolonged intervention (< 6 months) with significant financial commitment by the B.U.	**Major damage** •Important repairs/replacement are needed to restore equipment and plants. •Period of reduced production between 1 and 3 months. •Production halted or interrupted for a period between 1 week and 1 month. •Financial damages from € 1,000,000 to €10,000,000*. *note: same as above.	**National impact** •National public concern. •National extensive negative press coverage. •Adopted regional/national policies with potential impact and/or restriction on B.U./Company (operations, access to new areas, concessions, regulations, sanctions). •Potential loss of future regional business opportunities and/or national lasting damage to eni's image. •Militant groups mobilization	C (NOTIFY ENI)
5 Maximum	**Multiple fatalities** •Multiple fatalities. •Occupational disease affecting many people within the same work environment and/or the same type of activity.	**Extensive impact** •Affects a vast sensitive area (S ≥ 100 Ha). •Affects the ecosystem with loss of biodiversity due to a massive loss. •Widespread discomfort for the affected territory. •Requires a coordinated response with national/international authorities (P.C., VVFF, ASL, etc..) and long term intervention (> 1 year) with significant financial commitment by eni.	**Extensive damage** •Revamping needed in order to resume normal operations. •Period of reduced production (< 3 months). •Production stopped/interrupted <1 month. •Financial damages over € 10.000.000*. *note: same as above.	**International impact** •International public concern. •International extensive negative press coverage. •Adopted national/international policies with high potential impact and/or restriction on B.U./Company (operations, access to new areas, concessions, regulations, sanctions). •Potential loss of future national/international business opportunities and / or international lasting damage to eni's image.	C (NOTIFY ENI)

Appendix A

Incident notification, investigation and reporting

Matrix including potential consequences/frequency/investigation level

APPENDIX 2: TEMPLATE INCLUDING POTENTIAL CONSEQUENCES/FREQUENCY/INVESTIGATION LEVEL					Frequency of occurrence and level of investigation based on POTENTIAL consequences				
LEVEL OF SEVERITY	Incidents' Potential consequences				Reported by industry and for similar work	Occurred at least once in the BU	Occurred more than once in the BU or associated company	Occurred more than once a year in the BU or associated company	Occurred more than once a year in a location/plant/site
	people	environment	assets	image	1	2	3	4	5
1 Lowest	**Slight effect on health Minor injury** •First aid. •On-site medical treatment. In both cases absence from work is limited to the day of the accident.	**Slight impact** •Temporary impact, limited to (<0,1 Ha) spaces, plant sections or specific areas on site/plant or in a non sensitive external area. •Affects temporarily only one environmental element. •No discomfort to personnel/population (odours/noise/light pollution). •No substantial measures need to be taken and the cost is negligible.	**Slight damages** •No operations/activities interruption. •Financial damages up to € 25,000*. *note: eBp and saipem will define their own applicable financial damage thresholds to add in this table.	**Slight impact** •Known by part of the local population, but did not cause concern. •No press coverage.	A	A	A	A	A
2 Limited	**Minor effect on health Injury** •Single LTI with <30 calendar days of absence from work (first prognosis). •Reversible health affects. •Medical treatment (off-site).	**Minor impact** •Affects the whole site even if contained in a limited area (0,1 Ha≤ S <1 Ha) or in an external area. •Affects temporarily several environmental elements, without potential permanently effects. •Discomfort to personnel/population (odours/noise/light pollution with reports coming from individuals within and outside of the site). •The event requires a coordinated response with limited commitment in term of resources and in length (<2 weeks).	**Minor damages** •Damage to the assets that do not require any repairs or replacement in order to return to normal operations. •Short period of reduced production (< 1 week). •Financial damages from € 25,000 to €100,000*. *note: same as above.	**Limited impact** •Local public concern. •Limited negative press coverage. •Slight local political attention..	A	A	A	B	B
3 Medium	**Greater effect on health Injury** •Multiple LTI.. •Single LTI with ≥30 calendar days of absence from work (first prognosis). •Irreversible health affects. •Partial permanent disability.	**Modest impact** •Affects not only the site but also the surrounding area (1 Ha≤ S <10 Ha). •Impacts several environmental elements, even without persisting effects (e.g. groundwater). •Discomfort to personnel/population (odours/noise/light pollution with repeated reports coming within and outside of the site and from Authorities). •Requires a coordinated response with significant resource commitment to site/operating unit costs to duration (<1 month) to get back to previous conditions..	**Local damage** •Repairs/replacement needed to restore equipment and plants. •Period of reduced production between 1 week and 1 month. •Production stopped/interrupted <1 week. •Financial damages from € 100,000 to €1,000,000*. *note: same as above.	**Considerable impact** •Regional public concern. •Local extensive negative press coverage. •Some attention from national press and/or local/regional political attention. •Local politicians and militant groups take a stand on the event.	A	A	B	B	C (NOTIFY ENI)
4 High	**Total permanent disability** **Fatality** •Total permanent disability. •Single fatality. •Single occupational disease. •Reserved prognosis.	**Significant impact** • Affects large areas (including sensitive ones) outside of the site (10 Ha≤ S <100 Ha). •Impacts the ecosystem (air, soil, groundwater, surface water, species and protected habitats) with effects that may persist . •Discomfort to personnel/population (odours/noise/light pollution with repeated reports coming within and outside of the site and from Authorities). •Requires massive, multidisciplinary and prolonged intervention (<6 months) with significant financial commitment by the B.U.	**Major damage** •Important repairs/replacement are needed to restore equipment and plants. •Period of reduced production between 1 and 3 months. •Production halted or interrupted for a period of 1 week to 1 month. •Financial damages from € 1,000,000 to €10,000,000*. *note: same as above.	**National impact** •National public concern. •National extensive negative press coverage. •Adopted regional/national policies with potential impact and/or restriction on B.U./Company (operations, access to new areas, concessions, regulations, sanctions). •Potential loss of future regional business opportunities and/or national lasting damage to eni's image. •Militant groups mobilization.	A	B	B	C (NOTIFY ENI)	C (NOTIFY ENI)
5 Maximum	**Multiple fatalities** •Multiple fatalities. •Occupational disease affecting many people within the same work environment and / or the same type of activity.	**Extensive impact** •Impacts a vast sensitive area (S ≥100 Ha). •Impacts the ecosystem with loss of biodiversity after a massive loss. •Widespread discomfort for the affected territory. •Requires a coordinated response with national and international authorities (P.C., VVFF, ASL, etc..) and long term intervention (>1 year) with significant financial commitment by eni.	**Extensive damage** •Revamping needed in order to resume normal operations. •Period of reduced production (<3 months). •Production stopped/interrupted <1 month. •Financial damages over € 10.000.000*. *note: same as above.	**International impact** •International public concern. •International extensive negative press coverage. •National/International adopted policies with high potential impact on B.U./Company (operations, access to new areas, concessions, regulations, sanctions). •Potential loss of future national/international business opportunities and/ or international lasting damage to eni's image.	B	B	C (NOTIFY ENI)	C (NOTIFY ENI)	C (NOTIFY ENI)

10. List of Attachment

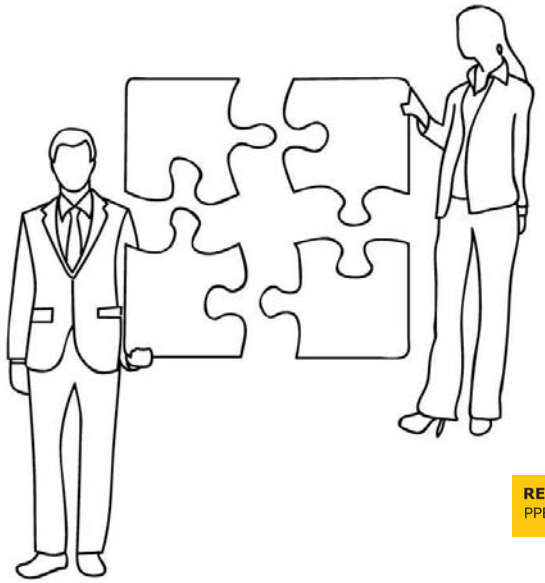
- Attachment A: "Incident Investigation Report"

Annex B5

Eni Personal Protective Equipment System

Procedure

Personal Protective Equipment (PPE) System



REFERENCE MSG:
PPE Management

TITLE:		
Eni Myanmar B.V. Personal Protective Equipment System		
NOTES:		
This procedure applies to Eni Myanmar B.V. and all contractors and sub-contractors		
DATE OF ISSUE:		**EFFECTIVE DATE:**
October 2016		October 2016
PREPARED BY:	**CHECKED BY:**	**APPROVED BY:**
HSE Supervisor Coordinator **Andrew Pryce**	HSE&CI Manager **LAURA CONSALVI**	Managing Director **STEFANO CARBONARA**

pro HSE 014 2016 r00 eni Myanmar

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Contents

1. Objectives

The primary scope of the procedure is to define the process for the management of Personal Protective Equipment (PPE). In terms of correct selection, distribution, training and use by company, contractor employees and visitors in all sites of Eni Myanmar B.V. (hereinafter referred to as “Eni Myanmar” or the “Company”) and to give the minimum and mandatory requirements of use of PPE.

2. Field of application

This Procedure is applicable to the “PPE Management” by Eni Myanmar.

This procedure is applicable to all Eni Myanmar B.V. sites, projects and operations and involves the whole Eni Myanmar structure, including contractors and subcontractors that work within the Eni Myanmar sites.

3. References

3.1 Internal References

- Code of Ethics
- Model 231
- eni spa and Eni Myanmar Policies
- eni spa HSE Management System Guideline and related annexes
- Eni Upstream HSE Golden Rules: opi sg hse 021 ups r01

3.2 External References

- ISO 14001:2004 “Environmental Management System – Requirements with guidance for use”
- OHSAS 18001:2007 “Occupational Health and Safety Management System – Requirements”

To ensure correct application of this procedure, for each reference listed above any subsequent revisions, updates, or additions also apply.

4. Definitions and abbreviations

HSE Integrated Management System (HSE IMS): part of the overall management system that enables the management of the HSE risks associated with the business of the organization. This includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the organization's HSE Policy;

Operation Personnel: refers to all Eni Myanmar personnel who work mainly on site or who visit the site often as their duties/position is directly related to the operation etc.

Office Based Personnel: refers to Eni Myanmar personnel who work mainly in the office.

Personal Protective Equipment (PPE): all equipment to be worn in order to reduce employee exposure to safety and health hazards at work site to acceptable levels. PPE such as safety shoes, helmets, glasses, gloves, ear plug/protection, coveralls and other equipment specific for particular tasks, must not be confused with "Working Clothes" (trousers, shirts, jackets, polo, socks, etc). The first are mandatory to work on site. Minimum PPE must be worn by everyone visiting a worksite (e.g. clerks, managers etc).

5. Roles & responsibilities

The ***HSE Manager*** shall:

- provide and verify that PPE are in accordance with EN and ISO standard or equivalent recognized standard;
- ensure that the necessary PPE will be given to company personnel, based on job type and risk assessment, through the HSE Coordinator in the logistic base;
- ensure through the HSE Coordinator all contractor employees on Eni Myanmar sites wear the appropriate PPE;
- ensure signs about PPE requirements are posted in all eni Myanmar sites;
- ensure the correct use of PPE, their protection specification and their limitations are explained to employees, through the HSE Coordinator in the base;
- ensure expired, damaged or malfunctioned PPE are replaced, through the HSE Coordinator in the base;
- keep record and control of PPE delivered to personnel;

The ***Line Managers*** shall:

- assist the HSE Department in the assessment of risks related to all activities on site and assist in the selection of the appropriate PPE;
- inform in due time the HSE Manager in case of site visit in order to be given the appropriate PPE;
- inform the HSE Manager in due time about any extraordinary activities that may require the use of special PPE, not provided previously to each employee;
- make sure that personnel in their Department wear the Proper PPE in worksites.

The ***HSE Coordinator*** shall:

- ensure that the necessary PPE will be given to company personnel, based on job type and risk assessment;
- ensure all contractor/subcontractor employees in the base camp and during field operations of eni Myanmar wear the appropriate PPE;
- ensure signs about PPE requirements are posted;
- ensure the correct use of PPE, their protection specification and their limitations are explained to eni Myanmar employees by him/her and to contractors' employees by the Site HSE Supervisor;
- verify definition of criticalities related to the use of PPE and evaluate possible improvements;
- ensure expired, damaged or malfunctioned PPE are replaced;
- ensure the correct storage and disposal of PPE;
- keep record and control of PPE delivered to personnel;
- provide visitors with proper PPE according to the site visited if they do not have;
- keep updated the PPE gear in order to control the storage and guarantee a sufficient availability of all the kind of PPE and to register any time the date and the signature of the person that is receiving the PPE.

The ***Contractor's/Site HSE Advisor*** shall:

- make sure that the proper PPE are worn in his site, by all company and contractors employees and visitors;
- ensure the correct storage and disposal of PPE;
- inform the HSE Department in case of replacement or shortage of PPE;
- conduct a risk assessment for the specific jobs and define the proper PPE for those jobs.
- All employees shall:
- confirm the PPE provided to them as reported in the PPE Register and sign the form;
- take the PPE with him/her to the worksite and wear them;
- use properly the PPE, taking into consideration their limitations;

- keep their PPE secured and maintain it clean and in order;
- periodically check their PPE and notify their supervisor in case of need for replacement.

6. Process Description

Personal Protective Equipment (PPE) is required to be used when the hazards associated to a specific job cannot be eliminated or reduced to acceptable levels through engineering or administrative control measures. In these cases, the use of the appropriate PPE is mandatory.

The hazard control hierarchy processes are as follows:

- elimination
- substitution
- engineering
- administration
- Personal Protective Equipment

PPE is the last line of defence; hence, its effectiveness is crucial to the health and safety of workers. Workers must be informed and always bear in mind of the limitations of the use of PPE.

6.1 Selection and Personal Protective Equipment

In order to ensure that the correct PPE is used, a health and safety risk assessment must be done. The risk assessment shall consider the following:

- the ergonomic requirements associated with the task;
- the environment in which the task will be performed;
- the presence of more than one health or safety risk which will make it necessary for the employee to wear or use more than one item of personal protective equipment, in this case all equipment must be compatible;
- PPE must be effective to prevent or adequately control the risk or risks involved without increasing overall risk.

However, some special activities may require additional or different protection or different protection definition.

The material used and the construction characteristics of the PPE must fulfil the following requirements:

- be strong and resistant both regarding specific agents in the workplace (chemical, thermal, mechanical, electrical);
- allow for ordinary maintenance and cleaning as described in manufacturer's instructions to be carried out easily;
- be made of materials that will not injure or harm the worker during use.

6.2 Distribution of PPE

All worksite employees, upon the start of his/her employment, are given the appropriate PPE relevant to their duties. If in the course of time, an employee who used to be office-based acquires additional duties that are performed on site, the appropriate PPE must be given to him/her. The HSE Coordinator gives the required PPE to the employee in the base camp, as dictated by the HSE Manager who is responsible to assess the need.

In the case of visitors, the HSE Coordinator or the Contractor's/Site HSE Advisor is responsible to ensure that they are given the appropriate PPE before the site visit. The HSE Manager is responsible to notify the worksite personnel for the visit in order to ensure the availability of the PPE.

The quantity and type of PPE will be distributed according to type of work (i.e. Operational personnel or office based personnel). Table 1 shows the list of PPE and the validity period of each item.

Note: it is up to HSE department to decide the quantity and type of PPE will be distributed to personnel if there is quantity shortage or delay of shipment.

The following requirements regarding the use and the specifications of PPE must be met by both eni Myanmar and contractors and subcontractors.

TABLE 1: PPE and working clothes for Site Personnel

DESCRIPTION EQUIPMENT	VALIDITY MONTHS	N° PIECES
SAFETY HELMET/HARD HAT	36	1
HIGH VISIBILITY VEST	12	1
SAFERTY GLASSES CLEAR	12	1
SAFETY GLASSES TINTED	12	1
SAFETY GLOVES (COTTON/LEATHER)	3/6	1
SAFETY GLOVES (RUBBER)	6	1
EAR PLUGS (DISPOSABLE)	1	As & When Required To be Kept on Site
EAR PROTECTION – EAR MUFFS	12	1
LONG PANTS	12	2
LONG SLEEVED SHIRT	12	2
SAFETY BOOTS INCLUDING TOE PROTECTION AND ANKLE SUPPORT	12	1
LARGE RIM SUN HAT	12	1
SNAKE GAITERS (FOR LOWER LEG SNAKE BITE PROTECTION)	12	1
SUMMER RAIN JACKET	12	1
DUST MASK	1	As & When Required To be Kept on Site

Personal Protective Equipment (PPE) System

In case of PPE damage or malfunction, the worker has to inform his superior that shall contact the HSE department for replacement regardless the validity of PPE illustrated in the table above.

(*) Comply with European Standards BS EN471: 2003 or other equivalent international standard.

6.3 PPE Specifications

All PPE must comply with the following specifications:

No	PPE	SPECIFICATIONS (*)
1	Safety Helmet/Hard Hat	• Comply with EN 397, ANSI Z89.1 or other equivalent international standard.
2	High Visibility Vest	• Comply with European Standards BS EN471: 2003 or other equivalent international standard.
3	Safety Glasses Clear	• Comply with EN 166 or ANSI Z87.1 or AS/NZS 1337 or other equivalent international standard.
4	Safety Glasses Tinted	• Comply with EN 166 or ANSI Z87.1 or AS/NZS 1337 or other equivalent international standard.
5	Safety Gloves (Leather)	• Comply with EN 388, EN 407, EN 420, or other equivalent international standard. • Anti sharp or jagged object, wood or similar hazard producing items.
6	Safety Gloves (Cotton)	• Comply with EN 420, or other equivalent international standard.

7	Safety Gloves (Rubber)	• Comply with EN 388, EN 407, EN 420, or other equivalent international standard • protection from microorganisms • Resistance to abrasion, blade cut resistance, tear resistance, puncture resistance
8	Disposable Ear Plug	• Comply with EN 352.2 or other equivalent international standard.
9	Ear Protection – Ear Muffs	•EN 352-1: 2002 Hearing Protection – Ear Muffs or other equivalent international standard.
10	Long Pants	•Impregnated with mosquito replant and incorporating solar shield to UPF 40 sun protection
11	Long Sleeved Shirts	• Impregnated with mosquito replant and incorporating solar shield to UPF 40 sun protection
12	Safety Boots With Ankle Support	• Comply with EN 345, ANSI Z41 or other equivalent international standard • Steel or composite toe cap • Stainless steel mid sole for nail proof • Quick release system
12	Large Rim Sun Hat	• Incorporating solar shield to UPF 40 sun protection
13	Snake Bite Gaiters	• No Standard Recognized
14	Summer Rain Jacket	• No Standard Recognized
15	Dust Mask	• For mechanically and thermally generated particulate: Comply with EN 149 or other equivalent international standard.

All pieces of PPE must have compliance certificates and the certification mark must be visible on each piece of equipment, except for cases when this is not possible.

The information that must accompany each piece of PPE shall include:

- the manufacturer's name and identification trademark;
- the model of PPE and the risks it protects from;
- instructions and conditions to use and care for the product;
- safety information and limitations of the product, as well as possible conflicts with other types of PPE;
- other information regarding characteristics of the PPE such as sizes, pictograms, technical standards, washing and care instructions, storage and sale instructions.

6.4 PPE Standard

Requirements All PPE shall:

- comply with the International Standards "where applicable";
- be used and stored according to the manufacturer's recommendations;
- be replaced as soon as the protection is no more guaranteed;
- be available on stock.

As a general rule, in all sites, all personnel (Staff and Contractors) shall be supplied, as minimum, with well-fitting the following PPE:

- long sleeve coveralls (one piece or two pieces), with eni or contractor logo,
- safety boots or shoes,
- safety helmet,
- gloves,
- safety glasses, compatible with prescription glasses.

Where deemed necessary or mandatory within health hazardous areas or when performing hazardous activities, additional protective equipment shall be worn.

The following points should be noted:

- loose clothing can get caught in moving machinery. All clothing should be correctly fastened;
- contaminated clothing should be washed or discarded;

- jewellery, particularly chains and other loose items, shall not be worn at work site.

Site Management shall provide visitors, government bodies, etc. under their area of responsibility, who can be exposed to hazards, with the appropriate PPE (standard PPE and additional/specialized PPE as necessary).

Head protection

Safety helmets shall be:

- worn at all times in all sites (this does not include field operations when conducting seismic operations) when out of office,
- free from paint, stickers, except eni and contractors logo,
- replaced every three years from the date of initial use (not the manufacturing date),
- discarded immediately, if there are any signs of deterioration; the shell has received a severe impact, deep scratches occur, or the shell has any cracks visible to the naked eye.

Foot protection

Safety boots shall be:

- worn for all work on site,
- oil resistant,
- in good condition and free from grease/dirt,
- discarded if the soles become worn.
-

Protective clothing

Coveralls shall be:

- long sleeve coveralls,
- 100% cotton for personnel entering or working in operated areas,
- replaced once a year, for exposed personnel.

Hand protection

Gloves shall be:

- worn properly based on its function; the following list gives examples of types and uses of protective gloves:

PVC/Rubber gloves:	Handling chemicals
Leather gloves:	Handling sharp objects, wood, hot work and cold work
Cotton Gloves:	Can be worn when conducting inspections on site

Eye and face protection

Eye and/or face protectors shall be worn whenever there is the appropriate sign and/ or when:

- chipping, grinding, cutting or breaking of brittle material (concrete/ stone/ glass/metal or other hard materials) where particles may fly around,
- paint spraying, air blowing, blast cleaning, high pressure water jetting,
- handling chemicals, during maintenance of chemical pumps/equipment or certain routine tasks such as draining, venting and sampling of chemicals,
- sampling products from pressurized systems,
- welding or gas cutting or assisting in these activities.

Safety glasses must be compatible with prescription glasses.

Standard safety glasses shall be replaced once a year, for exposed personnel.

Ear protection

Ear protector shall be worn in:

- all areas designated by signs as hearing protection zones,
- all noisy areas.

In this context, “noisy” means that the noise in the area is more than 85 db or when it is necessary to raise one's voice in order to be heard when talking to someone from a distance of one meter.

For the use of disposable ear plugs, roll into small cylinder, then insert in the ear canal. Follow manufacturer instructions for its lifetime.

The dust mask shall be used for preventing from particulate generated:

- mechanically: dust, silica, cutting, grinding, sandblasting,
- thermally: lead, chromium or welding fume, zinc oxide.

The dust mask is not the appropriate respiratory protective equipment for toxic/noxious or oxygen deficient atmosphere.

6.4.1 PPE Items to be worn by Operation

Operation/Department	Type of PPE to be Worn
Inspections, main&fly camps, Accommodation, Offices, Toilet & Shower blocks, Catering, Food storage, Mess/Dining halls.	Safety Glasses, Long Pants, Long Sleeved Shirt, Safety Boots.

Operation/Department	Type of PPE to be Worn
Inspections, main& fly camps including workshops, hazardous storage, fuel storage and electrical generation areas.	Safety Helmet/Hard Hat, Disposable Ear Plugs, Ear Muffs, Safety Glasses, Long Pants, Long Sleeved Shirt, Safety Boots, Cotton/Leather/Rubber Gloves, High Visibility Vest.

Operation/Department	Type of PPE to be Worn
Field Operations, Survey Operations	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Sun Hat, Safety Glasses, Leather Gloves, High Visibility Vest

Operation/Department	Type of PPE to be Worn
Field Inspections, Drilling Operations	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Safety Helmet/Hard Hat, Sun Hat, Ear Muffs, Safety Glasses, Leather Gloves, High Visibility Vest (Keep a safe distance "2 meter" from all moving parts in the drilling operation). **Drillers and drill labor should not wear a high visibility vest or any form of loose clothing. If the operations involves pre loading of explosives, all radio and telephone communications and electronic devices must be turned off, with in a 100-meter vicinity of the loading operation. All safety distances have to be observed.**

Operation/Department	Type of PPE to be Worn
Field Inspection, Loading (Explosives) Operations	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Safety Helmet/Hard Hat, Sun Hat, Safety Glasses, Leather Gloves, High Visibility Vest. **When the team loading is loading the explosive charge, 10 m safety distance has to be observed. When approaching the operation, all radio and telephone communications and electronic devices must be turned off, with in a 100-meter vicinity of the loading operation. All safety distances will be observed.**

Operation/Department	Type of PPE to be Worn
Field Inspection, Recording Operations Explosives Shooting	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Safety Helmet/Hard Hat, Sun Hat, Ear Muffs, Safety Glasses, Leather Gloves, High Visibility Vest. **All safety distances have to be observed (minimum 50m).**

Operation/Department	Type of PPE to be Worn
Field Inspection, Recording Vibroseis Operations	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Sun Hat, Ear Muffs, Safety Glasses, Leather Gloves, High Visibility Vest. **All safety distances have to be observed (minimum 5m).**

Operation/Department	Type of PPE to be Worn
Field Inspections, Line Crew Layout/Pick up	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Sun Hat, Safety Glasses, Leather Gloves, High Visibility Vest

Operation/Department	Type of PPE to be Worn
Field Inspections, Scouting (uncut bush)	Long Pants, Long Sleeve Shirt, Safety Boots, Snake Gaiters, Sun Hat, Safety Glasses, Leather Gloves, High Visibility Vest

6.5 Training in the use of PPE

Those involved in the use of PPE shall be given suitable instruction with respect to that particular equipment from his supervisor. This training must be documented. The information and training provided must cover the following aspects:

- inform the worker about the residual risks related to the specific working conditions or task for which the PPE must be used;
- explain how and when to use the available PPE with regard to the risks related to the work being performed;
- explain the risks of wearing more than one pieces of PPE;
- explain the limits of the use of the PPE.
- give the worker instructions about the correct maintenance and storage of the PPE;
- provide specific training and practical drills on particular types of PPE that require so.

6.6 Record, maintenance and inspection of PPE

PPE shall be maintained by the user as per the manufacturer's instruction. They shall be also inspected periodically. PPE shall be removed from service and be replaced as soon as it shows any signs of deterioration or the reliability is doubtful.

A PPE Register (Annex I) must be always up-to-date in order to ensure that all site employees have the necessary PPE and to enable tracing PPE availability on site. This is also the tool through which the date and the person who is receiving the PPE are identified.

7. Updating responsibilities

The HSE Manager is the custodian of this procedure. Therefore any suggested changes or queries about its applicability should be addressed to him/her.

The HSE Manager is also responsible for coordinating periodic reviews of this procedure, which will take place every two years.

8. Storage, record keeping and traceability

The functions involved in the process described herein arrange, each for their competence and also by the information systems used, the traceability of data and information and ensure the preservation and archiving of documentation produced, printed and/or electronic so as to enable the reconstruction of the various phases of the process itself.

9. List of Attachments

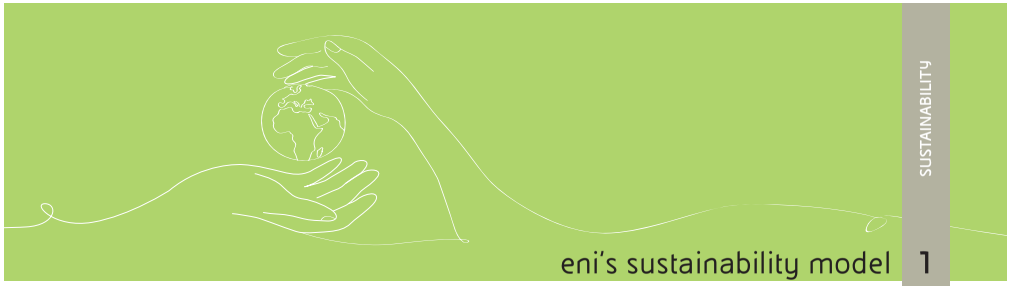
Attachment A : PPE Gear Register

Annex B6

Eni Sustainability Policy

Policy
Sustainability

Approved by the Board of Directors of eni spa on 27 April, 2011.
The english text is a translation of the italian.
For any conflict or discrepancies between the two texts the italian text shall prevail.



eni's sustainability model 1

To operate in a sustainable manner means to create value for stakeholders, and to use resources so that the needs of future generations will not be compromised, respecting people, the environment and the society as a whole .

eni draws inspiration from fairness, transparency, honesty and integrity principles, adopting the highest standards and international guidelines when managing its activities, in every operating context.

eni considers sustainability as an engine of a continuous improvement process that guarantees achievements over time and strengthens economic performance and reputation.

eni is engaged in a wide range of activities that are aimed at promoting the respect of people and their rights, of the environment and, more generally, of the widespread interests of collectivities that reside where eni works.

eni undertakes to conduct its activities by considering the stakeholders' interests, being aware that the creation of reciprocal value is possible through dialogue and the sharing of objectives.

eni contributes, through its activities, to a sustainable development of the countries where it operates, creating opportunities for local people and companies.

eni guarantees the sustainability of its activities by applying a model that crosscuts all processes and all company's functions. It is conceived for a long-term strategy providing a coherent framework for innovation development as well as risk mitigation and risk prevention management strategy.

Stakeholder relations 2

Engaging stakeholders and involving them in company's business are both prerequisites for sustainability and for the construction of reciprocal value.

eni considers "stakeholders" all subjects holding rightful interests - both implicit and explicit - which are influenced by the activities of the company.

eni undertakes to set up stakeholder relations that are based on fairness and transparency, with the aim of pursuing tangible and shared sustainable development objectives, even through the consolidation of trust.

eni pursues a proactive dialogue with stakeholders and promotes the conditions that enable the establishment of a long-term cooperation with them.

eni contributes to initiatives, networks and working groups that deal with sustainable development topics on a local, national and international level, and develops public - private partnerships concerning these issues.

eni promotes the diffusion of the culture of sustainable development among its stakeholders, even through the establishment of partnerships that can benefit from eni's network of knowledge and expertise.

eni supports research and innovation, cooperating with universities and networks of the highest level, even through the activities of eni corporate university and of Fondazione eni Enrico Mattei.

Human Rights 3

The respect of Human Rights represents the basis for an inclusive growth of societies, of the territories and, consequently, of the companies that work there.

eni is committed to respect internationally recognized Human Rights in its own operations and to promote the respect of the aforementioned rights with regard to activities assigned to or carried out with Business Partners and in its relationships with stakeholders.

eni, through its business activities, contributes to the creation of socio-economic conditions that are necessary for the actual enjoyment of Human Rights.

in those cases of potential divergence between local and international standards, eni shall strive to develop alternative solutions based on the highest standards, even taking account of local principles.

eni takes into account Human Rights issues, from the very first feasibility evaluation phases of new projects, in order to avoid detrimental behaviours and to detect areas of possible intervention, to contribute to the amelioration of the local stakeholders' access to fundamental rights.

eni respects the distinctive rights of indigenous people, with particular reference to their cultures, life styles, institutions, bonds with their homeland and development models.

eni, in accordance with current regulations and international standards, adopts preventive and defensive measures to minimize the necessity for active response by state and/or private security forces to threats to personnel and assets, even through the creation of a context of reciprocal respect between the company, workers and local communities.

Relations with communities and contribution to local development 4

Dialogue, the respect of local communities, the evaluation of impacts are all preconditions for an effective cooperation, targeted at creating territorial value.

eni participates in the creation of growth opportunities and enhances the capacity of people and local companies in the territories where it operates, promoting knowledge transfer and the development of local professional skills.

eni informs and engages local communities by promoting a free, prior and informed consultation, with the purpose of considering their requests concerning new business projects, impact assessments and community investments.

eni carries out environmental, socioeconomic and cultural impacts assessments generated by its activities where it operates, including those related to indigenous people, guaranteeing their mitigation and designing suitable ameliorative initiatives, through the planning of actions for development.

eni is committed to avoid the resettlement of local communities; should this not be possible, it carries out preventive consultations with the affected people in order to reach joint agreements, by guaranteeing that the acquisition of territorial rights is properly compensated.

eni realises a community investment strategy aimed at guaranteeing an independent, long-lasting and sustainable local development, by activating competence and knowledge networks, the sharing of resources and skills and by working in partnership with local communities, local organisations and key actors engaged in local development.

eni implements philanthropic activities in line with its sustainable development vision; to this end, it promotes and support non profit initiatives based on a pre-feasibility analysis of the context and of the local needs, and does this, even through the activities of eni foundation, whose mission is to protect and promote the overall well-being of communities where it operates, by paying particular attention to children and elderly rights.

Climate strategy 5

To satisfy the world's energy demand, by containing, at the same time, emissions of gases that have an impact on climatic change, is one of the greatest challenges of modern society.

eni assumes an active role in the international scene, in adopting different solutions that deal with the problems of climate change, including the development of flexible mechanisms and of new instruments to reduce deforestation and to promote technology transfer towards developing countries.

eni invests in scientific research with the aim to develop new technologies for the reduction of emissions that alter the climate and a more efficient and sustainable production of energy.

eni undertakes to reduce greenhouse gas, improving plant efficiency and increasing the use of fuel that contains less carbon.

eni adopts a system that detects, analyses and manages risks connected to climate change, in order to carry out proper mitigation and adjustment measures concerning its operational activities.

eni promotes the sustainable management of water resources in actions that are oriented towards the adjustment of the consequences of climate change.

eni promotes a conscious and sustainable use of energy, through internal and external information and education campaigns, and by inserting sustainability criteria, when selects and evaluates its suppliers.

Safeguarding biodiversity and ecosystems 6

The conservation of biodiversity and ecosystems is a fundamental need of humanity. They support life, human wellbeing and business activities. The benefits they provide (ecosystem services) such as food, fresh water, climate regulation and nutrient recycling, are vital for the livelihood communities and for the equilibrium of the whole planet.

eni considers the conservation of biodiversity ecosystems and the services they provide as a fundamental component of sustainable development in the implementation of its projects, and is committed to integrate their conservation during the whole life cycle and all its operational sites.

eni considers, when evaluating projects and in operational practices, the presence of protected areas and of areas of biodiversity value, the presence of threatened and endangered species and of ecosystem services that are ecologically and socially important.

eni identifies and assesses all potential impacts of its operations on biodiversity and implements mitigation actions, including offsets in order to minimise any adverse effects.

eni evaluates the interaction of its activities with ecosystem services, and promotes, in particular, efficient water management, especially in areas under water stress, and the reduction of emissions in air, water and soil.

eni promotes investment projects and initiatives that combine the conservation biodiversity and ecosystems with the sustainable development of local communities, and raises awareness on these topics through dedicated initiatives.

eni promotes a transparent and continuous dialogue with relevant stakeholders and partnership with conservation NGOs, and with national and international scientific institutions

Annex B7

Eni Waste Management Plan

WASTE MANAGEMENT PLAN

MD-4 Offshore Seismic Acquisition

TITLE:		
MD 4 - Offshore Waste Management Plan.		
NOTES:		
DATE OF ISSUE:	**EFFECTIVE DATE:**	
April 2017	April 2017	
PREPARED BY:	**CHECKED BY:**	**APPROVED BY:**
HSE Specialist Aung Phone Myat **HSE Engineer** Khant Thaw Htoo	**HSE Manager** Laura Consalvi	**Managing Director** Stefano Carbonara

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LIST OF ACRONYMS

ADN	International Carriage of Dangerous Goods by Inland Waterways
CCU	Cargo Container Unit
EWC	European Waste Catalogue
IFC	International Finance Corporation
LoW	List of Waste
PPE	Personal Protective Equipment
WEEE	Waste Electrical and Electronic Equipment
WFD	Waste Framework Directive
WMP	Waste Management Plan
WSA	Waste Storage Areas
WTM	Waste Manifest

DEFINITIONS

Waste Manifest: document to be issued prior to waste transportation. It describes the wastes, conditions, quantities and shall be issued for each back loading, in order to allow the adequate tracking of the wastes, from the site to the waste management facility.

Container: any device such as drums, feed, plastic tanks etc. used to contain wastes.

Discharge: any controlled and regulated release of wastewater or liquid waste to surface water bodies.

Disposal: any waste management operation different from reuse, recycling, treatment and discharge, even where the operation has, as a secondary consequence, the reclamation of substance or energy.

Hazardous Waste: Waste should be classified as **hazardous** waste as per local regulatory authority legislation or, in case of missing local references, per European Union - Commission Decision (2000/532/EC) of 3 May 2000, and amendment No. 2014/955/EU "on the list of waste", December 2014; a characterization of the waste has to be carried out in order to classify it.

Inert Waste: waste is considered inter if it does not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm to human health.

Operator: any Eni subsidiary or affiliate that operates in a country under specific permit/license/PSA.

Treatment: Any operation, including reprocessing, that makes the waste suitable for recycling or disposal by reducing its contaminant load and/or changing its chemical-physical properties.

Recycling: Any operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes

Reuse: Any operation by which (residual) products or components that are not waste are used again for the original or other purposes without reprocessing.

Waste: Any substance or object which the holder discards or intends or is required to discard.

1.0 INTRODUCTION

On 17th of February 2013 the Republic of the Union of Myanmar announced an invitation to apply for hydrocarbon exploration authorizations and subsequent hydrocarbon exploitation licenses. On 31 March 2015 Eni Myanmar BV signed at the presence of the Country's Energy Ministry the Production Sharing Contract (PSC) for the two offshore Block MD-2 and Block MD-4.

The Project proponent consists in a Joint Venture between Eni Myanmar, Total Energy and Petro Vietnam. Eni Myanmar and Total Energy hold the 40 per cent, while Petro Vietnam holds the rest.

The project foresees the acquisition of a 3D seismic survey within the Blocks, aimed to identify potential opportunities for further hydrocarbon exploration activities. Block MD-4 covers an area of 5.900 km2, but the seismic survey will be executed on a portion of 4.910 km2.

As required by Eni Myanmar internal standard and national applicable regulation, a Waste Management Plan (WMP) shall be prepared.

The WMP includes the requirements for the management, removal and disposal of all waste generated during eni Myanmar seismic activities and provides the following information:

- a framework of the relevant legislation related to the waste management;
- a list of the types and quantities of wastes potentially produced and a list of the sources of each type of waste;
- a description of the proposed management procedures for the transport, treatment, removal and/or disposal of the produced wastes;
- the identification of the licensed waste management Contractor appointed for the waste management activities.

This document includes the most updated project data and information, with particular reference to:

- waste typologies and methods proposed for their management by the waste Contractor;
- registered quantities for waste typologies produced during the seismic operations;
- roles and responsibilities of the personnel appointed for the waste management and the documentation for the tracking of waste produced.

eni myanmar	Waste Management Plan	MD-4 Offshore Seismic Acquisition

2.0 PURPOSE AND SCOPE OF THE WMP

This WMP is designed to be used in all activities associated with the seismic project.

The target users of this Plan are the seismic and chase, support vessels personnel, who will be responsible for the actual handling and management of wastes generated from project activities.

This Plan applies to all sectors and activities related to the seismic operations Block MD-4, throughout all operations and includes:

- collection, handling and temporary storage of wastes; and
- management and transportation to treatment/disposal of the waste at authorized facilities.

The main objective of this Plan is to define the management procedures of the waste produced during the activities performed in Offshore Seismic Acquisition, in compliance with the international standards and guidelines presented in the following sections.

3.0 REVIEW AND UPDATE OF THE WMP

This Waste Management Plan is intended to provide general guidance for various work activities and consequently it may need to be updated periodically. The Plan may need to be revised when there are changes in the waste streams generated or changes in the treatment/disposed options available. The Plan will therefore be revised as appropriate.

The requirements of this Plan will be reviewed and implemented by the primary users of this Plan, the supervisors and workers onsite at the work locations, prior to beginning any work that may generate waste.

4.0 LEGAL FRAMEWORK, POLICIES AND STANDARDS

The section provides a description of the legal framework relevant to the management of the wastes produced during seismic activities.

4.1 INTERNATIONAL CONVENTIONS AND AGREEMENTS

Basel Convention: The Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was adopted on 22nd March 1989 by the Conference of Plenipotentiaries in Basel, Switzerland. The overarching objective of the Basel Convention is to protect human health and the environment against the adverse effects of hazardous wastes. The provisions of the Convention center around the following principal aims:

- the reduction of hazardous waste generation and the promotion of environmentally sound management of hazardous wastes, wherever the place of disposal;
- the restriction of transboundary movements of hazardous wastes except where it is perceived to be in accordance with the principles of environmentally sound management;
- a regulatory system applying to cases where transboundary movements are permissible.

4.2 EUROPEAN DIRECTIVES

Directive 2008/98/EC: The Waste Framework Directive (WFD) sets the basic concepts and definitions related to waste management, such as definitions of waste, recycling, recovery. WFD defines waste as “any substance or object which the holder discards or intends or is required to discard”. The Directive explains when waste ceases to be waste and becomes a secondary raw material (end-of-waste criteria), and how to distinguish between waste and by-products. The Directive lays down some basic waste management principles: it requires that waste be managed without endangering human health and harming the environment, and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest. Waste legislation and policy of the EU Member States shall apply as a priority order the waste management hierarchy. The Directive introduces the “polluter pays principle” and the “extended producer responsibility”. It incorporates provisions on hazardous waste and waste oils and includes recycling and recovery targets to be achieved by 2020. The Directive requires that Member States adopt waste management plans and waste prevention programmes. This Directive repealed Directive 2006/12/EC of the European Parliament and of the Council of 5th April 2006 on waste (the codified version of Directive 75/442/EEC as amended), hazardous waste Directive 91/689/EEC, and the Waste Oils Directive 75/439/EEC.

Commission Decision 2014/955/EU: It is amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council (2014/955/EU).

It includes the list of waste and related codes - the different types of waste in the list are fully defined by a six-digit code - and identifies hazardous waste, marked with an asterisk in the list. This waste classification system applies across the EU.

The List of Waste is meant to be a reference nomenclature providing a common terminology throughout the Community with the purpose to improve the efficiency of waste management activities. The List of Waste (LoW) serves as a common encoding of waste characteristics in a broad variety of purposes like classification of hazardous wastes. Assignment of waste codes has a major impact on the transport of waste, installation permits (which are usually granted for the processing of specific waste codes), decisions about recyclability and compatibility of the waste or as a basis for waste statistics.

The policy for the management of waste follows the waste hierarchy (prevention, reduction, re-use, recycling, recovery, treatment and disposal). The priority target is the efficient management of natural resources and waste through the prevention of the generation of waste, the reduction of the production of waste and disposal to landfills, the encouragement of re-use, recycling and recovery and a sound environmental management in order to reduce to the minimum any negative effects to the human health and the environment.

MARPOL Convention: The International Convention for the Prevention of Pollution from Ships or MARPOL Convention was adopted on 2nd November 1973 at IMO (International Maritime Organization). As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument entered into force on 2nd October 1983 as MARPOL 73/78. MARPOL Convention has been updated by amendments through the years. It deals with the preservation of the marine environment through the prevention of pollution by oil and other harmful substances and the minimization of accidental discharge of such substances.

The Convention's technical content is laid out in six Annexes. Annex V, Prevention of Pollution by Garbage from Ships (entered into force on 31st December 1988), deals with different types of garbage and specifies the distances from land and the manner in which they may be disposed of. According to Annex V the following main provisions are to be considered:

- the disposal of any materials is prohibited from fixed or floating exploration and exploitation platforms;
- the disposal into the sea of food wastes may be permitted when the conditions of the Annex are respected;
- the discharge of all plastics and all other garbage, except for food wastes not less than 12 miles from the coast, is prohibited within "special areas";
- a garbage management plan shall be carried and a Garbage Record Book must be kept onboard the ship.

4.3 MYANMAR LAWS AND REGULATIONS

The Ministry of Natural Resources and Environmental Conservation is the main institutional body responsible for setting a framework for waste management at the national level.

Similarly, all major cities across Myanmar are administrated by City Development Committees that are responsible for providing municipal waste management services.

4.3.1 Existing policy and regulations

Traditionally, waste collection and disposal in Myanmar had been the responsibility of local municipal authorities. In Yangon, Mandalay and Nay Pyi Taw, autonomous city development committees and their pollution control and cleansing departments (pccds) with their network of administrative branches and sub-units are tasked with solid waste management in municipal areas. In other parts of the country the respective township development committees under the local government, which manage Municipal waste collection and disposal (IGES 2016).

According to the United Nations Centre for Regional Development (UNCRD) presentation for the 2nd meeting of the Regional 3R Forum ('3R" refers to the waste management hierarchy, "Reduce, Reuse, Recycle") municipal solid waste in Myanmar is composed mainly of organic waste (73%) followed by paper/cardboard (18%), wood (4%), plastic and textiles (2% each) and others (1%) (UNCRD, 2010).

Existing Laws and Regulations are as follows:

National Level

- National Government Policy (1994)
- Environmental Conversation Law (March, 2012)
- Environmental Conservation Rules (June 2014)
- Environmental Impact Assssment procedures (Dec, 2015)
- National Environmental Quality and Emissions Guidelines (Dec, 2015)
- Hazardous Waste Notification (Draft 2016)

Yangon

- The Yangon Civil Development Law 2013
- The City of Yangon Development Law (1990)
- The Underground Water Act (1930)
- The Water Power Act (1927)
- The City of Yangon Municipal Act (1922)
- The Yangon Water-work Act (1885)

In addition, City and Township Development Committees promulgated the solid waste disposal and collection by-law providing the legal basis at the local level.

Waste Disposal – Non Hazardous

Municipal solid waste collection systems in Myanmar cities can largely be characterized as labour intensive, relying on the use of both manual workers and non-specialised vehicles. In general, the current waste collection system includes primary and secondary collection. Primary collection takes place in different forms such as door-to-door (bell collection), block, and container collection methods. The primary waste collection system is carried out either or in combination of pushcarts and tri-bicycles while secondary collection system is performed mainly with tipper trucks (dumpers).

The Ministry of Industry is responsible for managing state-owned industries, 18 industrial zones, 3 special economic zones and coordinating with private industries to engage in the industrial sector. Moreover, seven industrial zones will be extended. Notably, the Government has made efforts to encourage the industrial sector to minimize impacts on the environment. For instance, in order to avoid unnecessary pollution and damage on the natural environment caused by industrial waste, the Water and Air Pollution Control Plan (Standing Order No.3) was issued in 1995. In this order, actions to control, reduce and eliminate wastes must be progressively developed and carried out. However, it was found that all major cities (Yangon, Mandalay and Nay Pyi Taw) are facing tremendous challenges with regard to managing industrial waste. Accordingly, all cities are responsible for collecting industrial waste from respective factories but only on-call basis. Consequently, collected waste is often transported to landfill sites without prior treatment. There is currently no reliable data on the generation and collection of industrial waste by

the cities. According to YCDC, approximately 150 tons of industrial wastes are daily collected by the city (IGES 2016).

Sewage and black water is mostly collected in septic tank systems, pit latrines, or flows untreated into surface waters. There are only a few wastewater treatment plants, in Nay Pyi Taw and Yangon city, which connect only a small part of the city to a conventional sewage system. The only regional laws that exist for industrial waste water are in Mandalay which are focused on regulating industrial waste water discharge to specific times (i.e. 6 pm and 5 am) and to regulate the temperature of waste water to less than 30 C. The national laws for industrial wastewater per industry have been detailed under the National Environmental Quality and Emissions Guidelines (Dec, 2015).

Waste Disposal - Hazardous

There is no specific government institution assigned with the task of overall management of hazardous wastes. There are general sectorial laws and regulations related to management of toxic chemicals and legislation such as the Factories Act (1951) and Public Health Law (1972) which are related to management of hazardous waste.

In terms of the way forward, the following ministries, institutes and organisations will be involved in the development process of National Waste Management Strategies and Action plans. These respective organisations will have their own roles to play in this process agenda as well as` in the design of respective action plans.

- Environmental Conservation Department (ECD), Ministry of Natural Resources and Environmental Conservation (MONREC)
- Nay Pyi Taw City Development Committee (NDC)
- Yangon City Development Committee (YCDC)
- Mandalay City Development Committee (MCDC)
- Union Attorney General Office
- Ministry of Planning and Finance
- Ministry of Education (science and technology)/ Department of Research and
- Innovation/ Institutes and Universities
- Ministry of Industry
- Ministry of Electricity and Energy
- Ministry of Health
- Ministry of Transportation and Communication
- Ministry of Agriculture, Livestock and Irrigation
- NGOs and INGOs
- Private Sectors
- Community

4.4 STANDARDS AND GUIDELINES

The following Standards and Guidelines are to be considered:

- ISO 14001:2015, Environmental Management Systems - Requirements with Guidance for use;

- ISO 14004:2005, Environmental Management Systems -General Guidelines on Principles, Systems And Supporting Techniques;
- OGP Guidelines for waste management with special focus on areas with limited infrastructure - Report No. 413, September 2008 (updated March 2009);
- International Finance Corporation (IFC), General Environmental, Health, and Safety General Guidelines, 2007;
- International Finance Corporation (IFC) Environmental, Health, and Safety Guidelines-Waste Management, 2007;
- International Finance Corporation (IFC) Environmental, Health, And Safety Guidelines For Offshore Oil And Gas Development, 2015;
- AMTE TG 010 "Waste Management in Upstream Oil&Gas Activities", March 2016.

In particular, AMTE TG 010 "Waste Management in Upstream Oil & Gas Activities" provides to all eni Upstream division's subsidiaries and affiliated Companies a set of recommendations and treatment options that shall be considered for a correct management of wastes produced during Upstream activities.

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5.0 WASTE SITE SCREENING & SELECTION

According to common seismic activities, during the development of the project it could be generated domestic waste and wastewaters. Seismic contractors will operate in compliance with MARPOL convention requirements and with Myanmar law.

All the solid wastes generated on the vessels will be properly collected on board, and periodically delivered to the waste treatment facility, where authorized companies will dispose/recycle all the wastes according to Myanmar law.

6.0 SUMMARY OF THE GENERATED WASTES

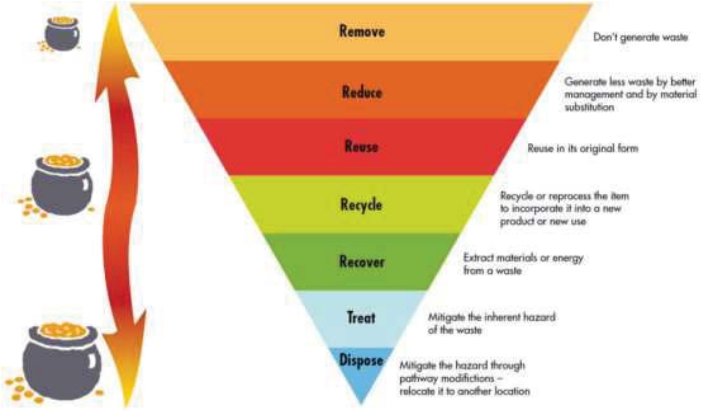
In the following paragraphs, an inventory and description of the wastes generated during the project activities is provided. In practice Laboratory analytic tests will be performed on an amount of sampled waste when it is produced to correctly establish the EU code to assign to the waste; other complementary information can come from Material Safety Data Sheets and process knowledge.

Waste management will be carried out in compliance with applicable legal requirements and binding provisions and according to AMTE TG 010 "Waste Management in Upstream Oil&Gas Activities"

Waste management will refer to the following waste hierarchy:

- remove (don't generate waste);
- reduce (generate less waste by better management and by material substitution);
- reuse (reuse in its original form);
- recycle (recycle and reprocess the waste to incorporate it into a new product or new use);
- recover (extract material or energy from a waste);
- treat (mitigate the inherent hazard of the waste;
- dispose (mitigate the hazard through pathway modifications, relocate the waste to another location).

Figure 1: Eni Waste Management Hierarchy



Provision for the more significant typology of waste are presented in the eni Upstream standard, with particular reference to the following:

- oil/chemical waste;
- drums/containers;
- inert and non-inert solid non hazardous waste.

In general, all opportunities to avoid the generation of waste will be pursued.

6.1 GENERAL WASTE HANDLING AND DISPOSAL

6.1.1 Non Hazardous Waste

Non-hazardous solid waste will be produced daily. This will include mainly food waste, paper, cardboard, plastic and some scrap metals. All waste generated onboard will be brought back onshore for disposal. Domestic and general waste should be segregated into combustible (paper, food, cardboard, and wood) and the various non-combustible waste streams will be collected using suitable labelled containers to ensure safe collection segregation and handling of all waste streams generated. Closed containers shall be provided for potentially wind-blown wastes. Food waste are processed through the comminuter or grinder and

disposed to sea, when the vessel is at minimum 12 nautical miles from land and the mesh of the grinder are no greater than 25 mm (see appendix A).

All solid general waste will be sent for recycling or disposal to the licensed waste treatment site, where waste contractor dispose/recycle all the wastes according to Myanmar law and international standard.

6.1.2 Hazardous Waste

Hazardous waste generated may include oils, solvents, used batteries and medical waste.

Waste oil, batteries and other hazardous waste will initially be segregated and collected onboard and then these will be sent for recycling or disposal at a licensed facility onshore.

The seismic contractor has to ensure appropriate and safe storage until these wastes are taken to the waste treatment licensed facility, where waste contractor dispose/recycle all the wastes according to Myanmar law and international standard.

6.1.3 Wastewater and Sanitary Waste

Reference can be made to the annex E.

6.1.4 Waste Management and Minimisation Plan

The Seismic Contractor will be responsible for waste management during the seismic acquisition programme, and will be required to be in compliance with the local legislation and Environmental Management and Monitoring Plan (EMMP). However, Eni Myanmar will regularly conduct inspections and audits during operations to ensure compliance to contract requirements.

Waste minimisation practices are to be applied to all typology of waste. In addition, the conservation of resources (energy, water, gas, and fuel) will be addressed. The waste minimisation plan is one part in the overall programme of responsible waste management.

Waste minimisation includes reduction and control at source, reuse, recycling and recover. It does not include the treatment or disposal of waste. Waste minimisation focuses on preventing the generation of waste and, where this is not possible, reusing waste. Waste will be reduced at source through management measures such as product substitution (e.g. for toxicity reduction) and product conservation i.e. working efficiently to avoid the generation of waste. Waste will also be controlled through good operating practices i.e. equipment maintenance, spill prevention, routine crew inspections, improved 'housekeeping', and inventory control.

6.1.5 Waste Audits

Waste audits will be conducted by Eni Myanmar as part of the site HSE audit and inspection for the purpose of identification and proper disposal of all waste. The Eni Myanmar Superindent will conduct the audit programme and use it as a tool for training employees in waste minimisation and management techniques. Also to verify if previous training efforts have been effective.

6.1.6 Overall Duration and Timing

Eni will conduct the 3D seismic survey activities in Block MD-4 for approximately 100 days.

6.2 PROJECT ACTIVITIES GENERATED WASTES

6.2.1 WASTE TYPOLOGY

The following typical typologies are expected to be produced during project activities:

- hazardous waste:
  - spent hazardous chemicals;
  - spent lubricants and exhausted oils;
  - contaminated waste;
  - accumulators, batteries;
  - electronic waste;
  - glass and bulbs used lamps;
  - paints, resins;
  - medical waste;
  - toners, cartridges;
  - oil, oily wastewater;
- non hazardous waste:
  - empty metal drums;
  - mixed metals and scrap metals,
  - mixed waste (paper, plastic, wood) and plastics,
  - wooden packaging,
  - paper and cardboard packaging,
  - domestic waste.

Waste typologies are updated taking into consideration the characteristics of the waste collected by the waste management Contractor during the offshore seismic activities.

6.2.2 WASTE QUANTITIES

The following Table 1 provides a summary of the following characteristics:

- waste description;
- type of waste and code according to EWC (European Waste Catalogue);
- waste details, and;
- expected quantities.

It has to be underlined that waste quantities were estimated based on conservative assumptions, thus smaller amounts of waste are generally expected to be produced during the seismic activities.

Quantities have been updated taking into consideration the registered quantities for the waste typologies produced during the seismic activities of previous similar activities.

Table 1: Types of Wastes Potentially Generated during Project Activities

HW /NH	EU code	Waste description	Waste details	Amount estimated for the project duration (m^3)
NH	07 02 99	Streamer skin	Cable, etc	2
NH	19 12 04	Ropes	Rubber and Plastic	30
NH	17 02 01	Wood	Dunnage and Lining, etc	10
NH	18 01 04	Medicine	Medical Equipment	0.50
HW/ NH	02 01 10*	Metal	Scrap Products, Tins, Cans	10.00
NH	17 02 02	Glass	Used or Damaged Glass	0.05
NH	15 01 01	paper and cardboard packaging	Paper, Carton, Card-boxes	20
NH	20 03 01	Food Waste	Kitchen and Canteen	1
NH	20 01 25	Edible oil and fat	Cooking Oil	0.50
HW	16 01 07*	Used Oil Filters	Used or damaged oil fil-ters	20
HW	13 08 99*	Waste oil	Used Hydraulic oil/fuels	3.00
HW	14 06 03*	Aerosols	Lighters, etc	0.20
NH	16 06 05	Dry Cell Batteries	Lithium Batteries	0.30
NH	16 06 04	Alkaline Batteries	Camera, Wireless Mouses, etc	0.20
HW/ NH	16 02 13* & 17 04 01	Electrical Waste	Wire, damage smoke alarm	1.50
HW/ NH	08 03 17*	Electrical Waste	Used toner and other printer cartridges	2.00
HW	16 02 09*	Electrical waste	Used light bulbs, fluores-cent tubes	1.0

Note: The codes listed above are provisional and based on assumptions; however, it should be noted that the waste code in practice would be determined from analytic tests once the waste is generated and stored at the temporary site.

7.0 WASTE CLASSIFICATION, STORAGE, LABELLING AND TRANSPORTATION

7.1 CLASSIFICATION

7.1.1 Waste Colour Coding

All personnel have the responsibility to ensure proper waste collection and segregation. The containers for collecting and storing the wastes will be of different colours and appropriately labelled, as follows:

- red colour, for plastic waste such as miscellaneous packaging materials (non hazardous), empty plastic bags, plastic cups/spoons, plastic bottles;
- blue colour, for paper waste such as scarp paper, cardboard, napkins, paper tissue;
- green colour, for glass waste such as glass bottles or containers, broken glass;
- orange colour for food waste, such as waste food from the galley and others, tea dye, toothpick;
- yellow for metallic waste, such as used/damaged tubular and pipes, damaged slings, non-hazardous metallic packaging, beverage cans, drums, miscellaneous scrap metals;
- black for hazardous and contaminated waste, such as; batteries, toner/cartridges, used lamps, used lube oils, filters, adsorbents, waste paint and thinners, waste chemicals, medical waste, electronic waste, oily rags, contaminated Personal Protective Equipment (PPEs).

Wastes shall not be mixed, as mixing could result in chemical reaction or reclassification of wastes.

In case of new typology of waste, the following shall be considered:

- waste not contaminated with oil, grease, solvents, paints and others shall be considered as Contaminated Waste and shall follow the management procedures;
- waste contaminated by oil, grease, solvents, paints and/or chemicals shall be considered as Non-recyclable Waste and shall be recorded and stored in a separate container.

7.1.2 Seismic Vessel

Waste classification for identification and transportation is based on:

- the European List of Waste (Commission Decision 2000/532/EC), Amended by European Union – Commission Decision (EU) No 2014/955/EU "on the list of waste", December 2014;
- Annex III to Directive 2008/98/EC.

The seismic Contractor and Eni Myanmar will need to sign a bridging document. Classification is always in accordance with the legal requirements (local and EU Regulations).

For any produced waste whose characteristics are not known through prior knowledge and that may exhibit one or more hazardous characteristics (e.g.: flammable, ignitable,

toxic, mutagenic, reactive, corrosive, etc.), the following sources should be referred for its classification:

- safety data sheet, waste profile sheet or other information documents;
- information from manufacturer;
- knowledge of the process generating the waste;
- historic information;
- laboratory analysis.

In any case, when a produced waste is showing uncertain characteristics it is to be classified as hazardous.

Waste segregation must be ensured both at the temporary storage site at the Seismic Contractor and at the authorized company waste management facility.

7.2 STORAGE

7.2.1 SEISMIC PROGRAM WASTE STORAGE AREAS (WSAS)

An exclusive segregated space is arranged in the seismic vessel in order to temporary accommodate waste produced. The waste storage area is paved with covered, fenced and provided with dedicated collection system.

The waste produced in the seismic vessel will be collected every day from the containers set all around the vessel and they will be segregated at the temporary storage area. The main vessel wastes will be transported by the support/chase vessel to the shore and an agreement will be fixed with the licensed waste management contractor and the port authority to transfer the wastes to the Waste Management facility.

7.2.2 BEST PRACTICES

The following best practices guidelines to be followed for the appropriate storage of wastes:

- wastes will be stored in containers that are in good condition (i.e. no severe rusting or apparent structural defects);
- wastes will be stored in compatible containers (i.e. the waste would not react with the container and impair its ability to contain waste);
- incompatible wastes, both in the sense of reactivity and the wastes requiring different treatment and/or disposal methods, will not be placed in the same container;
- empty containers, which had contained raw materials, will be used for storing waste provided that the waste is compatible with any residues that may be left in the container;
- where practical, waste containers will be stored in single layers (i.e. not stacked);
- containers will be stored in a manner that limits the ability of spilled materials to migrate laterally or into the water. For the Base Camp, materials such as concrete or metal catch pans, or prefabricated secondary containment units may be used. In all cases, the base

material should be designed to support, and not be damaged by, the weight of the containers when full;
- liquid wastes and oily sludge containing free liquids will be stored in closed containers (e.g. drums or tanks). Such containers will be properly sealed and not be leaking;
- all containers containing wastes will be clearly labelled or marked with the type of waste and its hazards. For instance, containers of hazardous substances will display appropriate hazard warning labels (e.g. flammable liquid, corrosive material, poison, etc.);
- the packaging will be secure enough to prevent leaks, spills, and vaporization during transportation.

7.2.3 Container Types

The characteristics of the proposed waste containers are described in the following paragraph.

Waste bins

Waste bins are located in appropriate positions (e.g. accommodation) in order to allow for an effective waste collection and segregation. Bins will be in different colour and properly labelled with regard to the specific typology of waste, as shown in the Figure 2 below.

Figure 2: Example of clearly labelled wheelie-bins with colour-coded lids

Containers for Hazardous waste

Appropriate containers will be located in appropriate positions (e.g.: workshop) in order to allow segregated collection for specific hazardous waste typology (e.g.: batteries, lamps, lube oils), as shown in the Figure 3 and Figure 4 below.

Figure 3: Example exhausted Batteries Container

Figure 4: Example used Lamps Container

7.3 LABELING

All waste containers will be adequately labelled/marked with the contents prior to shipment.

The Waste Contractor will ensure that the waste containers are correctly labelled in compliance with ADN requirements for their transportation to the authorized treatment/disposal facility. Labelling placards will be appropriately posted on the containers. ADN labelling will be used according to the waste and it will be transported at each trip.

7.4 TRANSPORTATION

7.4.1 COLLECTION AND TRANSPORTATION PROCEDURE

For the collection and transport of the waste, a specific procedure will be established by the waste contractor/port authority to be followed during the collection and transportation of seismic waste from the vessel to the treatment facility.

The waste contractor/port authority holds a business license for the management of hazardous and non-hazardous waste.

The procedure is to include:

- responsibilities;
- relevant documents;
- process: general, collection organization, collection and transportation order, preparation, collection, transportation.

In particular, once the wastes will reach the shore, the collection and transportation will be carried out using vehicles that are listed in the waste permit and designed to transport the type of waste produced. Drivers shall be licensed and authorized to transport the typology of waste produced. Every collection of waste must be accompanied by the following documents:

- Waste manifest;
- Collection and transportation work instructions;
- Risk Assessment Document;
- Identification and monitoring of Hazardous Waste transportation form;
- Road Spillages Emergency Plan.

The waste weight will be estimated at the site prior to transportation by determining volume of different types of wastes. The container will be loaded on approved waste management waste transport vessel for their transportation. Waste will be weighed at the waste contractor Waste Management Facility upon arrival. The seismic contractor will need to review all actual waste manifest and resolve any discrepancies between estimates and actuals.

The waste contractor will provide appropriate waste transport vessel for the transportation of the waste equipped with adequate fittings to transport the proposed containers.

Waste transport vessel will follow a preventive inspection and maintenance program. Each vessel will be equipped with the following:

- necessary equipment with instructions according to the Hazardous Waste Management Permit;
- appropriate labelling and additional equipment according to ADN rules.

Waste container will be transferred to the authorized facilities. Containers will be stored in an appropriate area or emptied and returned to the seismic vessel as appropriate.

7.4.2 WASTE IDENTIFICATION AND TRANSFER FORM AND TRACKING

The waste collected by the waste management Contractor at the Seismic vessel will be identified and tracked.

The Waste Management Facility will maintain data on the time and place of each collection, the transportation route and delivery at the installation. The system provides information on all transportation journeys thus ensuring that collected waste is managed in accordance with the specified environmental standards and in accordance with applicable waste contractor and government regulations.

The collected waste amount will be reported by the appointed transporter. This information will contain the following details: date of collection and time, generator of the waste, vessels and disposal company identification and waste information (code and quantity).

The Waste Management Tracking System will apply to all material that will be sent to the waste management site. This shall allow for the following:

- to provide a control mechanism for the safe handling, transport, and treatment of wastes to demonstrate environmental, health and safety compliance;
- to monitor waste streams in a consistent manner throughout the project.

The waste management Contractor will ensure that:

- the segregation and documentation of all wastes is in accordance with the applicable requirements and documentation system prior to their removal from the site;
- the Waste Manifest is completed with the signature of the seismic contractor at the moment of its collection/removal and transportation. A continuously numbered, dated copy of the Waste Manifest shall accompany each transfer of the waste to be disposed of. Waste contractor, shall hold a record of all the Manifests and the Transportation Logs issued in a permanent record;
- all hazardous waste shall be accompanied by a Waste Information Sheet similar to an MSDS or laboratory test results during shipment (an internal HSE document aiming to

identify the waste in accordance to its classification) to ensure the safe handling and storage of the waste when subjected to treatment. At the Waste Management Facility, the wastes will be sampled to determine classification and appropriate treatment requirements. The maintenance of such a log allows a record to be maintained of all wastes collected at any time;

- waste transports vessel and any other waste management services provided are licensed in compliance with local regulations;
- suitable equipment must be available for the required transport and other related services;
- appropriate incident reporting and any contingency response procedures must be in place.

Waste contractor and the Seismic Contractor will maintain waste registries as defined in Appendix C, which includes the Confidential Waste Profile Sheet.

7.4.3 SPILL CONTROL MEASURES

The Waste Management Transporter will ensure that waste transport vessels are not overloaded.

The support vessels that transfer the wastes from the main vessel or the support vessel otsel itself to the shore as well as the drivers of the approved truck to transfer the wastes from the shore to the licensed facility, will be provided with PPE and a spill containment kit, containing absorbent materials, (pads, rolls or granules), impermeable gloves and a shovel, should any accident with potential spillages during transport, or marine traffic incident involving wastes occur.

Specific procedures will be established by the Waste Management Transporter for emergency situations. In the event of any spillage of hazardous material the initial response will include the following:

- notify Eni Myanmar Superintendent and the Seismic contractor of the incident;
- if able, without risk, and if correct PPE is available, attempt to stop the source of the leak/spill;
- attempt using either spill containment kit or available absorbent material, (oil etc.), to contain the spread of the material;
- all contaminated material resulting from cleaning up the spill shall be contained within proper containers. This material must be disposed of as hazardous waste.

Should any spillage occur on a marine, local Authorities will be timely informed by Eni Myanmar.

8.0 ROLES AND RESPONSIBILITIES

Roles and responsibilities for the involved parties are reported in the following Section.

Prior to waste management collection, transportation and disposal, waste contractor will conduct laboratory analytic tests on an amount of sampled wastes to correctly establish the EU code assigned to the wastes; other complementary information can be collected from Material Safety Data Sheets and process knowledge. This will assist to ensure that proper storage and handling procedures are in place.

An Audit and inspection of the Waste Management Facility has been conducted and future audits will be completed during operations to check the conformity of disposal to what has been required.

8.1 WASTE TRACKING PROCEDURE

Seismic Contractor (Producers of waste) onboard of the vessel: issue five (5) copies of the Waste Manifest (in carbon copies), which will be signed at their stage by:

- support/chase Vessel, which transfers the wastes to the shore,
- waste transporter onshore, which moves the wastes from the port to the licensed facility,
- waste facility receiving the wastes which keeps a copy for the site and send the last one signed for receival back to the vessel to close the loop.

The waste manifest is reporting the following:

- date and number of issuance;
- issuer name and signature (seismic camp manager name & signature);
- waste generator company name , transportation company (waste contractor or a third party company) and waste service company:
- waste classification:
- kind: hazardous, non hazardous, others,
- name: identification of the waste (e.g. plastic, glass, wood, etc …),
- quantity: description of waste amount or waste weight estimation,
- style of packing: description of containers,
- remark: actual weight waste from waste contractor ,
- waste classification code is to be assigned by waste contractor,
- Request the transportation company signature for all the waste manifest copies.

9.0 TRAINING

All contractor personnel will be trained on the eni Myanmar Waste Management Plan, so they can become familiar with the reporting procedures and the entities involved in the management of the wastes derived by the seismic activities. Training of personnel will take place at the following frequency:

- New Personnel will be initially trained to ensure familiarity with the Waste Management Plan prior to beginning their job assignments (applicable to all shift changes);
- Specific training will be provided for the management of hazardous wastes;
- Refresher training will be conducted whenever there are inadequacies in management of waste (classification, storage, handing) or when deviations from the Waste Management Plan are observed.

10.0 REFERENCES

eni Code of Ethics “I. General Principles: Sustainability and Corporate Responsibility, MyEni website

eni spa - Form 231 (Modello 231) and “Sensitive Activities and Specific Control Standards of Model” (available on Myeni intranet site)

Management System Guideline (MSG) “HSE” and related Annexes (msg-hse-eni spa)

Management System Guideline (MSG) “HSE” Annex E-G: Waste Management

Management System Guideline (MSG) “HSE” Annex F HSE Risk Management

Professional Operating Instruction: Analysis and control of environmental aspects with potential 231-interferences, May 2014 (opi hse 008 eni spa r01)

Professional Operating Instruction "HSE Reporting" (opi sg hse 003 e&p)

Professional Operating Instruction: Identification of significant environmental aspects (opi sg hse 028 ups)

eni e&p Division – Standard n. 1.3.6.08, “Managing Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) in Liquid and Gaseous Hydrocarbon production, treatment and transport activities”, available on Myeni website.

Technical Guideline: Assessment and Remediation of Potentially Contaminated Sites (AMTE TG 009)

Technical Guideline: Sustainable Water Management for the Upstream Sector (AMTE TG 012)

Waste Management in Upstream Oil & Gas Activities AMTE TG 010

IGES, June 2016, Quick Study on Waste Management in Myanmar, Current Situation and Key Challenges,

MARPOL 73/78 “International Convention for the Prevention of Pollution from Ships”

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APPENDIX A

Offshore Discharge Program
for the Seismic Operations

Table A.1: Offshore Discharge Program for the Seismic Operations

Discharge [1]	Limitations and prohibitions	Disposal/Treatment Methodology	Estimated Quantities	Monitoring/Reporting
Sewage	**MARPOL Annex IV** As indicated in Regulation 11, discharge of sewage (including blackwaters from toilets and any hospital grey water) is prohibited, except when: • the ship has approved sewage treatment plant certified in accordance with the provision of Regulation 9.1.1; and • the test result of the plant are reported in the International Sewage Pollution Prevention (ISPP) certificate; and the effluent will not produce visible floating solids nor cause discoloration of the surrounding water.	The seismic vessel is provided with the "Statement of Compliance for Sewage Pollution Prevention" certificate and equipped with a "Sewage Treatment Plant" in compliance with MARPOL Regulation 9 and 10, Annex IV. The sewage treatment plant is a marine sanitation biological device that produces an effluent with a minimum residual chlorine concentration and no visible floating solids or oil and grease, according to the MARPOL's Annex IV. The plant is composed of (i) Aeration Tank, (ii) Settling Tank and (iii) Disinfection Tank. The sewage is clarified and disinfected and then discharged in accordance to MARPOL Annex IV (Regulation 9, 10 and 11). The plant is equipped with alarms in case of any malfunction.	Estimated total quantity for sewage is: 0.5 $\times 10^0$ m^3	The Statement of Compliance certificate is periodically renewed. The plant is equipped with alarms in case of any malfunction. During the operation attention will be paid to any presence of floating solids or discoloration of the surrounding waters. eni Myanmar has developed a procedure for planning, monitoring and reporting of HSE indicators. Monitoring is applicable to all eni Myanmar sites and operations and involves the whole organization structure and the Contractors involved in the project activities. Monthly data are collected in order to monitor the HSE parameters, including all treated wastewater.
Grey Water **Oily Water**	• According to MARPOL Resolution MEPC.219(63), adopted on March 2012, on Guidelines for the implementation of MARPOL Annex V, grey water means drainage from dishwater, shower, laundry, bath and washbasin drains. Grey water does not include drainage from toilets, urinals, etc., as defined in Annex IV (sewage), it does not include drainage from cargo spaces, it is not considered garbage in the context of Annex V (garbage).	Oily water includes bilge waters (the water collected in the lowest compartment of a ship) and drainages from decks and rooms. Bilge water are collected into the bilge holding tank. Bilge waters shall pass through an oil-water separator (OWS) in which the oil is separated in two stages prior to its discharge. After the treatment the treated water (<15 ppm or mg/l) can be discharged overboard,	Estimated total quantity of gray water is: 1.5×10^0 m^3 Deck drainage water is variable depending above all on the rainfall amounts, therefore the discharged volumes are variable.	Eni Myanmar has developed a procedure for planning, monitoring and reporting of HSE indicators. Monitoring is applicable to all eni Myanmar sites and operations and involves the whole organization structure and the Contractors involved in the project activities. Monthly data are collected in order to monitor the HSE parameters, including water discharge with no need for treatment.

Discharge [1]	Limitations and prohibitions	Disposal/Treatment Methodology	Estimated Quantities	Monitoring/Reporting
	MARPOL Annex I According to Regulation 39, for fixed or floating platforms including seismic and support/chase vessels when engaged in the exploration of hydrocarbons discharges within special areas of oil or oily mixtures shall be prohibited except when: • the oil content of the discharge without dilution does not exceed 15 ppm.	according to MARPOL Annex I and Offshore Protocol Article 10 requirements. The OWS are yearly checked by ABS and are provided with the five years International Oil Pollution Prevention Certificate (IOPP), in respect of the provisions of the resolutions MEPC.139(53). If the treated oily wastewater still exceeding the 15 ppm, these water have to be sent to the licensed contractor onshore. Oily waste and sludge from separation processes will be transported onshore (in accordance with Offshore Protocol - Annex V).		The OWS are equipped with an automatic monitoring system and alarm in case the discharge water shall exceed the 15 ppm content. To monitor the oil content in the discharge water from the Slop Treatment Unit, an oil-in-water analyzer (UV fluorescence) is used. Monthly data are collected in order to monitor the HSE parameters, including all treated wastewater.
Food Waste	**MARPOL Annex V** As indicated in Regulation 4, the disposal into the sea of food wastes may be permitted when they have been passed through a comminuter or grinder from fixed or floating platforms located more than 12 nautical miles from land. Such comminuted or ground food wastes shall be capable of passing through a screen with openings no greater than 25 mm.	Regarding the food waste (organic and rotting waste from kitchens) the vessels are provided with food scrap macerator unit for the disposal of food into the sea, located in the galley. The food waste is ground passing through a 25-mm mesh and discharged in accordance with MARPOL Annex V, considering that block location is more than 12 nm from land.	Estimated quantities of food waste is 0.3 m^3/day.	-
Plastics (synthetic ropes, fishing nets and plastic bags) **All garbage**	**MARPOL Annex V** As indicated in regulation 5, disposal of plastics including but not limited to: synthetic ropes, fishing nets, plastic garbage bags is prohibited. **MARPOL Annex V** As indicated in Regulation 5, all other garbage including paper product, rags, glass, metal, bottles, crockery, dunnage, lining and packing material is prohibited.	All plastic waste is collected separately and sent onshore for treatment. No disposal will be carried out in compliance with the MARPOL requirements. All non biodegradable garbage is collected separately and sent onshore for treatment. No disposal will be carried out in compliance with the MARPOL requirements.	- -	- -

APPENDIX B

Waste Delivery Manifest

WASTE DELIVERY MANIFEST

Details or orgin/consingor	
Vessel name:	
Port of Registery:	
Flag:	
Callsign:	
IMO number:	
Person responsible onboard	
Email address	

Group	Group	Waste Category	Amount	Unit	Remarks
A	1	Cable-Skin			
A	1	Ropes-Rubber and Other plastic waste			
F	2	Wood-Dunage –Ling etc			
F	3	Medicines-Medical Equipment			
F	3	Grounded Products, non recyclable			
C	4	Metal-Scarp Products			
C	4	Tins-Cans			
C	4	Glass			
C	4	Paper, Carton, Cardboxes			
C	5	Food Waste			
B	5	Cooking Oil			
D	6	Incinerator ash (if any)			
E	7	Incinerator ash from plastic (if any)			
E	7	Chemicals-Paint-Used Oil etc			
F	7	Aerosols-Lighters, etc			
F	7	Used Oil filters-Rags etc.			
F	7	Lithium Batteries			
F	7	Other Batteries			
F	8	Electrical Waste, Electronics, Printer Toners			
F	8	Used light bulbes, fluorescent tubes			
G	9	Cargo Residues			
H	9	Animal Carcass (es)			
I	9	Fishing Gear			
	9	Other			

Consignor/Origin of Waste	Consignor/Forwarder of Waste	Final receiver of waste

Signature, name, date and stamp	Signature, name, date and stamp	Signature, name, date and stamp

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APPENDIX C

Waste Classification Codes

HW/NH	EU code	Waste description	Waste details
NH	07 02 99	Streamer skin	Cable, etc
NH	19 12 04	Ropes	Rubber and Plastic
NH	17 02 01	Wood	Dunnage and Lining, etc
NH	18 01 04	Medicine	Medical Equipment
HW/NH	02 01 10*	Metal	Scrap Products, Tins, Cans
NH	17 02 02	Glass	Used or Damaged Glass
NH	15 01 01	paper and cardboard packaging	Paper, Carton, Cardboxes
NH	20 03 01	Food Waste	Kitchen and Canteen
NH	20 01 25	Edible oil and fat	Cooking Oil
HW	16 01 07*	Used Oil Filters	Used or damaged oil filters
HW	13 08 99*	Waste oil	Used Hydraulic oil/fuels
HW	14 06 03*	Aerosols	Lighters, etc
NH	16 06 05	Dry Cell Batteries	Lithium Batteries
NH	16 06 04	Alkaline Batteries	Camera, Wireless Mouses, etc
HW/NH	16 02 13* & 17 04 01	Electrical Waste	Wire, damage smoke alarm
HW/NH	08 03 17*	Electrical Waste	Used toner and other printer car-tridges
HW	16 02 09*	Electrical waste	Used light bulbs, fluorescent tubes

Any waste marked with an asterisk (*) is considered as a hazardous waste pursuant to Directive 2008/98/CE on hazardous waste, and subject to the provisions of that Directive unless Article 20 of that Directive applies

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APPENDIX D

Wastewater Management

MANAGEMENT OF GENERATED WASTES

The following paragraphs provide an estimate of the typical waste and source of waste resulting from project activities. In addition, the waste management measures are defined.

It has to be highlighted that the waste produced will be stored in proper containers at the seismic camp. The waste will then be collected upon call by the appointed licensed waste Contractor, within the minimum timeframe, and transferred to the waste management facility according established procedures.

The waste contractor will be responsible for the transportation and treatment/disposal of the waste at the Waste Management Facility.

Hazardous Waste

Spent Hazardous Chemicals

This waste typology includes any surplus, off specification, discarded or contaminated chemicals (solvents, paints, etc.) used during seismic activities.

These wastes will require specific segregation and disposal techniques.

After transportation to the Waste Management Facility, the waste will be stabilized and replaced to other containers, possibly recycled for use as fuel mainly and or sent to the hazardous waste landfill and to the water treatment facility.

Spent Lubricants and Exhausted Oils

This waste includes exhausted lubricants and oils from activities of light maintenance carried out at the vessels.

These wastes will require specific segregation and disposal techniques.

After transportation to the Waste Management Facility, the waste will be stabilized and sent to the hazardous waste landfill or to the water treatment facility, or replaced to other containers and possibly recycled for use as fuel mainly.

Contaminated Wastes

This typology includes packages and metals with presence of dangerous substances (e.g. oils), wastes contaminated during routine operations, maintenance activities and oil spill clean-up materials that can be produced.

These wastes will require specific segregation and disposal techniques. After transportation to the Waste Management Facility, the waste will be stabilized by mixing it with incombustible materials after shredding it and sent to the hazardous waste landfill.

Packing materials made of plastic, metal and glass will go through the washing line for decontamination and once cleaned will be sent to recycling in authorized facilities. Wood, paper and film material packing (e.g. big bags) will go through shredding stabilization line for the production of Alternative Solid Fuel (ASF) for the incinerator or local cement factories.

Accumulators and batteries

This typology includes industrial and automotive type lead-acid cell batteries and commercial size nickel-cadmium, lithium, and mercury cell batteries, all classified as hazardous. Non-industrial batteries including household and single cell batteries used to power small electronic equipment such as flashlights, radios and watches are considered general trash and are not included in this waste stream.

After transportation to the Waste Management Facility, the batteries will be sorted into lead-acid cell batteries and others. As for lead-acid cell batteries, it will be dismantled into the electrolytic solution and other parts. The former will be disposed in the water treatment facility, and the latter will be recycled. As for others, it will be discharged electricity and stabilized and sent to the hazardous landfill.

Electronic wastes

Electronic wastes include discarded electrical detonator wires, smoke alarms or electronic devices.

After transportation to the Waste Management Facility, the waste will be washed and sorted into recyclable and non-recyclable materials for recycling. If can't recycle, they will be stabilized and sent to the hazardous landfill.

Contaminated Electronic wastes

Contaminated electronic wastes include contaminated cables with oils or chemicals.

After transportation to the Waste Management Facility, the waste will be washed and sorted into recyclable and non-recyclable materials for recycling. If can't recycle, they will be stabilized and sent to the hazardous landfill.

Glass bulbs and used lamps

Glass and bulbs used lamps, fluorescence bulbs, halogen light, mercury light used in the Seismic vessel are included in this typology.

After transportation to the Waste Management Facility, the waste will be:

- Lamp crushing/packing at an authorized facility
- Any gas released during the crushing is collected and treated in an active carbon filter.

Glass will be sorted for recycling and remainder stabilized and sent to hazardous waste landfill.

Medical wastes

Medical Wastes include infected gauze, gloves, tissues, cotton balls, suturing tread, intravenous sets.

After transportation to the Waste Management Facility, the waste will be stabilized and sent to the hazardous waste landfill.

Cooking Oil & Grease

Cooking Oil and Grease waste coming from the kitchens at the Seismic vessel.

It is estimated that there will be 100 kg/mo or 600 kg during the project.

Cooking Oil & Grease wastes will be collected and stored at the vessel.

After transportation to the Waste Management Facility, the waste will be stabilized and replaced to other containers, possibly recycled for use as fuel mainly and or sent to the hazardous waste landfill and to the water treatment facility.

Non Hazardous Waste

Mixed Metals, scrap metal and empty metal drums

This waste typology includes:

- any metallic non-contaminated materials (parts, pipes, etc.) used at all stages of seismic activities. These wastes will require specific segregation and disposal techniques;
- scrap metal may include sheet metal, piping, used casings and tubulars, electrical cables and other wire, empty drums/containers, pump housings, valves, fittings, used process equipment and vehicle parts discarded;
- metal containers are used for a wide range of uses throughout the activities. A container is considered empty if all material has been removed that can be removed using the removal practices commonly employed for that type of container (e.g., pouring, pumping, aspirating). To the extent possible, the empty container should be dry and decontaminated. Containers that contain quantities of residues will be managed based on the characteristics of the contained material.

After transportation to the Waste Management Facility, the waste will be sorted into recyclable and non-recyclable materials for recycling. If can't recycle, they will be sent to the non-hazardous landfill after cutting it less than about 30cm.

Mixed waste (paper, plastic, wood) and plastics

This includes discarded items from several areas including kitchens and dining areas, bathrooms, laundry, offices, warehouses, etc. as well as plastics, eventually from segregation.

After transportation to the Waste Management Facility, the waste will be sorted into recyclable and non-recyclable materials for recycling. If can't recycle, they will be sent to the non-hazardous landfill.

Wood Packaging

This waste typology includes any wooden packaging materials (wooden pallets, boxes, etc.) used at all stages of seismic activities. These wastes will require specific segregation and disposal techniques. Most are packaging from boxes carrying explosive.

After transportation to the Waste Management Facility, the waste will be sorted into recyclable and non-recyclable materials for recycling.

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Paper and Cardboard

This waste typology includes any paper and carton packages (carton boxes, etc.) used at all stages of seismic activities. These wastes will require specific segregation and disposal techniques.

After transportation to the Waste Management Facility, the waste will be sorted into recyclable and non-recyclable materials for recycling. If can't recycle, they will be sent to the non-hazardous landfill after cutting it less than about 30cm.

Annex C

JNCC Guidelines

JNCC guidelines for minimising the risk of injury to marine mammals from geophysical surveys

April 2017

For further information please contact: Joint Nature Conservation Committee Inverdee House, Baxter Street, Aberdeen, AB11 9QA, United Kingdom	Email: seismic@jncc.gov.uk Tel: +44 (0) 1224 266550 Fax: +44 (0) 1224 896170 http://jncc.defra.gov.uk/

Contents

Introduction

It is recognised that sound generated from geophysical survey sources has the potential to cause injury (e.g. hearing damage) to marine mammals (cetaceans and seals). Seismic surveys in particular (although not limited to) have the potential to result in a deliberate injury offence as defined under UK regulations[1] to European Protected Species[2] (EPS). "Deliberate" has been interpreted in European Commission guidance as "actions by a person who knows, in light of the relevant legislation that applies to the species involved, and the general information delivered to the public, that his action will most likely lead to an offence against a species, but intends this offence or, if not, consciously accepts the foreseeable results of his action"[3]. Therefore, anyone carrying out certain activities which they should reasonably have known could cause injury as in the regulations could be committing an offence.

The mitigation measures outlined in these guidelines have been adopted as part of the consenting regime for geophysical activities within the United Kingdom Continental Shelf (UKCS) to reduce the risk of deliberate injury to marine mammals. These guidelines were originally written with the oil and gas industry in mind, however since their conception the use of geophysical technology by other industries in the marine environment has grown. Subsequently, any geophysical survey that has the potential to result in injury to marine mammals should apply the mitigation measures outlined in these guidelines (or an alternative as agreed with the relevant Regulator). Whilst the mitigation measures in these guidelines have some limitations and their effectiveness has not been and may not be able to be fully tested, they are based on reasonably conservative assumptions. It is considered that compliance with these guidelines constitutes best practice and will, in most cases, reduce the risk of deliberate injury to marine mammals to negligible levels.

The focus of these guidelines is marine mammals, however they could be adapted to help reduce the risk of deliberate injury to other marine species if deemed appropriate by the relevant Regulator. For example, other potentially sensitive species include marine turtles, also listed as EPS, and several shark species including basking shark which are UK priority marine species[4].

JNCC has no objections to these guidelines being used in other territories, however we would encourage all operators determine if any special or local circumstances apply, as these guidelines are not intended to be used where local mitigation guidance has been adopted.

[1] Regulation 41(1a) of the Conservation of Habitats and Species Regulations 2012; Regulation 39(1a) of the Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2012; Regulation 34(1a) of the Conservation (Natural Habitats, &c.) (Amendment) Regulations (Northern Ireland) 2015; Regulation 39(1a) of the Offshore Marine Conservation (Natural Habitats &c.) Regulations 2007 (as amended); Regulation 10(a) of the Offshore Petroleum Activities (Conservation of Habitats) Amendment Regulations 2007.
[2] Species listed on Annex IV of the Habitats Directive2 and in UK waters includes all cetacean species
[3] Section 1.2.1 in The protection of marine EPS from injury and disturbance (JNCC et al., 2010)
[4] http://jncc.defra.gov.uk/page-5167

The following document has been divided into three sections:

- **Section 1**: Background information to assist with survey planning;
- **Section 2**: Mitigation guidelines;
- **Section 3**: Reporting.

Appendix 1 includes a glossary of the terminology used within these guidelines, Appendix 2 provides further details on reporting requirements and Appendix 3 the compliance advice form. In addition, a separate JNCC Guidelines Frequently Asked Questions (FAQ) document is available, which should be read alongside the guidelines[5].

These guidelines were originally prepared by a working group convened by the then Department of the Environment. They have subsequently been reviewed four times by JNCC following consultation with relevant stakeholders. In addition to comments received from stakeholders, the current revision has also considered the 2015 review of marine mammal observer (MMO) data and compliance (Stone, 2015 a and b), new research into potential impacts to marine mammals from anthropogenic noise and new developments in geophysical and monitoring technology.

[5] http://jncc.defra.gov.uk/marine/seismic_survey

Section 1: Planning

The following information is provided to assist personnel involved with geophysical surveys, however should not be seen as definitive advice. When planning a geophysical survey, the applicant should identify and contact the appropriate Regulator and Statutory Nature Conservation Body(s) (SNCB) for specific survey advice as required.

Current UK Regulators, to which these guidelines could be relevant, include the Department for Business, Energy and Industrial Strategy (BEIS)[6], the Marine Management Organisation, Marine Scotland, Natural Resources Wales (NRW), Department of Agriculture, Environment and Rural Affairs (DAERA) and the Planning Inspectorate (PINS). The SNCBs are JNCC (offshore waters), Natural England (English territorial waters), Scottish Natural Heritage (Scottish territorial waters), Natural Resources Wales (Welsh territorial waters) and the Department of Agriculture, Environment and Rural Affairs (Northern Irish territorial waters).

1.1. Consent

It is the responsibility of the organisation planning a geophysical survey (referred to as the applicant) to assess the potential for a deliberate injury and deliberate disturbance[7] offence because of their survey and if the survey will occur within or near any Marine Protected Areas (MPAs), for example SACs. The applicants' assessment will be reviewed by the Regulator and appropriate SNCB(s) on a case by case bases. Further assessment (i.e. Habitats Regulation Assessment) and licensing requirements (i.e. EPS licence) may be deemed necessary by the Regulator.

The SNCBs have provided guidance on '*The Protection of Marine European Protected Species from Injury and Disturbance*' which can assist with applications within English and Welsh territorial waters and the UK offshore marine area. To obtain a copy of the latest version, please contact JNCC. Further EPS guidance for Scottish territorial waters has been produced by Marine Scotland (Marine Scotland, 2014).

The standard radius of the mitigation zone referred to in these guidelines is 500m**.** If during the environmental risk assessments submitted during the application process the potential injury zone is estimated to be different from 500m, the size of the mitigation zone can be adjusted by the Regulator if necessary**.** Alternative mitigation zone sizes can also be proposed by the applicant during the application process, but require a clear rationale, potentially some noise propagation modelling to justify any proposed changes. If mitigation measures discussed within these guidelines are not practical because of changes to mitigation zones, this should also be discussed within the application and alternatives suggested. For advice regarding noise thresholds to be used as part of any assessment, please refer to the EPS guidance and contact the appropriate SNCB(s).

[7] While these guidelines to not deal with disturbance directly, it is considered the mitigation measures contained may assist in reducing potential disturbance.

Typically, any survey consent issued will include a general consent condition that these mitigation guidelines are followed. Furthermore, key elements of the guidelines of particular relevance to the survey in question may also be incorporated as detailed consent conditions by the Regulator. It is the Regulator who ultimately outlines the final consent conditions for an application (taking account of SNCB(s) advice during the consultation), and not the SNCB(s) themselves.

It is the responsibility of the company issued consent (the applicant) to ensure these guidelines are adhered to. Compliance with these guidelines is also usually a condition of any EPS license issued.

Not all geophysical surveys across different industry sectors are subject to a formal consenting process i.e. some surveys require notification (to the Regulator) only. However, the mitigation principles outlined in these guidelines should still be considered and applied where appropriate. The organisation undertaking the survey is still required to determine whether an offence of deliberate injury (and disturbance) may occur because of the survey and apply appropriate mitigation to reduce the risks. Attention should be paid to surveys occurring in MPAs (Section 1.3).

1.2. Survey considerations

The applicant is expected to make every possible effort to design a survey that minimises the sound generated and the likely impacts to marine mammals. Early consultation with the appropriate Regulator and SNCB(s) is encouraged, particularly for situations not specifically covered in these guidelines. Discussions on the use of new seismic techniques or mitigation measures are also welcomed.

When planning a geophysical survey, the following should be considered:

- Use the lowest practicable power levels needed to achieve the survey objectives and seek / consider methods to reduce and or buffer unnecessary high frequency noise produced.
- Airgun firing (including testing) must not occur at any time above the maximum production volumes outlined in the consent conditions.
- Determine what marine mammal species are likely to be present in the survey area and identify if the survey is to occur within or near an area of importance for marine mammals (See Section 1.3). Assess the likelihood of deliberately injuring or disturbing marine mammals and include this assessment as part of the application or notification.
- Assess any seasonal considerations, for example, seal pupping, migration periods and routes and seasonal considerations in MPAs. When possible, plan surveys to avoid areas/ periods of high abundance and key seasons.
- Consider the direction of survey lines and distance to sensitive areas and coastline to reduce any potential for entrapment (i.e. prevent animals being trapped between the vessel and shoreline).

- Ensure sufficient MMO and Passive Acoustic Monitoring (PAM) operatives are employed, considering, for example, the size and location of the survey, the number of line turns and hence soft starts required, daylight hours and requirement for night-time operations. It is the applicant's responsibility (as they hold the consent) to ensure sufficient personnel are provided to prevent observer fatigue and meet Health and Safety requirements. SNCB(s) will recommend a minimum number of personnel, not maximum.
- Reliable lines of communication must be achieved between the MMO/PAM operatives and the crew. Copies of the consent (once available) and any other relevant documentation (electronic or paper) must be provided to the MMO/PAM operatives in sufficient time before any operations begin (Note: this is a condition of consent issued under the Offshore Petroleum Act).
- PAM should be used during periods when visual mitigation is not possible (e.g. darkness, low visibility). Operations should be delayed until conditions improve, unless an alternative method to visual surveys, such as PAM, is available and can be deployed.
- The PAM equipment chosen should be appropriate for the UK marine mammal species most likely to be found within the survey area in question. Options for PAM deployment should also be considered early within the planning stage to ensure it is used effectively (i.e. discuss with equipment supplier/ PAM operative etc.).
- Incorporate pre-shooting surveys and soft-starts into survey design. Where practical, time operations to commence during daylight hours to ensure visual mitigation by MMOs can be undertaken. If this is not achievable, note above points on PAM mitigation measures.
- When vessels are time-sharing, i.e. where two or more vessels are operating in adjacent areas and take turns to shoot to avoid causing seismic interference with each other, the guidelines must be applied on all vessels involved and clear communication channels are required to ensure effective mitigation between vessels.
- If dual source arrays are to be used, particularly if they are to be operated simultaneously rather than in an alternative manner (e.g. flip flop mode), the application should estimate the mitigation zone required to encompass the entire array and from where this distance is to be estimated (i.e. centre point between the two arrays). Any proposed alteration to the standard mitigation zone should be made clear in the in the survey application.
- No equipment testing should be undertaken outside of the consented operational area (or greater working area as defined in some applications).

1.3. Areas of importance

Areas of importance can be defined as discrete areas of important habitat to marine mammal species. These have the potential to be delineated and managed for conservation. Ultimately such areas could be designated as a Marine Protected Area (MPA), which in UK waters include:

- Special Areas of Conservation (SAC), designated under the EC Habitats Directive for habitats and species identified on Annex I and II respectively;
- Marine Conservation Zones (MCZs), created under the Marine and Coastal Access Act (MCAA) 2009 with the aim of protecting nationally important marine wildlife, habitats, geology and geomorphology in English and Welsh territorial and UK offshore waters; and
- Nature Conservation Marine Protected Areas (NC MPAs), created in Scottish seas under the Marine (Scotland) Act 2010 (inshore) and the MCAA (offshore) to conserve some of Scotland's most important marine wildlife, habitats and geodiversity.

With regards to survey applications, all proposed, possible and candidate MPAs are a material consideration within the consenting process.

All MPAs with a marine mammal species as a qualifying feature are considered an area of importance within the context of these guidelines. Consultation with the appropriate Regulator and SNCB(s) at the earliest opportunity is recommended when considering surveys within or near these areas. Additional mitigation requirements for operations in these areas may be required (e.g. combined use of MMO and PAM during daylight hours). Any requirement will consider (as a minimum) the size, duration and timing of the survey and the species most likely to be impacted.

West of Shetland

In addition to MPAs, the deep waters to the west of Shetland are considered an area of importance. Although this area does not currently have legal protection, the area is considered important for a variety of species, including some which do not occur elsewhere in UK waters i.e. deep diving species such as beaked whales and sperm whales. As such, variations to standard mitigation procedures (i.e. 60min pre-shooting searches) are implemented in this area (Section 2.1.2.1.1). Additional requirements such as the use of PAM to maximise detection potential may also be considered i.e. deep diving species are difficult to observe by visual mitigation methods alone.

1.4. Visual and Passive Acoustic Monitoring

The primary aim of these guidelines is to reduce the potential of deliberate injury occurring to marine mammals by monitoring a defined area (mitigation zone) prior to a noise source being switched on and delaying operations should a marine mammal be observed. Monitoring is achieved through a combination of visual and passive acoustic methods. No one method of detecting marine mammals is 100% effective for all species, rather it is considered that these methods seek to complement each other.

Visual monitoring is undertaken by a Marine Mammal Observer (MMO)[8]. It should be undertaken from the source vessel with the MMO located on a suitable platform enabling the best view of the mitigation zone and ahead of the vessel. It is acknowledged that weather conditions influence an observer's ability to visually detect marine mammals (e.g. Hammond

[8] Note the distinction between this mitigation role and that of a marine mammal surveyor (MMS), who undertakes surveys for research or monitoring purposes and may employ different monitoring techniques and survey methods.

et al., 2013; Northridge *et al.,* 1995), as does available daylight. Consequently, visual monitoring should be restricted to periods of good visibility and only be undertaken during daylight hours.

The use of **Passive Acoustic Monitoring** (PAM) was incorporated into the JNCC guidelines as a form of mitigation in 2002 and has been increasingly used as a tool for monitoring marine mammals during night time and poor visibility conditions. Specialist trained PAM operatives are needed to set up and deploy the equipment and to interpret detected sounds. It is acknowledged that current PAM systems are not suitable for detecting seals and some cetaceans (i.e. baleen whales) and has limited range for others (i.e. high frequency cetaceans). However, Stone (2015b) considered it a viable monitoring method during periods when effective visual monitoring is not possible.

Whichever PAM system is used it should be capable as much as possible of the following:

- Detecting the range of frequencies of marine mammal vocalisations expected to be present in the survey area;
- Detecting and identifying vocalising marine mammals and establishing bearing and range in a reasonable period of time;
- Immediately communicate relevant information to the PAM operator (real time) so appropriate and timely mitigation measures can be undertaken (i.e. delay soft start);
- Being repaired on board or replaced in case of breakdown (i.e. appropriate repair tools and backup equipment).

1.4.1. MMO/PAM Operative role during surveys

The role of an MMO/PAM operative is to detect marine mammals as part of the mitigation procedures and to advise a delay in the commencement of activity should any marine mammals be detected within the mitigation zone. This is to reduce the potential for deliberate injury to occur and ensure the survey complies with its consent conditions. Ultimately, however, it is the applicants' responsibility to ensure consent conditions are adhered to, noting the advice provided by the MMO/PAM operative(s).

MMO and PAM operatives should be equipped with an up-to-date copy of the JNCC guidelines and recording forms. The recording form is an Excel spreadsheet with embedded worksheets. Word versions of the spreadsheets named 'Deckforms' are also available which operatives may prefer to use before transferring details to the Excel spreadsheets. All forms, including a guide to completing them, are available on the JNCC website[9].

MMOs should be equipped with binoculars and a tool to estimate distance i.e. range finding stick or binoculars with reticles. The ability to determine range is a key skill for MMOs and a proven tool for distance estimation should be used. For these guidelines, the use of the "most appropriate method" for the survey and observer in question is recommended. Instructions on how to make and use a range finding stick are available on the JNCC website[9].

[9] http://jncc.defra.gov.uk/page-1534

Both the MMO and PAM operative should ensure their efforts are concentrated on the mitigation periods, i.e. the pre-shooting search and soft-start time periods and observing until the survey line has started and data acquisition has begun. The guidelines should not be interpreted to imply that MMO/PAM operatives should continue a visual/ acoustic search during all available hours, unless specified as a survey consent condition. MMO/PAM operatives should manage their time to ensure that they are available to carry out their duties to the best of their ability during the mitigation periods as outlined above. Whilst JNCC appreciates the efforts of MMO/ PAM operatives to record valuable data at other times, this should be managed to ensure those observations are not detrimental to their ability to undertake duties during mitigation periods.

In addition to conducting visual/ acoustic searches, the MMO/PAM operatives will advise the crew on the procedures set out in the JNCC guidelines and provide advice to ensure the survey programme is undertaken in accordance with the guidelines and survey consent conditions. It is essential that MMO/PAM operatives are provided with a copy of the survey consent conditions and any additional information required. In many cases this will be a condition of survey consent (i.e. all consents issued under the Offshore Petroleum Activities (Conservation of Habitats) Regulations). It is also recommended that MMO/PAM operatives attend pre-mobilisation meetings, to discuss working arrangements and their role while on the vessel.

1.4.2. Training

All MMO and PAM operatives are required to be trained.

For a MMO to be classified as trained, the individual must have undertaken formal training on a JNCC recognised course[10] plus have some experience of visually spotting marine mammals[11]. This experience need not be gained while implementing the JNCC guidelines, i.e. can be from other types of at sea survey work. Key to the MMO role is the ability to spot marine mammals within the mitigation zone, however, as mitigation within UK waters is required for all marine mammal species, identification to species level, while preferred, is not essential.

Currently, JNCC do not approve any PAM courses[12], however, a number of training courses are available covering both basic hardware and the use of specialist software. As a minimum a PAM operative should be able to assemble and deploy PAM equipment, configure the software and identify acoustic signals and bearing information.

1.4.3. Experience

An experienced MMO[12] should have a minimum of 20 weeks' experience of implementing JNCC guidelines in UK waters obtained within the previous ten years, preferably within the previous five. Furthermore, they will be experienced at identifying UK marine mammal species (visually and/ or acoustically depending on the role) and be familiar with their behaviour.

[10] Further information on accredited course providers is available at: http://www.jncc.gov.uk/page-4703.
[11] Note: level and form of experience will be considered alongside a general review of training requirements.
[12] Discussions are currently underway to identify minimum standards for the use of PAM as a mitigation tool, including operator training requirements. Further information will be published once available.

We recommend newly qualified MMOs and PAM operatives do not work in isolation for their first few jobs (i.e. are not the sole MMO/ PAM operative on board a vessel). Rather they work alongside experienced personnel who can act as mentors while they gain experience of implementing the guidelines.

The use of experienced MMO and PAM operators is essential in areas of importance for marine mammals.

1.4.4. Recommended requirements for MMOs and PAM operatives

JNCC will recommend to the Regulator a minimum number of MMOs required for each application, and whether PAM should be a requirement rather than recommended together with the recommended minimum number of PAM operatives. This will take into account, as a minimum, the survey location, duration, time of year, maximum airgun volume and species sensitivities.

In addition, MMOs will be referred to (by JNCC) as either:

- **Dedicated:** A trained MMO who is employed for the sole purpose of undertaking visual observations to detect marine mammals and advising on and monitoring the implementation of the guidelines. They are not normally a member of the vessel crew (i.e. are a sub-contracted professional).

  Dedicated MMOs have higher sighting rates than non-dedicated MMOs and supply higher quality data (Stone, 2015b). They also have the advantage of being quickly available outside of the mitigation periods. For example, they can search for marine mammals during operations[13] and advise if any marine mammals are present in the area if operations unexpectedly stop for technical reasons and need to start up promptly after the problem is solved. This can reduce the need for additional pre-shooting searches and soft starts (see below for further details).

- **Non-dedicated**: A trained MMO who may undertake other roles on the vessel when not conducting a mitigation role. This person can be a member of the rig's or vessel's crew providing they do not undertake other roles during mitigation periods.

  These are typically recommended for short surveys using low energy sources e.g. some vertical seismic profiling (VSP), sub-bottom profiling or when using a total airgun volume equal or less than 180 cubic inches.

Given the specialist nature of the PAM operative role, it is expected they will be a sub-contracted professional whose sole role on the vessel is to operate the PAM system i.e. all PAM operatives will be dedicated.

It is the applicants' responsibility knowing the specific requirements and logistics of their survey, to employ sufficient personnel to cover all mitigation periods, thus removing the potential for operative fatigue and meeting health and safety requirements. This is particularly important when working at northern latitudes (i.e. above 57°) during summer months (defined here as between 1st April and 1st October) and when planning 24-hour data acquisition. In this

[13] This should not be done to the detriment of mitigation periods, unless sufficient personnel are employed to allow continual monitoring.

case, the applicant must provide sufficient personnel to allow the work to be carried out in shifts.

PAM must be used if soft starts will occur during hours of darkness and is recommended for use during periods when day-time conditions are not conducive to visual surveys (e.g. fog). If day-time conditions are such that visual observations cannot be undertaken and no other form of monitoring is available, initiation of soft starts and seismic shooting must be delayed until conditions improve.

The use of PAM is particularly important during winter months when hours of darkness are longer. Visual surveys at dusk are not a reliable indicator to inform start-up decisions at night and should not be viewed as an alternative to using PAM. It is not recommended that PAM is used as the sole method of mitigation during periods when visual searches are possible (see Stone, 2015b).

A minimum of one PAM operative is required when PAM equipment is to be deployed with consideration of the survey specifics (including potential use during daylight hours) used to determine the total number. PAM may be required to supplement visual surveys (in addition to use at night and periods of poor visibility) in areas of importance for marine mammals. Under such circumstances, the applicant must ensure sufficient personnel are employed to allow for 24-hour PAM coverage (i.e. minimum of two PAM operatives).

It is not uncommon for individuals to conduct both the MMO and PAM role during the same survey. This is permitted under these guidelines however it is essential such personnel are trained and experienced in both roles.

Regardless of whether the MMO and PAM operatives are conducting sole or dual roles, an applicant not providing sufficient mitigation personnel for their survey is not a valid reason for surveys to be conducted without cover during mitigation periods. Such instances should be recorded as non-compliance and reported to the Regulator and JNCC with further details provided in the MMO report.

Section 2: Mitigation procedures

2.1. Standard Airgun Mitigation Procedures

The following guidelines apply to all geophysical surveys that use airguns.

All survey applications received by JNCC (and other SNCBs) will be considered on a case-by-case basis. All mitigation measures advised to the Regulator will reflect the survey particulars and the importance of the survey area for marine mammals. At all times, the SNCB(s) strive to provide mitigation advice that is proportional to the risk involved.

2.1.1. Pre-shooting search

Clear communication channels between the MMO/PAM operator and relevant crew must be established prior to the commencement of any operations. The MMO/PAM operator must be aware of the timings of the proposed operations. The crew must inform the MMO/PAM operators (or nominated lead) sufficiently in advance of airgun firing so that a full pre-shooting search can be completed prior to the soft start commencing.

Location of MMO/ PAM

All observations (visual and PAM) should be undertaken from the source vessel (where the noise source is deployed from), unless alternative arrangements have been agreed with the Regulator. The MMO should be positioned on a high platform with a clear view of the horizon, mitigation zone and ahead of the vessel.

The PAM operator should be positioned in the most appropriate location to allow them to monitor the PAM equipment for acoustic detections and maintain contact with both the MMO and relevant crew, for both mitigation purposes and ensuring the PAM equipment is deployed correctly.

Mitigation zone

The MMO/PAM operative will monitor the agreed mitigation zone and highlight if any marine mammals are within it. The standard radius of the mitigation zone is **500m** and is estimated from the centre of the airgun array or noise source location (noting comments in Section 1: on dual source arrays)**.** However, if the size of the mitigation zone is adjusted for any reason, this will be stipulated within the survey consent conditions.

Duration of search

The MMO must monitor the mitigation zone for the full duration of the pre-shooting search and soft-start procedure. Whether PAM is being used in conjunction with or in place of visual surveys, acoustic monitoring must also occur for the full duration of the pre-shooting search and soft-start procedure. Once the soft start has ended and data acquisition begins, monitoring can cease.

The duration of the pre-shooting search is determined as follows:

- **Waters less than 200m deep**: 30 minutes prior to the use of any airguns.
- **Waters greater than 200m deep**: 60 minutes prior to the use of any airguns.

This is to allow for deep diving species (e.g. sperm whale and beaked whale) which are known to dive for longer than 30 minutes. PAM may also be required on all pre-shooting searches in deeper waters (i.e. to complement visual surveys) to increase the potential to detect species with long dive times.

Due to the longer pre-shooting search time required in deeper waters, pre-shooting searches can commence before the end of a preceding survey line (whilst the airguns are still firing) **IF** line changes will take less time than the pre-shooting search and soft-start combined (i.e. 80 mins; Section 2.1.4).

2.1.2. If marine mammal detected within mitigation zone

If marine mammals are detected within the mitigation zone during the pre-shooting search (visually or acoustically), the soft-start must be delayed until their passage, or the transit of the vessel, results in them being outside of the mitigation zone. There should be a minimum of a 20-minute delay from the time of the last sighting within the mitigation zone and the commencement of the soft-start, to allow animals unavailable for detection (i.e. not re-surfacing in that time) to have moved outside of the mitigation zone.

A full soft-start must be undertaken after any delay due to the presence of marine mammals.

In situations where seal(s) are congregating around a fixed platform within a survey area, the soft-start should commence at a location at least 500m from the platform.

If marine mammals are detected within the mitigation zone whilst the airguns are firing, either during the soft-start procedure or when at full power, there is no requirement to stop firing.

Figure 1 illustrates a typical seismic survey with decision making pathways in the event a marine mammal is detected.

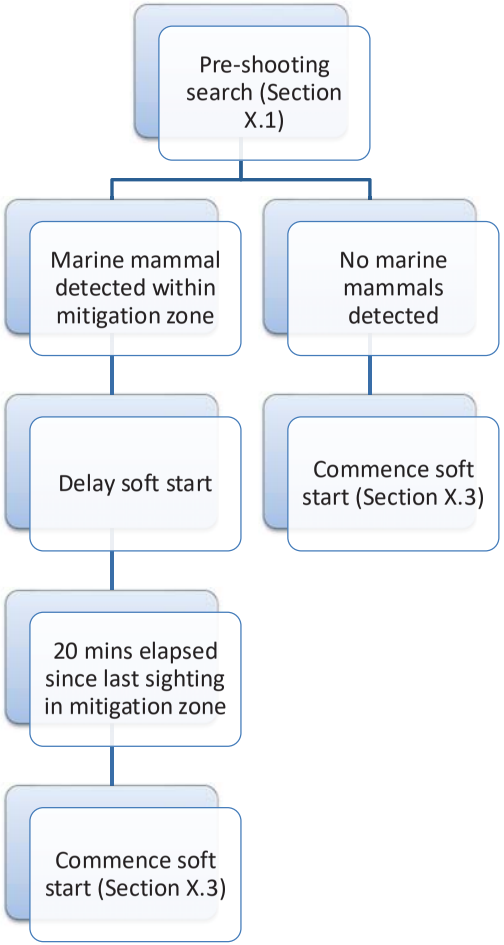

Figure 1. Flowchart illustrating the decision-making pathway of a MMO/ PAM operative during a seismic survey.

2.1.3. Soft-start

The duration of a standard soft start is defined by two criteria:

- From the start of the soft-start until full operational power: minimum of 20 minutes;
- From the start of the soft-start until the start of the survey line: maximum of 40 minutes.

One exception to these criteria is for surveys where the maximum airgun volume is <180 cubic inches:

- From the start of the soft-start until full operational power: minimum of 15 minutes;
- From the start of the soft-start until the start of the survey line: maximum of 25 minutes.

Regardless of duration, power should be built up gradually, in uniform stages from a low energy start-up (i.e. increasing the number of airguns starting with the smallest airgun in the array, or airgun pressure).

There should be a soft-start every time the airguns are used, the only exceptions being for certain types of airgun testing (Section 2.1.5), and the use of a 'mini-airgun' (single gun volume equal to or less than 10 cubic inches).

Surveys should be planned to avoid unnecessary firing at operational power before commencement of a survey line and to time operations to commence data collection as quickly as possible once full operational power is achieved.

2.1.4. Line changes

Seismic data is usually collected along predetermined survey lines. Line change is the term used to describe the activity of turning the vessel at the end of one survey line prior to commencement of the next.

The following procedures depend on the duration of the line change. If an applicant determines that an effective line change cannot be achieved using these procedures, then contact the Regulator and appropriate SNCB(s) at the earliest possible opportunity to discuss a proposed alternative. Details of any agreed alternative procedures should be described during the application process and reiterated, if appropriate, in the survey consent conditions.

One example of airgun use that does not require a line change is **Vertical Seismic Profiling** (VSP), a technique where measurements are made in a vertical wellbore using geophones inside the wellbore and a source at the surface near the well. In this instance, the break required to reposition geophones is to be treated in the same manner as line changes.

If difficulties are encountered when deploying PAM equipment, line changes must be extended to allow the full pre-shooting search to be completed with PAM.

a. If line changes are expected to take longer than 40 minutes:

If line changes (or geophone repositioning) are expected to take longer than 40 minutes, regardless of airgun volume:

- Firing is to be terminated at the end of the survey line (or geophone repositioning);

- A pre-shooting search is to be undertaken during the scheduled line change (or geophone repositioning);
- The soft-start is to be delayed if marine mammals are seen within the mitigation zone during the pre-shooting search (Section 2.1.2); and
- A full 20-minute soft-start is to be undertaken before the start of the next line (Section 2.1.3).

Most seismic surveys with airgun array volumes of 500 cubic inches or more are not able to complete their line changes within 40 minutes (Stone, 2015b) and should therefore follow the procedures outlined above.

b. If line changes are expected to take less than 40 minutes:

If line changes (or geophone repositioning) are expected to be completed within (or equal to) 40 minutes, regardless of airgun volume:

- Airgun firing can continue during the line change **only** if power is reduced to 180 cubic inches (or as close as is practically feasible) at standard pressure. Airgun volumes of less than 180 cubic inches can continue to fire at their operational volume and pressure; **AND**
- The Shot Point Interval (SPI) **is** increased to provide a longer duration between shots, with the SPI not to exceed 5 minutes: **AND**
- The SPI is **decreased** in uniform stages during the **final 10 minutes** of the line change (or geophone repositioning), prior to data collection re-commencing (i.e. mini soft start).

2.1.5. Seismic airgun testing

Airgun tests may be required before a survey commences to trial new arrays or to test damaged or misfiring airguns following repair. Individual airguns or several airguns within the full array may need testing and the airguns may be tested at varying power levels. The following guidance is provided to clarify when a soft-start is required for airgun testing:

- If the intention is to test a single airgun, a soft-start is not required.
- If the intention is to test multiple airguns within an array or the full array, a soft-start is required. This should be carried out over a time period proportional to the number of guns being tested and should not exceed 20 minutes in duration. Airguns should be tested in order of volume, smallest first.

A pre-shooting search (Section 2.1.1) should be undertaken before any instances of airgun testing.

Where feasible, it is recommended that airgun testing be incorporated into the soft start procedure and conducted before the start of a survey line to reduce the total amount of noise being introduced into the marine environment.

2.1.6. Undershoot operations

The MMO/PAM operatives should be placed on the source vessel to ensure they are close enough to the airguns to effectively monitor the mitigation zone. If this is not possible, i.e. for logistical or health and safety reasons, the applicant should explain this during the application

process and suggest alternative mitigation arrangements. Any alternatives would need to be agreed by the Regulator and SNCB(s) and stated in the survey consent conditions.

Irrespective of the location agreed with the Regulator, a pre-shooting search and soft-start procedure must be followed prior to undertaking all undershoot operations.

2.1.7. Unplanned breaks in operations

Unplanned breaks refer to instances where the airguns cease firing **unexpectedly** during data acquisition, i.e. a technical problem or breakdown. It is imperative that MMO/PAM operatives begin to monitor the mitigation zone as quickly as possible after an unplanned break has occurred.

- **Unplanned breaks of less than 10 minutes**: If the airguns can be restarted and data acquisition can resume in less than 10 minutes, there is no requirement for a soft-start and firing can recommence at the required power, **provided no** marine mammal(s) have been detected in the mitigation zone during the breakdown period.

  If a marine mammal is detected during the breakdown period, the MMO/PAM operative will advise to delay recommencement of the airgun firing until their passage, or the transit of the vessel, results in the marine mammals being outside of the mitigation zone. There should be a minimum of a 20-minute delay from the time of the last sighting within the mitigation zone and the commencement of the soft-start, as described in Section 2.1.1.

- **Unplanned breaks of longer than 10 minutes**: If it will take longer than 10 minutes to restart the airguns, a full pre-shooting search (Sections 2.1.1) and soft-start (Section 2.1.3) should be carried out before the survey re-commences. **If** an MMO/ PAM operative has been observing prior the breakdown period, this time can contribute to the pre-shooting search time, however, the full 30 or 60-minute search period is still required.

If the breakdown occurs at night or during daylight conditions not conducive for a visual search, the mitigation zone should be monitored as described above using PAM. If PAM is not available, the survey must be delayed until conditions are suitable for visual observations.

Planned breaks: If breaks in data acquisition other than during a line change are required (i.e. to avoid a structure), these should be considered within the application to allow the Regulator and SNCB to fully understand the survey procedure.

The same procedures as above (for unplanned breaks) can be applied. However, if the planned break will be for less than 10 minutes, the MMO/PAM operatives **must** be ready to begin monitoring 20 minutes prior to the planned break and continue for the duration of the break.

2.2. High Resolution Surveys (HRS)

High resolution data can be achieved either by using small airgun or electromagnetic sources. Sub-bottom profiling (SBP, i.e. pingers, sparkers, boomers and CHIRP systems), side-scan sonars and multibeam echosounders all use electromagnetic sources.

All applications will be considered on a case-by-case basis (by JNCC), with advice provided based on the following:

- **Airguns**: As a precautionary measure, JNCC advise any SBP/ HRS that use airguns require mitigation as described in Section 2.1 above.
- Electromagnetic sources:
  - Pre-shooting monitoring of the mitigation zone and a delay in proceeding if a marine mammal is observed as described in Sections 2.1.2.1.1 and 2.1.2.1.2. Typically, a non-dedicated MMO can be used.
  - Soft start – where practical, ramp up power in a uniform manner. However, it is acknowledged this is not possible for some SBP equipment (i.e. can either be on or off). If such equipment is to be used, highlight this during the application process.
  - Line change – as described in Section 2.1.2.1.4.
- If several pieces of HRS equipment are to be started sequentially or interchanged during the operation, only one pre-shooting search is required prior to the start of acoustic output, **only** if there are **no gaps** in data acquisition of greater than 10 minutes (refer to Section 2.1.2.1.7 for unplanned breaks in operations).

Multi-beam surveys in deep waters

SNCB guidance on the protection of EPS[14] highlights that some multi-beam systems used in deeper waters (> 200m) utilise frequencies (<100Khz) at sound levels that may be of concern to cetacean species, both in relation to deliberate injury and disturbance offences (see Section 3.14, page 43 of the EPS guidance). Therefore, an assessment of the risk to EPS from such surveys should be considered. JNCC (or the appropriate SNCB) will review this information as part of any consultation process and provide advice to the Regulator regarding mitigation requirements on a case by case basis.

Multi-beam surveys in shallower waters (< 200m) are not subject to these requirements as it is thought the higher frequencies typically used fall outside the hearing frequencies of cetaceans and the sounds produced are likely to attenuate more quickly than the lower frequencies used in deeper waters. JNCC do not, therefore, advise mitigation is required for multi-beam surveys in shallow waters.

[14] SNCB Draft Guidance, 2010. To obtain a copy of the latest draft version of the guidance please contact JNCC.

Section 3: Reporting

3.1. MMO report

For all oil and gas geophysical surveys, an MMO report should be sent to JNCC (via e-mail to seismic@jncc.gov.uk) after the survey has been completed. It is the responsibility of the consent holder to ensure that the MMO report is sent in a timely manner. The report should be accompanied by the completed JNCC marine mammal recording forms (i.e. the raw data in the excel spreadsheets) and a copy of the consent conditions. Please include the excel spreadsheets in their original format i.e. do not convert to pdf.

For other industry sectors and respective Regulators, it is suggested that similar procedures regarding MMO reporting could be followed, but this should be agreed with the relevant Regulator and SNCB(s).

Please note that information on marine mammal distribution and general ecology etc. are not required within the MMO report, as such information is provided and reviewed within the survey application prior to consent. The MMO report should provide a brief summary of the specifics of the conducted survey, mitigation watches (visual and acoustic) and required mitigation action as outlined above (see Appendix 2 for further information to be provided within an MMO report).

3.2. Compliance advice form

In addition to observing for marine mammals, the MMO/PAM operatives will advise the crew on the procedures set out in the JNCC guidelines and provide advice to ensure the survey programme is undertaken in accordance with the guidelines and survey consent conditions.

All efforts should be made to resolve any compliance issues during the survey between MMO/PAM operatives and relevant crew personnel. However, occasionally circumstances may arise were an issue cannot be resolved between these parties during the survey.

MMO/PAM operatives and consent holder/operators are encouraged to contact the Regulator/JNCC while still surveying to seek advice/discuss mitigation issues that have arisen to try and resolve these in a timely manner. The purpose of this form is to provide an audit trail of the issue, attempts to solve it and any outstanding matters from the different perspectives. This should help with evaluating compliance with the guidelines as well as in identifying any areas of the guidelines in need of further clarification or development.

When such circumstances arise, the completed form should be emailed to both the Regulator (emt@beis.gov.uk) and JNCC (seismic@jncc.gov.uk) along with a copy of the survey consent conditions. Upon review, it will be determined whether non-compliance will/has occurred and the Regulator will advise any remedial action required.

Details of the issue and how it was eventually resolved should also be included in the MMO report (see Appendix 2

MMO report).

Please note that this process has been written with oil and gas operations and Regulators in mind, but other industry sectors and appropriate Regulators could follow similar procedures. However, this should be agreed with the relevant Regulator and SNCB(s).

New Technologies

Techniques used to collect geophysical data are constantly evolving, for example the acquisition of data using ambient acoustic energy and automated underwater vehicles (AUVs) as a platform for site surveys. JNCC strive to keep up to date with developments and keep their guidelines up to date and relevant to industry practices. We welcome discussions with companies on the emergence of new seismic techniques, the potential for risk to marine species and development of monitoring/ mitigation measures.

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Appendix 1

Glossary

Areas of importance: Discrete areas of important habitat to marine mammal species.

Airgun: Device into which air is pumped into chambers at high pressure and then released through ports to form an oscillating bubble, thereby producing sound waves. Designed to emit a vertical beam of sound towards the seabed, with some unintentional sound radiating out from other angles.

Applicant: the company or organisation applying for (and issued) consent to undertake a geophysical survey

Consent holder: The company or organisation holding consent for a geophysical survey.

Daylight hours: Period between sunrise and sunset when sufficient light is available to effectively conduct visual observations.

Echosounder: Provide a water depth estimate by emitting pulses of sound that reflect from the seabed. The typical frequency range is from 10-200 kHz[15] .

European Protected Species: Species listed in Annex IV(a) of the Habitats Directive that occur naturally in the United Kingdom. In the marine environment, this includes all species of cetaceans (whales, dolphins and porpoises), turtles, and the Atlantic sturgeon.

Full power: Firing the airguns at their full operational level, reached at the end of a soft-start.

Geophysical survey: The systematic collection of geophysical data for spatial studies, using a range of sensing equipment including airguns.

Line turn/ change: The activity of turning the vessel at the end of one survey or production line prior to commencement of the next period of data acquisition.

Marine Mammal Observer (MMO): Individual responsible for conducting visual watches for marine mammals for mitigation purposes and provide advice to enable compliance with the JNCC guidelines. The MMO should be employed solely for the purpose of monitoring the implementation of the guidelines and undertaking visual observations to detect marine mammals during the mitigation periods of seismic activity (e.g. pre- shooting search, soft-start, line turns etc.):

- **Trained MMO**: Individual who has undertaken a JNCC recognised MMO course and has some experience of visually spotting marine mammals.
- **Experienced MMO**: Trained MMO with 20 weeks' field experience of implementing the JNCC guidelines in UK waters obtained within the previous ten years, preferably within the previous five.

Marine Mammal Surveyor: Individual responsible for conducting visual watches for marine mammals for monitoring or research purposes.

Mini-airgun: Airgun of volume less than or equal to 10 cubic inch.

[15] Genesis, 2011

Mitigation zone: The area within which the MMO/PAM operative searches (visually or acoustically) for marine mammals and delays the start of seismic activity should any marine mammals be detected.

Multi-beam echosounder: Similar to echosounder except emits a fan of sound beams. They work in a range of sound frequencies, with higher frequencies used in shallower waters normally outside the hearing range of cetaceans.

Ocean Bottom Seismic: Sound is released from a conventional source vessel and reflections are recorded by sensors placed on the sea floor. Originally introduced to enable surveying in areas of obstructions (i.e. production platforms) or shallow water inaccessible to ships towing seismic streamers. Based on the type of recording sensor used to collect data, these surveys may be referred to as

- **Ocean Bottom Cable (OBC)**: An assembly of vertically oriented geophones and hydrophones connected by cables and deployed on the seafloor to record and relay data to a seismic recording vessel.
- **Ocean Bottom Nodes (OBN)**: Similar to OBC except autonomous recording nodes are placed on the sea floor using ROVs. Nodes may be connected to each other and the recording vessel with cables or have inbuilt recording capabilities.

Passive Acoustic Monitoring (PAM): System that utilises hydrophones and specialist software to detect the vocalisations of marine mammals.

PAM operative: Individual responsible for conducting acoustic searches for marine mammals and experienced in the use of PAM equipment and marine mammal acoustics. The PAM operative should be employed solely for monitoring the implementation of the guidelines and undertaking acoustic observations to detect marine mammals during the mitigation periods of seismic activity (e.g. pre-shooting search, soft-start, line turns etc).

Pre-shooting search: Search for marine mammals (visually and/or acoustically) prior to commencing firing of airguns.

Production line: Survey line during which data is acquired and accepted within specification by the operator. Can also be expressed in terms of the number of shots or lengths (km or miles) of data acquired in a given time.

Marine Protected Area (MPA): A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values[16]. Within the UK, these may be designated under national legislation or international obligations and contribute to a network of MPAs in the north-east Atlantic.

Seismic survey: Any geophysical survey that uses airguns to generate sound which is sent into the seabed and the reflected energy is recorded and processed to produce images of the geological strata below; described as 2D, 3D and 4D and includes any similar techniques that use airguns:

[16] Dudley, N. (Editor) (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp.

- **2D seismic**: Survey vessel with a single towed hydrophone streamer. Reflections from the subsurface strata provide an image in two dimensions (horizontal and vertical).
- **3D seismic**: Uses more than one hydrophone streamers towed by the survey vessel.
- **4D seismic**: 3D seismic surveys repeated over a period of time, for example, to observe reservoir depletion during production and identify areas where there are barriers to flow that may not be easily detectable in conventional seismic.

Shot Point Interval (SPI): Interval between successive shots of the airgun(s), measured in metres along the ground (or sometimes in seconds).

Side-scan sonar: Used in mapping the surface of the seabed. Sound pulses are usually centred at frequencies between 100-500 kHz, the higher frequencies provide a greater resolution but reduce seabed penetration[15].

Site survey: Seismic survey of a limited area proposed for drilling, infrastructure emplacement etc., typically to identify seabed and subsurface hazards such as wrecks and the presence of shallow gas. They use a range of techniques, including multibeam and side scan sonar, sub-bottom profiler, magnetometer and small airguns with shorter hydrophone streamers (with source size of 40-400 cubic inches**Error! Bookmark not defined.**).

Soft-start: Process whereby the power of an airgun array is built up slowly from a low energy start-up, gradually and systematically increasing the output until full power is achieved (usually over a period of 20 minutes).

Source vessel: The vessel from which the seismic source (e.g.airgun(s)) is deployed.

Source: A device that provides energy for acquisition of seismic data, such as an airgun, explosive charge or vibrator.

Sub-bottom profiling (SBP): Systems employed to identify and characterise layers of sediment or rock under the sea floor. Low frequency sound sources (producing lower-frequency pulses) achieve greater penetration though the seafloor, however produce a lower-resolution picture; higher-frequency pulses achieve a higher resolution but do not penetrate as deeply into the sub-bottom strata. In addition to small airguns (typically less than 180 cubic inches), the following systems may be used:

- **Boomer**: Consist of two plates separated by a coil across which a high voltage impulse is created. The induced magnetic field causes one plate to vibrate radiating acoustic energy into the surrounding water. They have a broadband acoustic source ranging between 500 Hz - 5 kHz and are used to map the seabed layers between 30 - 100m depth (Genesis, 2011).
- **Pingers**: Periodically emit a high frequency ‘ping’ and typically operate on a range of single frequencies between 3.5 - 7 kHz (Genesis, 2011) and are used to achieve information from the seabed immediately below the surface layers. They offer a very high resolution but limited penetration dependent upon the seabed sediments, for example, a few tens of metres in mud.

- **Chirp systems**: These were designed to replace pingers and boomers and are now frequently used in oil and gas site surveys in place of the older systems. Chirp systems operate around a central frequency which is swept across a range of frequencies between 3 - 40 kHz (Genesis, 2011).
- **Sparkers**: Use an electrical discharge to generate sound similar to boomers but their use today is infrequent (Genesis, 2011). A high voltage impulse generates a spark across a pair of electrodes forming a gas bubble whose oscillations generate the sound. Sparkers are powerful devices and can be used to penetrate seabed layers up to 1 km.

Time-sharing: When vessels engaged on adjacent surveys take turns to run survey lines to avoid interference from the noise of each other's airguns.

Undershoot: Procedure used to facilitate shooting under platforms or other obstructions. One vessel is used to tow the seismic source and a second to tow the hydrophone array.

United Kingdom waters: Parts of the sea in or adjacent to the United Kingdom from the low water mark up to the limits of the United Kingdom Continental Shelf.

Vertical Seismic Profiling (VSP): Or Borehole Seismic. Measurements made in vertical wellbore using geophones inside the wellbore and a source at the surface near the well. The seismic sources used are generally smaller than for deep geophysical surveys but larger than for site surveys (Genesis, 2011) and can be deployed in several ways:

- **Zero offset:** from the platform;
- **Offset:** source vessel stationed at fixed location some distance from the platform; and
- **Walk away:** source vessel traverses one or more lines away from the platform.

Appendix 2

MMO report

An MMO report must be submitted upon completion of a survey and should include the following information. It should be accompanied by completed JNCC marine mammal recording forms (i.e. the raw data in the excel spreadsheets) and a copy of the consent conditions. Please include the excel spreadsheets in their original format i.e. do not convert to pdf.

Operator details:

Include brief details of the company awarded the consent, contractor details if appropriate and the survey consent reference number issued by the Regulator. Highlight contact details of whoever is responsible for the survey in case JNCC has any follow-up questions.

Survey details:

Provide a summary of the survey including:

- Date and location of survey;
- Total number and volume of the airguns used;
- Nature of airgun array discharge frequency (in Hz), intensity (in dB re. 1µPa or bar metres) and firing interval (seconds);
- Details of any other acoustic energy used (i.e. SBP);
- Details of any airgun testing;
- Average duration of all pre-watch, soft start, line changes and number of occasions were guideline durations were not met (noting the specific times will be detailed in the accompanying MMO excel recording forms);
- Summary of MMO/PAM activities for each period i.e. day/ night (i.e. full excel recording forms of operations and brief written summary)
- Number and types of vessels involved in the survey;

Survey area and greater working area geographical coordinates will have been included in the initial application, however a map illustrating the location of the survey (or the licensing blocks within which it occurred) can be beneficial, as an illustration of completed survey lines.

It should also be highlighted if the survey has occurred within or close to a protected area which includes marine mammals as a feature. Note, general details of likely marine mammal presence in the survey area will have already been included in the application and does not need repeating here.

MMO/PAM effort and detections:

Include details of the number of staff employed, whether dedicated or non-dedicated and their working location on the vessel. Also include details of their experience i.e. level of training, number of previous mitigation jobs or previous experience of observing if new to the role.

Provide details of a lead surveyor who can be contacted if JNCC has any follow up questions.

If PAM has been available on the vessel, include details of the equipment and software used and a summary of how often if was deployed. Also detail any technical issues encountered i.e. equipment failure or deployment issues. Screenshots of spectrograms can be helpful but are not essential.

Details of observer effort should be included in the recording forms, however this information should be summarised within the report. Also, summarise details of any marine mammals encountered, either visually or acoustically. If appropriate, distinguish between those seen inside the mitigation zone and outside.

Application of mitigation procedures

Include details of any survey specific arrangements agreed with the regulator as part of the survey consent conditions prior to the start of the survey i.e. changes to the size of the mitigation zone, location of MMO/PAM operatives etc.

Provide a summary of mitigation procedures applied, including details of soft-starts implemented and whether delays in firing were required. Again, only a summary is required as further details will be provided in the accompanying recording forms.

Compliance issues

Provide details of any compliance issues encountered and how they were resolved. If a compliance advice form was completed during the survey, cross-reference and include details of resultant actions.

If there are instances of non-compliance with the JNCC guidelines that constitute a breach of the survey consent conditions, JNCC will copy the report, and their comments on the potential breach to the Regulator.

Additional information

Additional information, for example, photographs of marine mammals observed, can be included at the end of the report if available.

Appendix 3

Compliance Advice Form			
Date / Time		**Reference**	
Operator		**Survey Location**	
Operator contact name		**Operator contact details (Email/ Phone)**	
Total no. of airguns		**Total volume of airguns (cubic inches)**	
No. of vessels			
No. MMOs		**No. PAM operatives**	
MMO/PAM Name		**Contact details**	
Detail of issue/ non-compliance			
Detail of remedial action attempted			

NOTE:

- The MMO/ PAM operator(s) **must** inform the applicant/ relevant crew personnel and attempt to resolve any compliance issues during the survey and record such actions and their resolution in the standard MMO report, to be submitted once the survey has been completed.
- Only when resolution is not possible during the survey, is this form to be completed and emailed to (the Regulator and JNCC) along with a copy of the survey consent conditions. Upon review, it will be determined whether non-compliance will/ has occurred and the Regulator will advise any remedial action required.

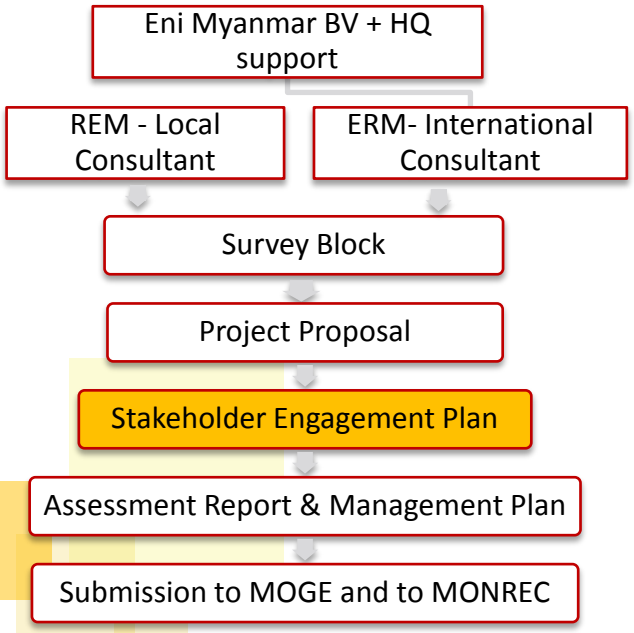
Annex D

Public Consultation and Disclosure Materials

Annex D1

Public Consultation Materials

Structural overview for the Impact Assessment process



- In Myanmar, an IEE study is required to be undertaken for Offshore Seismic Acquisition Projects that have the potential to cause environmental, health, safety and social impacts in order to receive approval from the Myanmar authorities.

- Environmental Resources Management (ERM) and Resource and Environment Myanmar (REM) have been contracted by Eni to prepare the IEE for the Project.

Concession Operator:

Eni Myanmar B.V. (Eni)
Sakura Tower 6th Floor
339 Bogyoke Aung San Road
Kyauktada Township Yangon,
Republic of the Union of Myanmar

Contact person:
For further questions please do not hesitate to contact Eni Myanmar Office
phone: (+95.1) 255364

Please excuse us for a possible short-term inconvenience and we thank you in advance for your understanding.

Executing company :

ERM

Resource and Environment Myanmar
Regist. 1337/2007-2008
Environmental and Resource Management Consultants

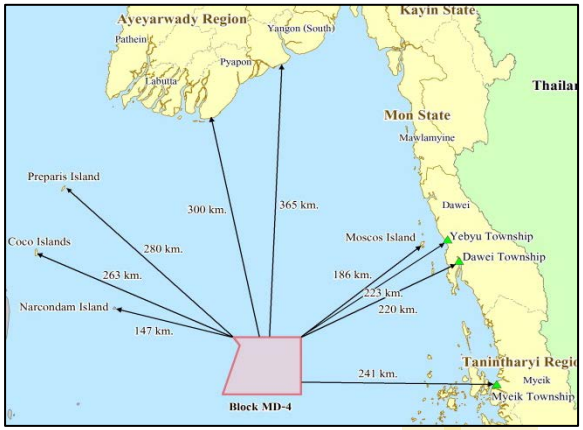
Public Consultation

Initial Environmental Examination (IEE) Study for Offshore block MD-4, 3D seismic acquisition

27 April 2017

Introduction

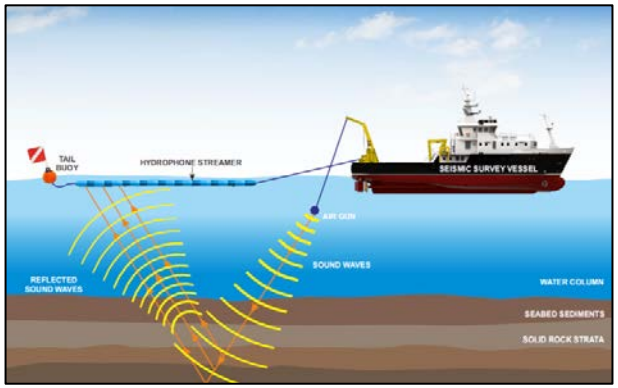
- Eni S.p.A. is an integrated energy company, active in 69 countries and one of the largest oil & gas company worldwide.
- Eni Myanmar B.V. (Eni Branch) is planning to conduct a 3D Offshore Seismic Survey in Myanmar Offshore Block MD-4
- Block MD-4 is located in Gulf of Martaban approximately 220 km from the nearest coast.

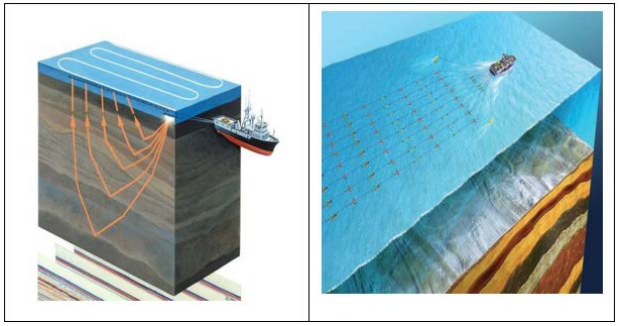


- The Block covers an area of 5,900 km^2, and water depth ranges from 1,500 to 2,200 m.
- Public consultations have been carried out with stakeholders in Dawei and Myeik to obtain suggestions/concerns from key relevant stakeholders on the IEE and proposed mitigation measures.
- An additional consultation is being held in Myeik to engage with more stakeholders.

Process

- During a marine seismic survey, a slow moving survey vessel tows impulse-emitting sound sources producing sound waves.
- These sound waves bounce off the sub-surface rock formations and return to the sea surface where the seismic energy is recorded by an array of receivers.
- This process allow to determine a map of the subsurface geological features that may contain oil & gas.





- 1 support vessel and 2 chase vessels are involved in the seismic acquisition to support the seismic vessel for technical, emergency and any other kind of needs.

Key Potential Impacts

Marine Life and Marine Ecology

- **Impact**: Noise/sound wave generated by airgun
- **Mitigation:** Maintain visual observation during operations, pause when required

Fisheries

- **Impact:** Fishermen may temporarily be unable to carry out fishing activities in some areas during survey
- **Mitigation:**
  - Timely Notice to Mariners
  - MOGE to support communication with Fishermen

Navigation

- **Impact:** Temporary obstruction to navigation in the area
- **Mitigation:** Use support vessels to regulate traffic

Socio-Economy

- **Positive impact** to other industry includes temporarily increasing income and employment

Occupational & Public Health

- No significant impacts
- Eni will ensure the implementation of H&S policy to minimize impacts on occupational health and public health

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ကမ်းလွန်လုပ်ကွက် MD-4 အတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း 3D ဆိုက်စမစ် တိုင်းတာခြင်း

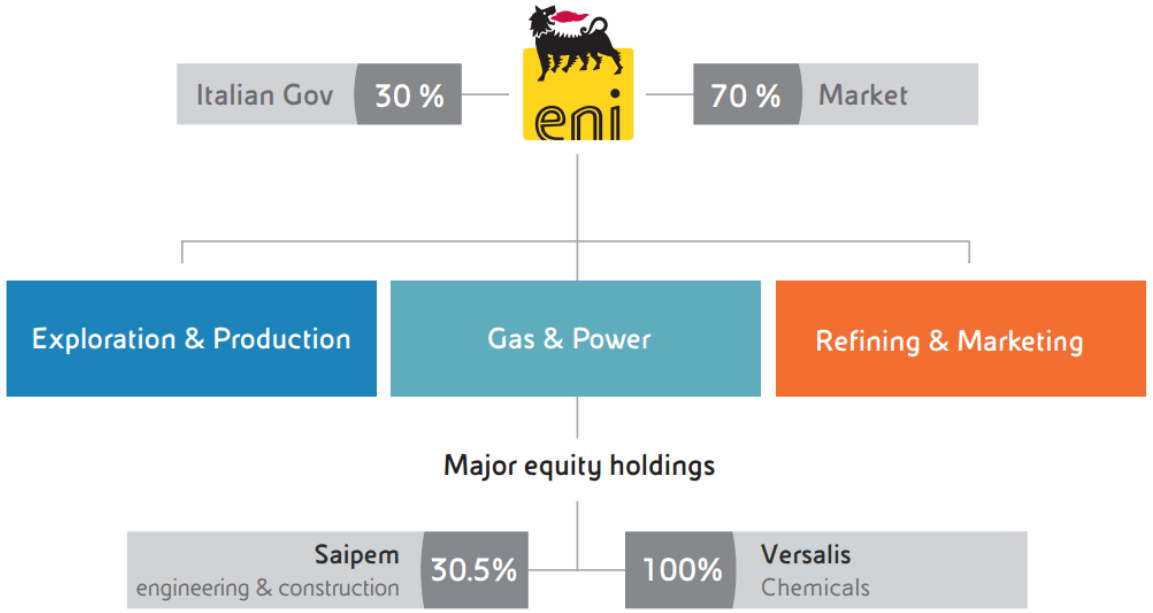
အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း

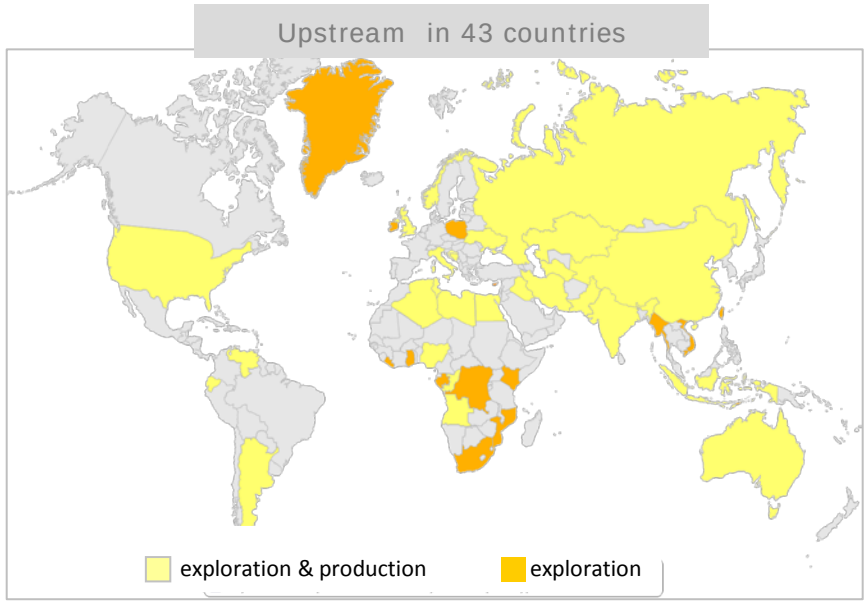
၂၇ ဖေဖြေလ ၂၀၁၇

အစီအစဉ်

- Eni ကုမ္ပဏီ အကြောင်းအရာ
- စီမံကိန်း ခြုံငုံသုံးသပ်ချက်
- ကနဦး ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း - ဘာလဲ၊ ဘာကြောင့်လိုအပ်သလဲ?
- အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း သုံးသပ်ချက်၊ ရည်ရွယ်ချက်
- IEE အကြံပေး
- စီမံကိန်းဖော်ပြချက်
- အခြေခံ အခြေအနေများ
- သက်ရောက်နိုင်ခြေနှင့် လျော့ပါးစေရေး နည်းလမ်းများ
- မေးခွန်းနှင့် အဖြေများ

ယနေ့ eni





2016 HIGHLIGHTS

Production: **1.8 Mboe/d**
Adj. operating profit**: 2.3 B €**
Net Cash Flow**: 7.7 B €**
Capex**: 9.2 B €**
112% organic reserve replacement ratio

- ကမ္ဘာပေါ်တွင် အကြီးဆုံး စွမ်းအင်ကုမ္ပဏီများထဲမှ တစ်ခု
- up, mid & downstream
- နိုင်ငံ ၆၉ နိုင်ငံတွင် တည်ရှိ
- အလုပ်သမား ၃၃၀၀၀

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Eni ပူးပေါင်းဆောင်ရွက်မှုပုံစံ - ရေရှည်ဖွံ့ဖြိုးတိုးတက်မှု

အများပြည်သူ ဖွံ့ဖြိုးတိုးတက်မှု ပေါင်းစပ်ဖွဲ့စည်းခြင်း ပုံစံ

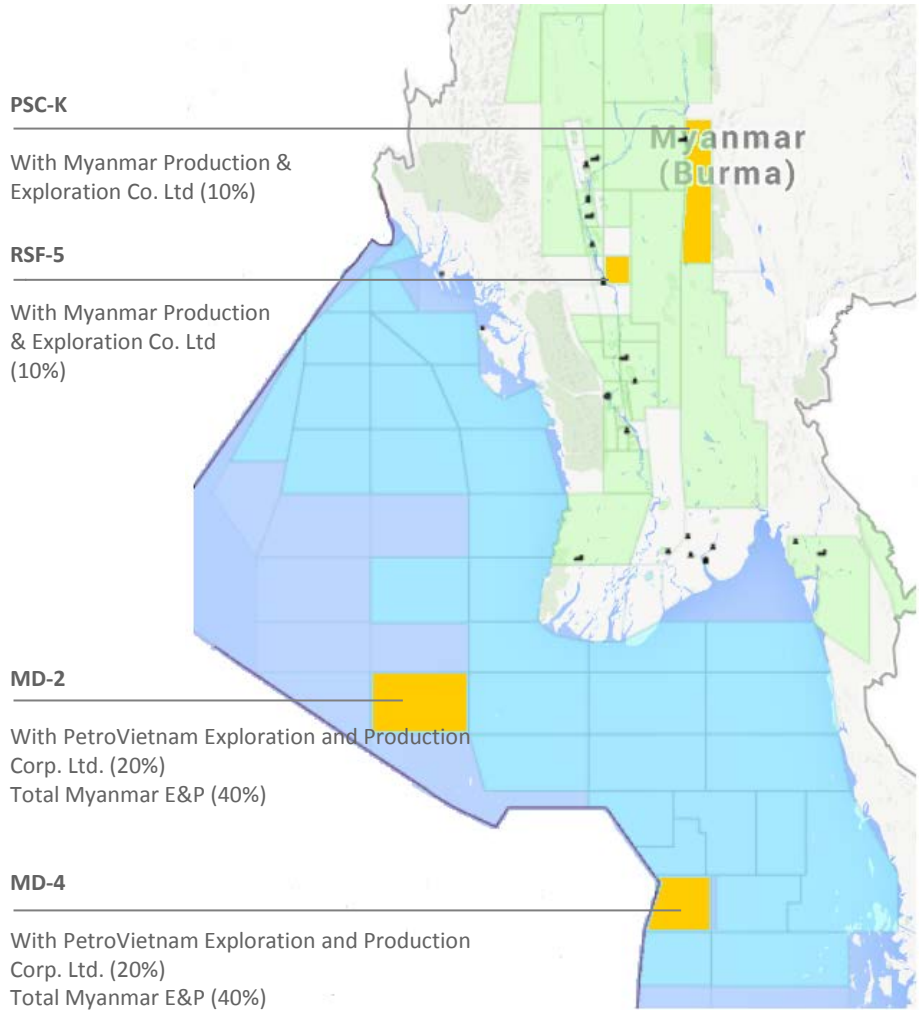
- စီးပွားရေးနှင့် နည်းပညာ ဖြန့်ဝေမှု
- O & G ပေါင်းစပ်ဖွဲ့စည်းမှု
- စွမ်းအင်နှင့် ဝန်ဆောင်မှု အကဲဖြတ်ခြင်း
- ဆက်သွယ်ရမည့်နယ်ခံ
- လူမှုရေးဆိုင်ရာ စီမံကိန်း
  (စိုက်ပျိုးရေး၊ ကျန်းမာရေး၊ ပညာရေး)
- အပြည်ပြည်ဆိုင်ရာ စပ်တူလုပ်ငန်း အခွင့်အလမ်းများ

Eni မြန်မာ

Eni - ဧကပမာဏအားဖြင့် အကြီးဆုံး အဓိက IOC

- Eni သည် ၂၀၁၃ တွင်ကမ်းလွန်နှင့် ကုန်းတွင်း နှစ်ခုစလုံးတွင် ဆောင်ရွက်ပြီး ဆုချီးမြှင့်ခြင်းခံခဲ့ရသည်။
  - စလင်းမြစ်ဝှမ်းရှိ RSF-5 ကုန်းတွင်းလုပ်ကွက်နှစ်ခုနှင့် မလေ့လာရသေးသော ပဲခူးရိုးမ-စစ်တောင်း မြစ်ဝှမ်းရှိ PSC-K လုပ်ကွက်
  - ရေနက်ကမ်းလွန်လုပ်ကွက်နှစ်ခု- ဘင်္ဂလားပင်လယ်အော်ရှိ လုပ်ကွက် MD-2နှင့် အက်ဒမန်ပင်လယ်ရှိ လုပ်ကွက် MD-4
- Eni သည် ထုတ်လုပ်မှုမရှိသေးသော်လည်းဧကပမာဏအားဖြင့် အကြီးဆုံးများထဲမှ တစ်ခုဖြစ်ပါသည်။

(၂၄၀၇၉ စတုရန်း ကီလိုမီတာ)



eni ရည်ရွယ်ချက်များ

ကျွန်တော်တို့သည် စွမ်းအင်ကုမ္ပဏီတစ်ခုဖြစ်ပါတယ်

လူတိုင်းလူတိုင်း စွမ်းအင်ကို
လုံလောက်စွာ၊ ရေရှည် အသုံးပြုနိုင်မယ့် အနာဂတ်ကို
တည်ဆောက်ရန် ကျွန်တော်တို့ ဆောင်ရွက်နေပါတယ်။

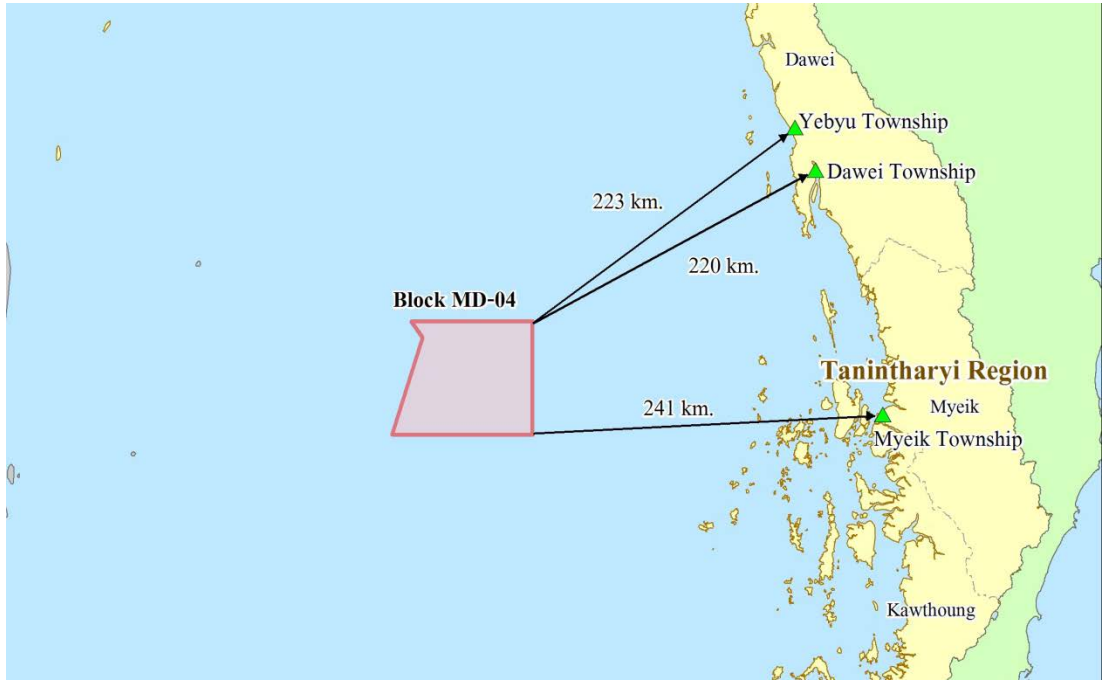
ကျွန်တော်တို့ လုပ်ငန်းသည် စိတ်အားထက်သန်မှုနှင့်တီထွင်ကြံဆမှု၊ ကျွန်တော်တို့၏ စွမ်းအားနှင့်
ကျွမ်းကျင်မှု၊ ဝန်ထမ်းများ၏ အရည်အသွေးအပေါ် မူတည်ပြီး
ကျွန်တော်တို့ လုပ်ငန်း ပုံ့နှံ့စေရေးအတွက် ဂရုတစိုက် ဆောင်ရွက်လျက် ရှိပါသည်။

ကျွန်တော်တို့သည် ကျွန်တော်တို့နှင့် ဆောင်ရွက်နေသော နိုင်ငံ၊ အဖွဲ့အစည်းများနှင့်
ရေရှည် လက်တွဲမှုကို
အလေးထား ယုံကြည်ပါသည်။

စီမံကိန်း ခြုံငုံသုံးသပ်ချက်

- ထုတ်လုပ်မှု သဘောတူညီမှုအပေါ် အခြေခံပြီး Eni သည် လုပ်ကွက် MD-4 တွင် 3D ဆိုက်စမစ် တိုင်းတာမှုများ ဆောင်ရွက်ရန် စီစဉ်ထားပါသည်။
- ၂၀၁၅ ဒီဇင်ဘာ ၂၉ ရက်နေ့တွင် ပြဋ္ဌာန်းခဲ့သည့် မြန်မာနိုင်ငံ၏ EIA လုပ်ငန်းစဉ်အရ စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်၊ လူမှုရေးနှင့် ကျန်းမာရေးဆိုင်ရာ သက်ရောက်နိုင်ခြေများကို သတ်မှတ်ရန် Eni မြန်မာသည် ကမ်းလွန်လုပ်ကွက် MD-4 တွင် 3D ဆိုက်စမစ် လေ့လာမှုအတွက် ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) လေ့လာခြင်းအား MONREC သို့ တင်ပြရမည်ဖြစ်ပါသည်။

တည်နေရာ- မုတ္တမပင်လယ်ကွေ့၊ မြေတ်မှ ၂၄၀ ကီလိုမီတာခန့်
ဇရိယာ - ၅၉၀၀ စတုရန်း ကီလိုမီတာ
ရေအနက် - ၁၅၀၀- ၂၂၀၀ မီတာ



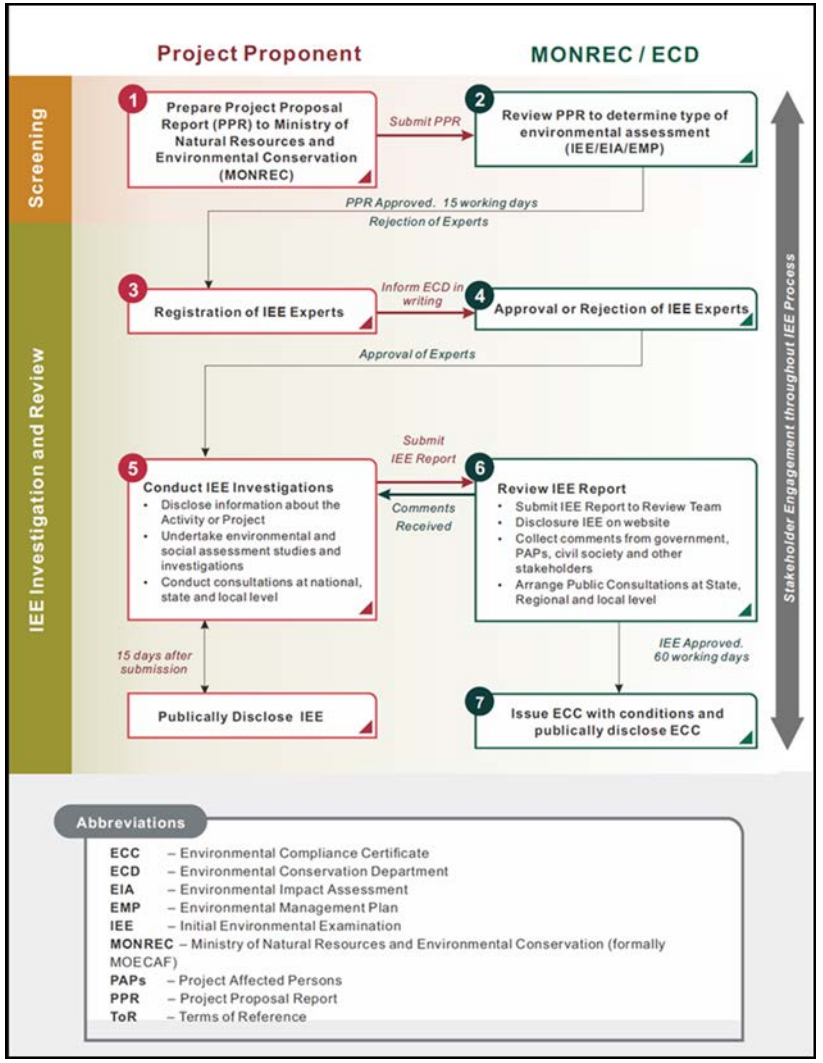
IEE ဆိုတာဘာလဲ? IEE ဘာ့ကြောင့်လိုအပ်သလဲ?

- မြန်မာနိုင်ငံဥပဒေ (EIA လုပ်ငန်းစဉ်၊ ၂၀၁၅)အရ၊ ဖွံ့ဖြိုးတိုးတက်မှု စီမံကိန်း အားလုံးသည် ပတ်ဝန်းကျင် ထိခိုက်မှု ဆန်းစစ်ခြင်း (EIA) သို့မဟုတ် ကနဦး ပတ်ဝန်းကျင် ဆန်းစစ်ခြင်း (IEE) ကို တင်ပြရပါမည်။

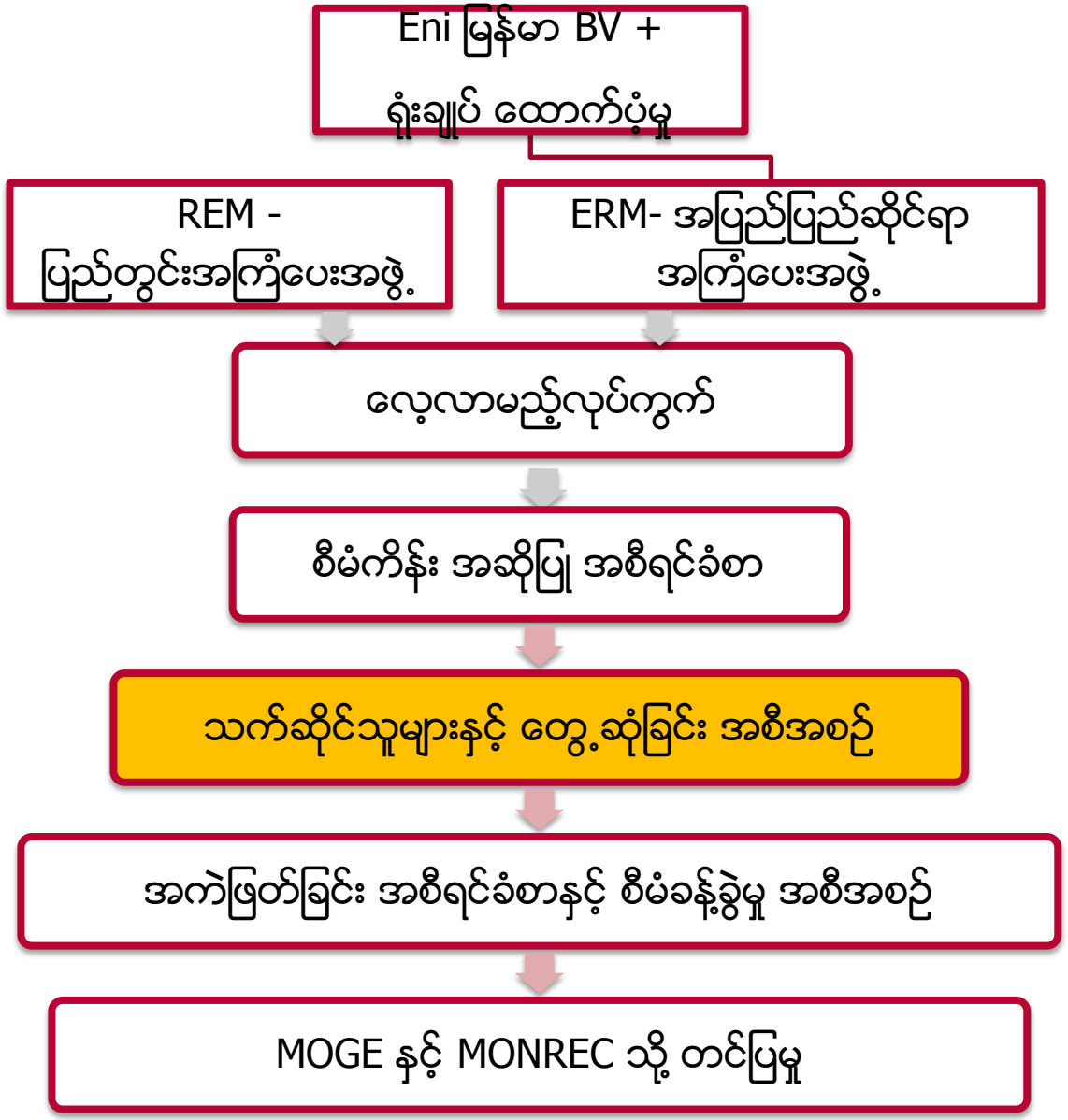
- ဆိုက်စမစ်တိုင်းတာခြင်း (ဤစီမံကိန်းကဲ့သို့) သည် IEE တင်ပြရမည်ဟု သတ်မှတ်ထားပါသည်။

- စီမံကိန်း ပြီးမြောက်အောင် ဆောင်ရွက်ရန် အတည်ပြုစာအတွက် IEE ကို ပတ်ဝန်းကျင် ထိန်းသိမ်းရေး ဦးစီးဌာန (ECD) သို့ တင်ပြရပါသည်။

- IEE သည် အဆိုပြု စီမံကိန်းကြောင့် ပတ်ဝန်းကျင်၊ လူမှုနှင့် လူထုကျန်းမာရေး သက်ရောက်နိုင်မှုများကို အကဲဖြတ်ခြင်း ဖြစ်ပါသည်။



သက်ရောက်မှု အကဲဖြတ်ခြင်း လုပ်ငန်းစဉ်အတွက် ချဉ်းကပ်ပုံ



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တင်ပြရခြင်း ရည်ရွယ်ချက်

- ယနေ့တွေ့ဆုံမှုသည် အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း တစ်စိတ်တပိုင်း ဖြစ်ပါသည်။ Eni အနေဖြင့် တနင်္သာရီတိုင်းဒေသကြီးအတွင်းရှိ ထားဝယ်မြို့တွင် ဧပြီလ ၆ ရက်နှင့် မြိတ်မြို့တွင် ဧပြီလ ၈ ရက်တို့တွင် ဆောင်ရွက်ပြီးစီးခဲ့ပြီး ဖြစ်ပါသည်။

- ယခုကဲ့သို့ မြိတ်မြို့တွင် ထပ်မံ၍ အများပြည်သူနှင့် တိုင်ပင်ဆွေးနွေးခြင်း ဆောင်ရွက်ရခြင်း ရည်ရွယ်ချက်မှာ -
  - ကနဦးပတ်ဝန်းကျင်ဆန်းစစ်ခြင်း (IEE) ၏ အဓိကဆောင်ရွက်မည့် လျော့ပါးစေရေးနည်းလမ်းများအပေါ် ဖြစ်နိုင်ချေရှိသည့် စိမ်ကန်းသက်ဆိုင်သူများ (အစိုးရအဖွဲ့နှင့် အဖွဲ့အစည်း အပါအဝင်) ၏ စိုးရိမ်ပူပန်မှုအား ရယူရန်
  - ကမ်းလွန်လုပ်ကွက် MD-4 တွင် 3D ဆိုက်စမစ် တိုင်းတာမှုကို Eni မှ မည်သည့်နေရာတွင် မည်သို့ လုပ်ဆောင်သည်ကို ရှင်းလင်းတင်ပြရန်။
  - နောက်ရက်သတ္တပတ်များအတွင်း ဆောင်ရွက်မည့် IEE လေ့လာမှု တစိတ်တပိုင်းအဖြစ် သက်ဆိုင်သူများနှင့် စိမ်ကန်းအကြောင်းအရာများကို မျှဝေရန်။

ပတ်ဝန်းကျင်နှင့် လူမှုရေးဆိုင်ရာ အကြံပေးအဖွဲ့

Environmental Resources Management (ERM)

- ရေနံနှင့် သဘာဝဓါတ်ငွေ့လုပ်ငန်း အပါအဝင် အဓိက စက်မှုလုပ်ငန်းများအတွက် ရေရှည်တည်တံ့သော ဆန်းသစ်ပြောင်းလဲမှုများကို ၄၂ နှစ်ကြာ ဆောင်ရွက်မှု။
- ERM ရန်ကုန်အပါအဝင် ကမ္ဘာ တစ်ဝှမ်းလုံး ရုံးခွဲပေါင်း ၄၀ ကျော် ရှိ
- ERM သည် မြန်မာနိုင်ငံတွင် ၁၉၉၃ ခုနှစ်တည်းက သက်ရောက်မှု အကဲဖြတ်ခြင်းနှင့် ဝန်ဆောင်မှု ကဏ္ဍအမျိုးမျိုးတွင် ဆောင်ရွက်ခဲ့ပါသည်။
- ရေနံနှင့် သဘာဝဓါတ်ငွေ့ လုပ်ငန်းအတွက် ကမ်းလွန်နှင့် ကုန်းတွင်းနှစ်ခုလုံးတွင် သက်ရောက်မှု အကဲဖြတ်ခြင်းအတွက် နှစ် ၂၀ ကျော် အတွေ့အကြုံများစွာ ရှိပါသည်။

ERM

Resource and Environment Myanmar (REM)

- REM သည် မြန်မာနိုင်ငံတွင် သယံဇာတနှင့် ပတ်ဝန်းကျင်ဆိုင်ရာ အကြံပေး ဆောင်ရွက်နေသော ဦးဆောင်ကုမ္ပဏီတစ်ခု ဖြစ်ပါသည်။
- REM ကို ရန်ကုန်တွင် ၁၉၉၈ခုနှစ်၌ စတင်ဖွဲ့စည်းခဲ့ပါသည်။
- ၂၀၀၅ မှ စတင်၍ ERM နှင့် လက်တွဲဆောင်ရွက်ခဲ့ပါသည်။
- ပတ်ဝန်းကျင်၊ လူမှုရေးနှင့် သယံဇာတစီမံခန့်ခွဲမှုအမျိုးမျိုးနှင့် သက်ဆိုင်သော လက်ရှိ (သို့) ယခင် တက္ကသိုလ်မှ အဖွဲ့ဝင်များ အပါအဝင် ပတ်ဝန်းကျင်ဆိုင်ရာ ပညာရှင်၊ လူမှုရေး ပညာရှင်နှင့် အတွေ့အကြုံရှိ ဝန်ထမ်းများဖြင့် ဖွဲ့စည်းထားပါသည်။
- မြန်မာနိုင်ငံတွင်း အတွေ့အကြုံများစွာရှိပြီး မြန်မာနိုင်ငံ လိုအပ်ချက်များကို ကောင်းစွာ သိရှိထားပါသည်။

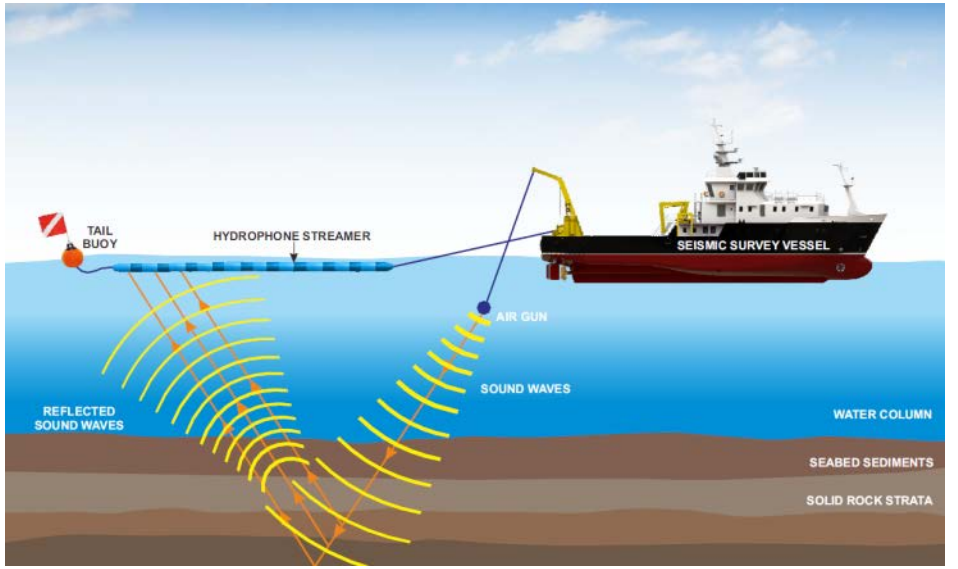
Resource and Environment Myanmar

Regist. 1337/2007-2008

Environmental and Resource Management Consultants

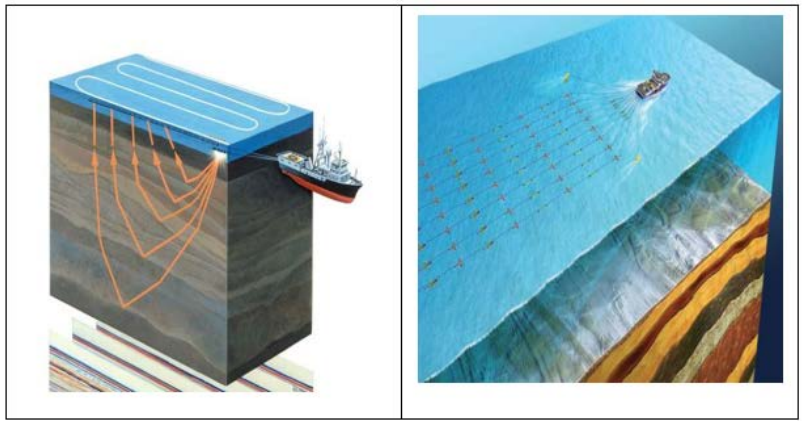
စီမံကိန်း ဖော်ပြချက်

- ဆိုက်စမစ်သည် တူးဖော်ခြင်း၏ ပထမအဆင့် ဖြစ်ပါသည်။
- ရည်ရွယ်ချက်မှာ ရေနံနှင့် သဘာဝဓါတ်ငွေ့အတွက် ဘူမိဗေဒ မြေပုံကို သတ်မှတ်ရန် ဖြစ်ပါသည်။
- သင့်တော်သော ရေလမ်းကြောင်းပြု၊ ဆက်သွယ်ရေးနှင့် လုံခြုံရေး ကိရယာများ ပါဝင်သော ဆိုက်စမစ် ရေယာဉ်များဖြင့် ဆောင်ရွက်ပါမည်။
- 3D ဆိုက်စမစ် တိုင်းတာမှုကို အသံအတွက် airguns များအသုံးပြု၍ streamer ဟုခေါ်သော အသံလက်ခံသည့်ကိရိယာများဖြင့်ဆောင်ရွက်ပါမည်။



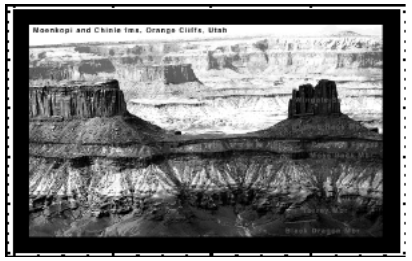
ဆိုက်စမစ်ဆိုတာ ဘာလဲ?

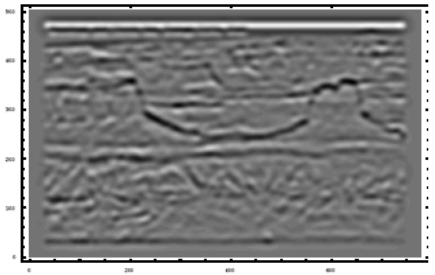
- *ဆိုက်စမစ်ဆိုသည်မှာ အသံလှိုင်းများကို အသုံးပြု၍* မျက်နှာပြင် အချက်အလက်များရယူရန် ဘူမိရူပဗေဒဆိုင်ရာ လေ့လာမှုအတွက် ကိရိယာတစ်ခုဖြစ်ပါသည်။



- ဆိုက်စမစ်လှိုင်းများသည် မြေသားကို ဖြတ်၍ ကျောက်ဆောင်များကို ရိုက်ပြီး လက်ခံနေရာသို့ လှိုင်းများ ပြန်ထွက်လာပါသည်။

- ဆိုက်စမစ် တိုင်းတာခြင်းသည် ဆေးပညာတွင် တယ်လီဗီရှင်းဓါတ်မှန်ရိုက်ခြင်းအယူအဆနှင့်အတူ တူပင်ဖြစ်ပါ သည်။





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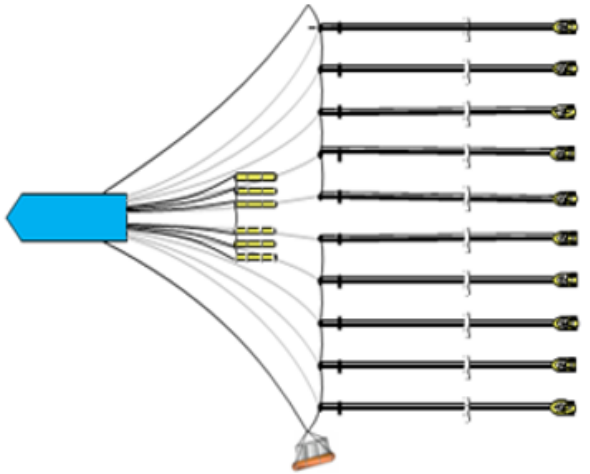
3D ဆိုက်စမစ်တိုင်းတာမှု

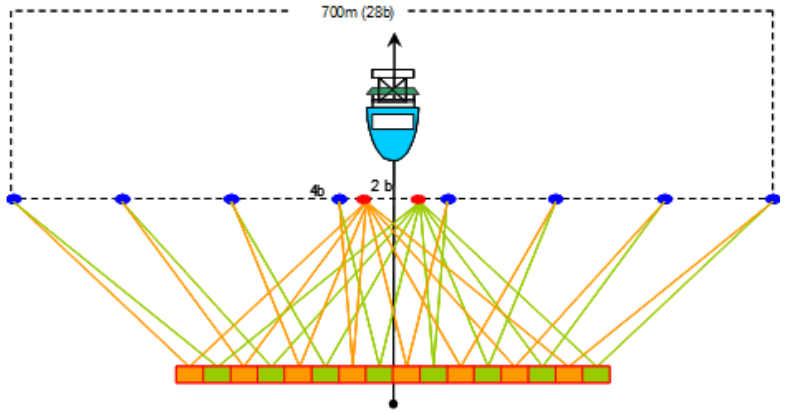
- 3D ဆိုက်စမစ် တိုင်းတာမှုအတွက် ကြိုတင်ပြင်ဆင်မှုများမှာ
  - ဆိုက်စမစ် ရေယာဉ် - ၁စီး
  - ထောက်ပံ့ရေယာဉ် - ၁စီး
  - သတိပေးရေယာဉ် - ၂စီး

ဆိုက်စမစ်ရေယာဉ်

ထောက်ပံ့ရေယာဉ်



(a)



(b)

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စီမံကိန်း အချိန်ဇယား

စီမံကိန်း ဆောင်ရွက်မှုများ	အချိန်ဇယား
စီမံကိန်း သတိပေးချက်	ကွင်းဆင်းဆောင်ရွက်မှု မပြုလုပ်မီ တစ်လ
ဆိပ်ကမ်းရှိ သဘော်များ	ဆိုက်စမစ်တိုင်းတာမည့်ယာဉ်နှင့် ထောက်ပံ့ရေးယာဉ်အားပတ်ဝန်းကျင်ဘေးကင်းလုံခြုံရေးစစ်ဆေးခြင်းနှင့် အကြိုညှိနှိုင်းစည်းဝေးခြင်း။
ကွင်းဆင်းဆောင်ရွက်ခြင်းနှင့် ပြင်ဆင်ခြင်း ပိတ်ပင်တားဆီးခြင်းများ ဆောင်ရွက်ခြင်း။ ဥပမာ-ကွင်းဆင်းဇရိယာရှိ ငါးဖမ်းခြင်းနှင့် လိုအပ်ပါက အတားအဆီးများအားလုံး ဖယ်ရှားခြင်း။	ဆိုက်စမစ်တိုင်းတာခြင်း စတင် မလုပ်ဆောင်မီ အနည်းဆုံး တစ်ပတ်အလို
လုပ်ကွက် MD-4တွင် 3D ဆိုက်စမစ် အချက်အလက်များ ရယူခြင်း	စတင်သည့်ရက်: နောက်လာမည့်ပွင့်လင်းရာသီ။ ဆိုက်စမစ်တိုင်းတာခြင်းသည် ရက် ၁၀၀ ခန့် ကြာမြင့်ပါသည်။
စီမံကိန်းပြီးဆုံးမည့်အချိန်	နောက်လာမည့်ပွင့်လင်းရာသီ

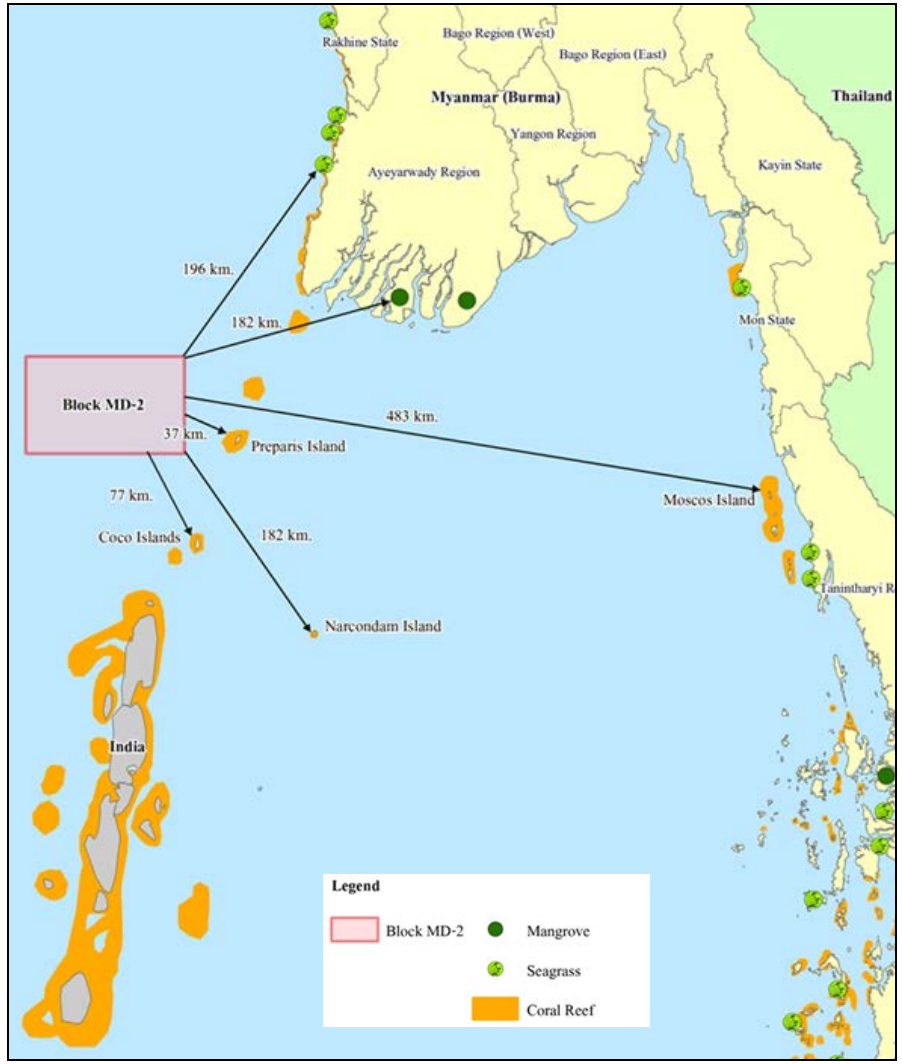
ပတ်ဝန်းကျင်ဆိုင်ရာ - အပင်၊ တိရိစ္ဆာန်နှင့် ကာကွယ်ထားသော ဇရိယာများ

- မြန်မာနိုင်ငံတွင် အဏ္ဏဝါ ကာကွယ်ထားသော ဇရိယာ ရှစ်ခုရှိပါသည်။ လေ့လာမှုဇီယာတွင် ၄င်းဇရိယာများ မပါဝင်ပါ။

- လုပ်ကွက် MD-4 သည် ကမ်းရိုးတန်း အဓိက ကုန်းမြေနှင့် ကျွန်းများမှ ဝေးသော ကမ်းလွန်တွင် ရှိပြီး စီမံကိန်း ဇရိယာ အနီးအနားတွင် ဒီရေတောများ မရှိပါ။ အနီးဆုံး ဒီရေတော စိုက်ခင်းမှာ လုပ်ကွက် MD-4 မှ ၂၄၆ ကီလိုမီတာခန့်တွင် တည်ရှိပါသည်။
- ပရီပဲရစ်၊ကိုကိုးနှင့်နာကွန်ဒန်ကျွန်းများတွင်သန္ဓာကျောက်တန်း ဖြစ်ပေါ်မှုများရှိပြီး လုပ်ကွက် MD-2 မှ ၂၆၃ နှင့် ၂၈၀ ကီလိုမီတာ အကွာအဝေးတွင် တည်ရှိပါသည်။

- ရေအနက်သည် အရေးကြီးသည့် ဂေဟဆိုင်ရာ အုပ်စုများနှင့် ဆက်စပ်မှု မရှိပါ။ သို့သော်လည်း ရေနေ နို့တိုက်သတ္တဝါများ၊ အဏ္ဏဝါလိပ်များနှင့် ပင်လယ်ဇင်ယော်များ ၄င်းရေပြင်တွင် ကျက်စားနိုင်ပါသည်။

- <u>စီမံကိန်း ဆောင်ရွက်မှုနှင့် ပတ်သက်၍ ယခင် လေ့လာမှုများအရ ပတ်ဝန်းကျင်နှင့် အဏ္ဏဝါ ဂေဟဗေဒအပေါ် ကြီးကြီးမားမား အနှောင့်အယှက်ဖြစ်နိုင်မှု မရှိပါ။</u>



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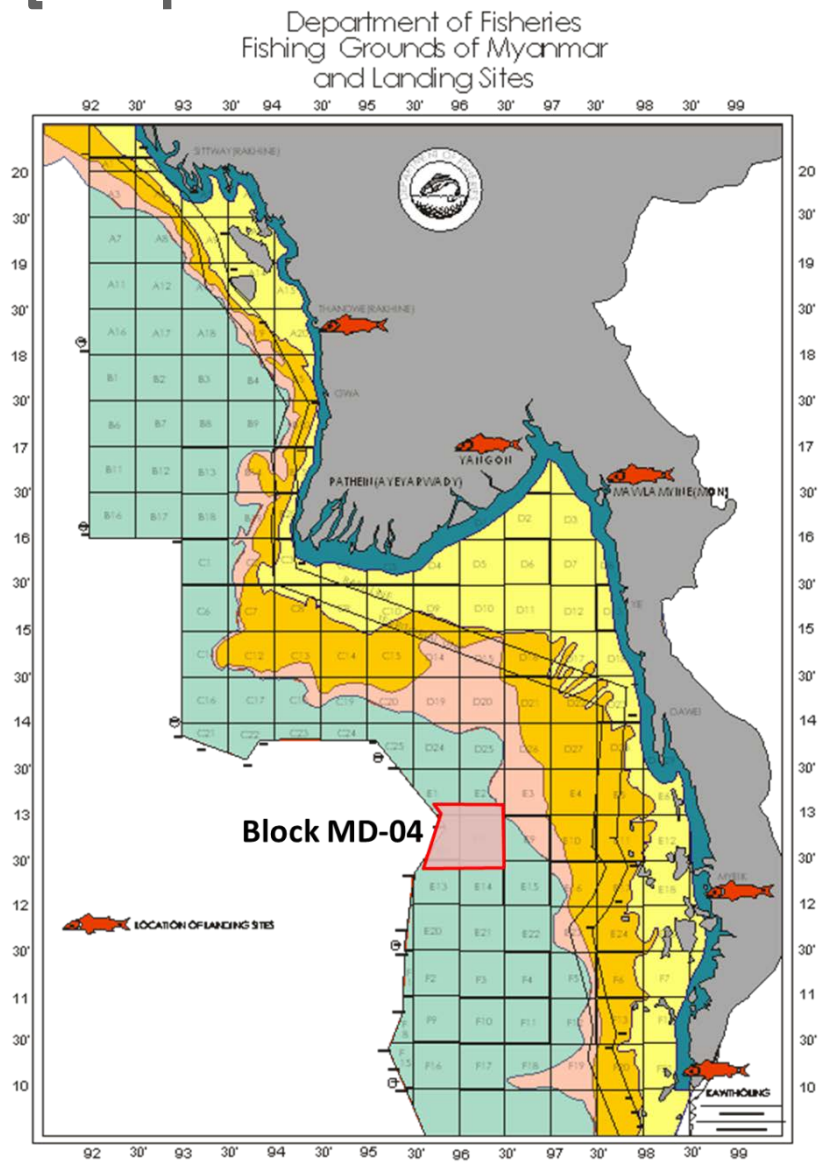
လူမှုရေးဆိုင်ရာ လေ့လာမှု ဇရိယာ- ငါးဖမ်းလုပ်ငန်း

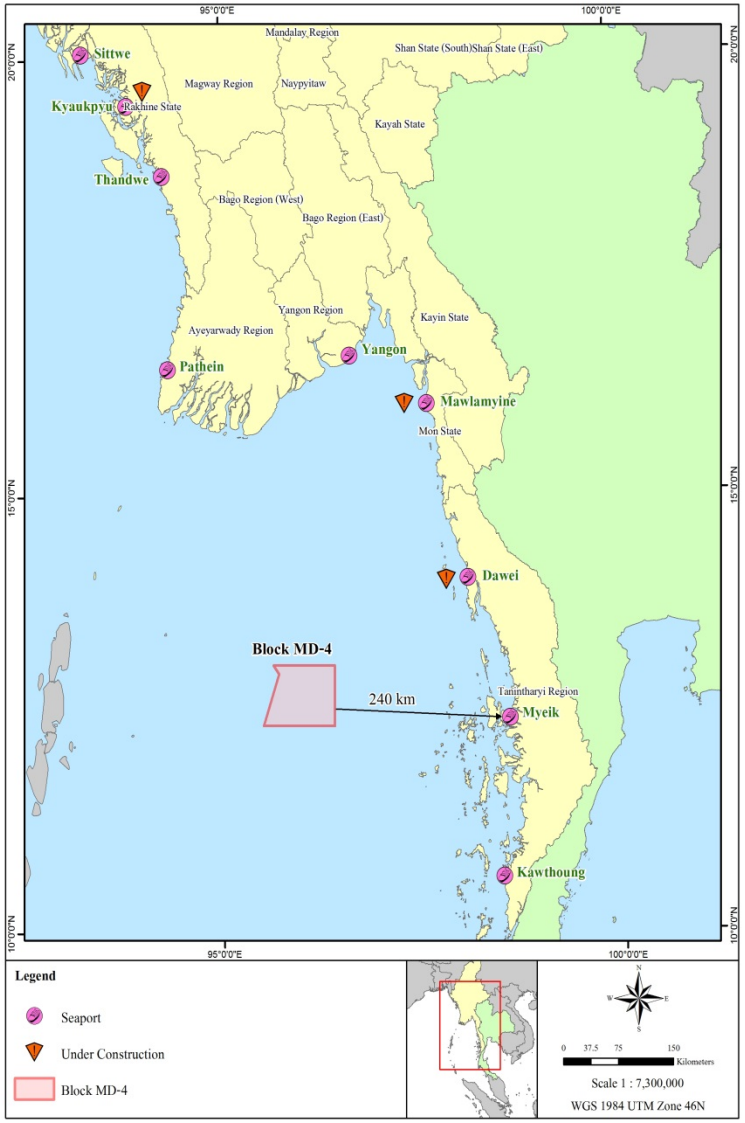
- ငါးလုပ်ငန်းဦးစီးဌာနသည် မြန်မာကမ်းရိုးတန်းကို ငါးဖမ်းနယ်နိမိတ် ၁၄၇ ခု ပိုင်းခြားထားပြီး တစ်ခုလျှင် ၃၀ စတုရန်းမိုင် ရှိပါသည်။ .
- သတ်မှတ်ထားသော ငါးဖမ်းဇရိယာ လေးခု- ရခိုင်၊ ဧရာဝတီ၊ မွန်နှင့် တနင်္သာရီ။ ၎င်းတို့တွင် လုပ်ကွက် ၄၀၊ ၄၄၊ ၁၄ နှင့် ၅၂ အသီးသီး ရှိပါသည်။
- စီမံကိန်း ဇရိယာသည် E7- E8 ငါးဖမ်းနယ်မြေတွင် တစ်စိတ်တပိုင်း ပါဝင်ပါသည်။
- ငါးလုပ်ငန်း ဦးစီးဌာန (DOF) နှင့် ဆွေးနွေးမှုကို ၂၀၁၇ မတ်လတွင် ဆောင်ရွက်ခဲ့ပါသည်။
- <u>စီမံကိန်း ဆောင်ရွက်မှုနှင့် ပတ်သက်၍ ယခင် လေ့လာမှုများအရ ကြီးကြီးမားမား အနှောင့်အယှက်ဖြစ်နိုင်မှု မရှိပါ။</u>



eni myanmar

လူမှုရေးဆိုင်ရာ လေ့လာမှု ဇရိယာ– သဘော်သွားလာမှု

- မြန်မာနိုင်ငံ ကမ်းရိုးတန်း ဇရိယာများတွင် စီးပွားရေးအတွက် အဓိက အရေးပါသော လုပ်ငန်းမှာ သဘော်သွားလာမှု ဖြစ်ပါသည်။
- မြန်မာကမ်းရိုးတန်း ရေပိုင်နက်တွင် မှတ်ပုံတင်ထားပြီး သွားလာနေသော အရွယ်အစားအမျိုးမျိုးဖြင့် ငါးဖမ်းလှေပေါင်း ၂၃၀၀၀ ခန့်ရှိပါသည်။
- မြိတ်ဆိပ်ကမ်းသည် လုပ်ကွက် MD-4 နှင့် အနီးဆုံး ဆိပ်ကမ်းဖြစ်ပြီး ၂၄၀ ကီလိုမီတာခန့် ကွာဝေးပါသည်။
- <u>စီမံကိန်း ဆောင်ရွက်မှုနှင့် ပတ်သက်၍ ယခင် လေ့လာမှုများအရ ကြီးကြီးမားမား အနှောင့်အယှက်ဖြစ်နိုင်မှု မရှိပါ။</u>



m)

အဓိက သက်ရောက်နိုင်ခြေနှင့် ဆောင်ရွက်မည့် လျော့ပါးစေရေး နည်းလမ်းများ

Key Aspects	သက်ရောက်နိုင်ခြေ	လျော့ပါးစေရေး ဆောင်ရွက်ချက်
အကျော်ဝါသက်ရှိနှင့် အကျော်ဝါ ဂေဟဗေဒ	အကျော်ဝါ သက်ရှိများ၊ အထူးသဖြင့် arigun ဖြင့် ဆူညံသံ၊ အသံလှိုင်း ထုတ်လွှတ်မှုကြောင့် ရေနေ နို့တိုက်သတ္တဝါများအပေါ် သက်ရောက်မှု	• 'Pre Start-up Visual Observation Procedures' ကို အကောင်အထည်ဖော်ခြင်း။ • နို့တိုက်သတ္တဝါများ တွေ့ပါက ဆိုက်စမစ်တိုင်းတာသည့် နေရာကို ပြောင်းရွှေ့ခြင်း။ • လှိုင်းများ မပစ်လွှတ်မီ အကျော်ဝါ သက်ရှိများ သတိပြုမိစေရန် အားပျော့ပျော့မှ စတင်ဆောင်ရွက်ခြင်း။ • လုပ်ငန်းဆောင်ရွက်နေစဉ်အတွင်း မြင်သာသော စူးစမ်းလေ့လာမှုများ ဆောင်ရွက်ခြင်း။ • ရေနေနို့တိုက်သတ္တဝါများကို မြင်ပါက ၎င်းတို့ ရွှေ့ပြောင်းသွားသည့် အချိန်ထိ တိုင်းတာမှုကို ရပ်တန့်ထားခြင်း။ • တိုင်းတာသည့် ဇရိယာကို စောင့်ကြည့်စစ်ဆေးရန် သတိပေးရေယဉ်များ အသုံးပြုခြင်း။
ရေကြောင်းသွားလာမှု	Airgun arrays နှင့် streamer များ အပါအဝင် တိုင်းတာသည့် ကိရိယာများသည် ယာယီ အတားအဆီးများ ဖြစ်နိုင်ပါသည်။	• ရေကြောင်း သတိပေးမှုများ ထုတ်ပြန်ရန် MOGE နှင့် ပူးပေါင်းဆောင်ရွက်ခြင်း။ • ရေယဉ်သွားလာမှု သတိပေးရန် အထောက်အပံ့ ရေယဉ်များ အသုံးပြုခြင်း။ • သင့်တော်သော မီး၊ ရေဒါနှင့် ရေလမ်းကြောင်းသုံး ကိရိယာများ အသုံးပြုခြင်း။ • မြင်နိုင်မှု လျော့နည်းသွားပါက တိုင်းတာမှုကို ရပ်တန့်ခြင်း။ • တိုင်းတာပြီးသည့်နောက် ကိရိယာများ အားလုံးကို ဖယ်ရှားပေးခြင်း။

အဓိက သက်ရောက်နိုင်ခြေနှင့် ဆောင်ရွက်မည့် လျော့ပါးစေရေး နည်းလမ်းများ

Key Aspects	သက်ရောက်နိုင်ခြေ	လျော့ပါးစေရေး နည်းလမ်းများ
ငါးဖမ်းလုပ်ငန်း	တိုင်းတာမှု ဆောင်ရွက်နေစဉ် အတောအတွင်း ငါးဖမ်းလုပ်ငန်းများ ယာယီ ဆောင်ရွက်နိုင်မှု မရှိသေးပါ။	• ငါးဖမ်းသမားများနှင့် အခြားသက်ဆိုင်သည့် အဖွဲ့အစည်းများနှင့် တွေ့ဆုံညှိနှိုင်း ဆွေးနွေးခြင်း။ • ရေကြောင်း သတိပေးမှုများ ထုတ်ပြန်ရန် MOGE နှင့် ပူးပေါင်းဆောင်ရွက်ခြင်း။ • ဆိုက်စမစ်တိုင်းတာခြင်း မပြုလုပ်မီ အနည်းဆုံး တစ်ပတ်အလိုတွင် အကြို လေ့လာမှုကို ဆောင်ရွက်ပြီး အတားအဆီးများအားလုံး ဖယ်ရှားခြင်း။ • ချည်းကပ်လာသော ရေယာဉ်များကို သတိပေးရေယာဉ်များဖြင့် သတိပေးဆောင်ရွက်ခြင်း။ • လိုအပ်ပါက ငါးဖမ်းသမားများနှင့် ဆက်သွယ်ရာတွင် MOGE မှ ကိုယ်စားလှယ်များကို အသုံးပြုခြင်း။
လူမှု- စီးပွား	အခြား ကောင်းသော သက်ရောက်မှုများမှာ ယာယီ ဝင်ငွေတိုးလာခြင်းနှင့် အလုပ်အကိုင်များ တိုးလာခြင်းတို့ ပါဝင်ပါသည်။	• ဖြစ်နိုင်ပါက ဒေသခံ ရေယာဉ်နှင့်အလုပ်သမားများကို အသုံးပြုရန်။
လုပ်ငန်းခွင်နှင့် ပြည်သူလူထု ကျန်းမာရေး	သိသာသော သက်ရောက်မှု မရှိပါ။	• လုပ်ငန်းခွင်နှင့် ပြည်သူလူထု ကျန်းမာရေးအပေါ် သက်ရောက်မှုများ လျော့နည်းစေရန် Eni သည် ကျန်းမာရေးနှင့် လုံခြုံရေး မူဝါဒများ အကောင်အထည်ဖော်ခြင်းကို ဆောင်ရွက်ပါမည်။

Eni သို့ ဆက်သွယ်ရန်

မေးခွန်းများ၊ ဆွေးနွေးမှုများ၊ အကြံပြုချက်များ (သို့မဟုတ်) နစ်နာစေသည့် အကြောင်းအချက်များ ရှိပါက အောက်ပါ Eni လိပ်စာအတိုင်း ဆက်သွယ်နိုင်ပါသည်။

ကုမ္ပဏီအမည်	Eni Myanmar B.V. (Eni)
လိပ်စာ	ဆာကူရာ တာဝါ၊ ခြောက်လွှာ၊ (၃၃၉)၊ ဗိုလ်ချုပ်အောင်ဆန်းလမ်း၊ ကျောက်တံတားမြို့နယ်၊ ရန်ကုန်မြို့၊ မြန်မာ။
ဖုန်းနံပါတ်	(+၉၅ ၁) ၂၅၅၃၆၄
အီးမေးလ်	info.enimyanmar@eni.com

တက်ရောက်ပေးသည့်အတွက်ကျေးဇူးတင်ပါသည်။

Back-up Slides

- *Back-up*

အတည်ပြုခြင်းအတွက် အဓိက ပါဝင်ပတ်သက်သူများ

- *မြန်မာ့ရင်းနှီးမြှုပ်နှံမှု ကော်မရှင် (MIC)*
- *လျှပ်စစ်နှင့် စွမ်းအင်ဝန်ကြီးဌာန (MOEE)*
- *သယံဇာတနှင့် ပတ်ဝန်းကျင်ထိန်းသိမ်းရေးဦးစီးဌာန (MONREC)*
- *မြန်မာ့ရေနံနှင့် သဘာဝဓါတ်ငွေ့ လုပ်ငန်း (MOGE)*

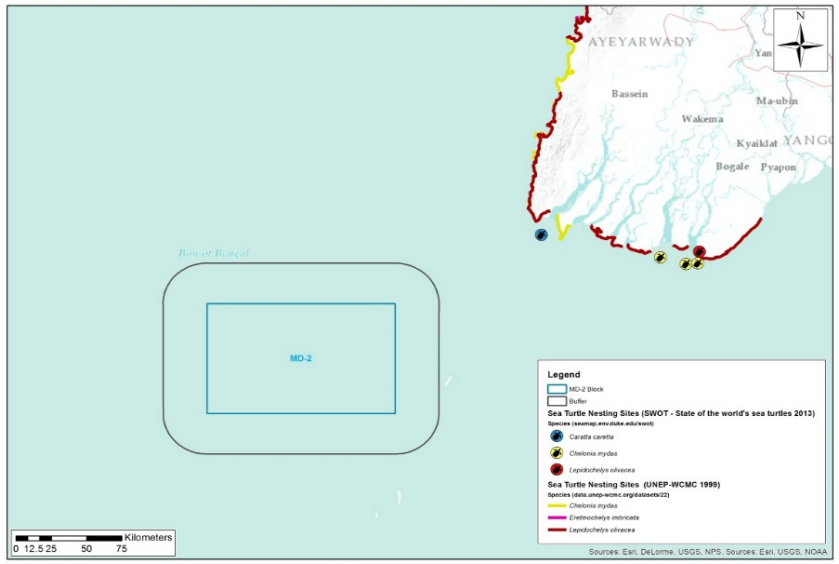
ထို့ပြင် IEE လုပ်ငန်းစဉ်အတွင်း အခြားသက်ဆိုင်သူများလည်း ပါဝင်ပါသည်။
ထိုပုဂ္ဂိုလ်များမှာ

- *ဝန်ကြီးချုပ် (ဧရာဝတီတိုင်း)*
- *ငါးဖမ်းလုပ်ငန်းဦးစီးဌာန (DoF)*
- *မြို့နယ် အထွေထွေအုပ်ချုပ်ရေး ဦးစီးဌာန*
- *ကျေးရွာအုပ်စု*
- *ငါးဖမ်းသမားအဖွဲ့အစည်း*
- *ကမ်းရိုးတန်းအဖွဲ့အစည်းများ*
- *NGOs/INGOs (FFI, WCS, MFF etc.)*

ပါဝင်ပတ်သက်သူများ ညှိနှိုင်းဆွေးနွေးခြင်း

- *The stakeholder consultation process will be developed following the present preliminary meeting. The process will bring to an assessment for each stakeholder, regarding their disposition toward the project and their influence*

- *Eni မြန်မာသည် ၂၀၁၇ မတ်လတွင် တိုင်း၊ ပြည်နယ်အဆင့်အများပြည်သူ တွေ့ဆုံဆွေးနွေးခြင်းကို အောက်ပါနေရာများတွင် ကျင်းပပါမည်။*
  - *ပုသိမ်*
  - *ငပုတော*
  - *ဟိုင်းကြီး*
  - *ပျဉ်ခရိုင်*
- *ထပ်၍ အများပြည်သူ တွေ့ဆုံဆွေးနွေးခြင်းများ လိုအပ်မှုမှာ ထိုတွေ့ဆုံမှုများ၏ ရလဒ်အပေါ် အခြေခံပါသည်။*



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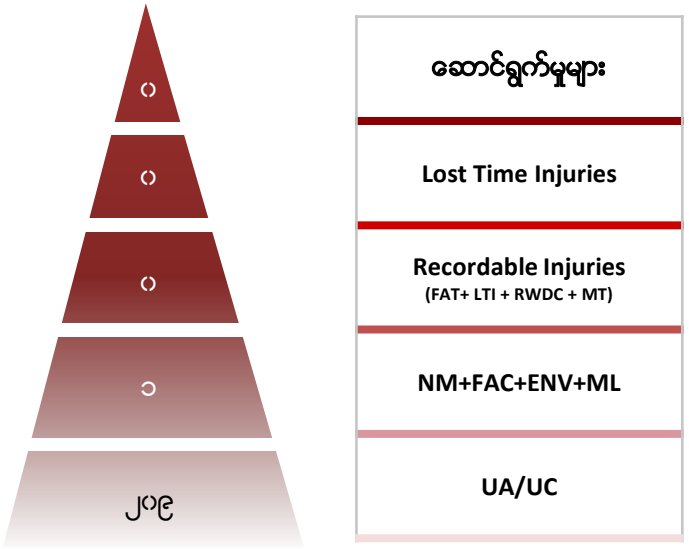
ကမ်းလွန်လုပ်ကွက် MD-2 တွင် ဆိုက်စမစ်တိုင်းတာခြင်း ဆောင်ရွက်ချက်များ

ကျန်းမာရေးနှင့် လုံခြုံစိတ်ချရမှု



MV Polarcus Asima	May-June 2016		
	Total Manhours	Peak Manpower	Average Manpower
Exposure hours	37.200	81	75,6

- 1 Near Miss (May 27th) that resulted in an emergency breakaway during offshore bunkering
- 1 Medical Treatment (June 11th): case of acute seasickness, for a MOGE representative

ပတ်ဝန်းကျင်ဆိုင်ရာ ဆောင်ရွက်မှု

- အရည်အသွေးရှိသော ရေနေနို့တိုက်သတ္တဝါများ စူးစမ်းလေ့လာသူ နှစ်ဦး
- Passive Acoustic Monitoring System in place

- JNCC guideline strictly applied
- Soft-start procedure: delay period of 20 minutes before the soft start after the last sighting of a marine mammal within the "500 meter zones"

By Literature:
- 29 marine mammal species recorded vulnerable in Andaman Sea,
- 21 species of whales, dolphins, porpoises and dugongs within the project area

Results of the monitoring:
- seven visual sightings were made during the MD2 2D survey
- none PAM detection

Fishing Activities:
No fishing activity in block area

Preventive Measure: edit information flye
in Burmese & English
Only one fishing boat encountered

eni myanmar

Next Steps

- *Public Consultations: March 2017*
- *Integration of Public Consultation into Initial Environmental Examination and submission to Authorities (MOGE/MOEE/MIC/MONREC): April 2017*
- *Seismic acquisition activities start-up: 1st Quarter 2018*

Annex D2

Public Consultation Meeting Minutes, Photos, and Sign in Sheets

Initial Environmental Examination (IEE) Study for Offshore block MD-4, 3D Seismic Acquisition

Summary of Meetings at Dawei and Myeik, April 2017

Regional Fishery Department, Dawei Township (7/04/2017) Time (2:00 pm)		
Meeting Minutes Item	Key Discussion	Response
1	**Question - U Tin Oo (President, National Unity Party, Taninthayi Region)** - I would like to know the plan for CSR. - I would like to suggest to have experts such as aquatic experts and representative from relevant departments during seismic survey. - I would like you to have a good relation with local people. If there is a grievance, I would like you to perform for the satisfaction of affected people.	**MOGE** - The Eni exploration activities are regulated based on a contract with Myanma Oil and Gas Enterprise and the Eni itself, the Production Sharing Contract, which is confidential. - If the exploration leads to a commercial production project, the Company will share a percentage of profit with the Government, and some percentage of profit will be used for the development of country and local people. **Eni Company** - There is currently an exploration project ongoing in one of our two onshore blocks which consists only in a seismic survey to investigate the structure of the subsoil to verify the presence of a potential reservoir. Still there is no production and further investigation projects will be needed. Eni founded its own non-profit organization, Eni Foundation, to carry out CSR project in the Countries where Eni operates. Eni Foundation is already active in Myanmar, some meetings with the Myanmar Authorities at ministerial level have been organized and it will start cooperation in the next future. If a grievance will be

		raised, Eni Myanmar will take responsibility for this and act accordingly.
2	**Question- U Shwe Tun (National Unity Party, Taninthayi Region)** - Since the current block is offshore, there may be conflict with local fisherman. There may be impacts on aquatic animals by vibration of airgun. - Fisherman also may be impacted due to prohibited area during seismic survey. It is recommended to meet with fisherman in Ye Phyu, Long Lon, and Thayet Chaung Townships. - Consultant Company should compile information through fisherman concerns and prepare the report accordingly.	**ERM** - The impact on the aquatic animals is negligible thanks to the mitigation measures implemented in the seismic survey. In addition, the noise emitted from the airgun will have no impact on fish or people. There will be marine experts on the seismic vessels during the survey. If aquatic mammals are observed during the seismic survey, Eni will stop the acquisition and will start again when the mammals will be sufficiently far away that it is safe to do so, in line with the International guidelines. - ERM is preparing the IEE Report, which will document fisherman concerns accordingly. This report will be submitted to ECD in Nay Pyi Taw. Experts from ECD will review the report and Eni can continue the project only with their approval.
3	**Question- U Aung Naing Soe (Assistant Administrator, ECD)** - Aquatic mammals should be studied carefully. - How will you manage waste from four vessels including seismic vessels?	**Eni Myanmar** - Eni Myanmar prepared a waste management plan. Eni Myanmar is currently cooperating with Dowa Company as a waste management licensed contractor for the onshore project. Eni will submit the IEE, which includes our waste and wastewater management plan, to ECD for offshore seismic activities. **ERM** - Seismic vessels also have to comply with international guidelines, including having appropriate waste management plans and systems. - Impacts on aquatic mammals will be negligible as discussed above. ECD will

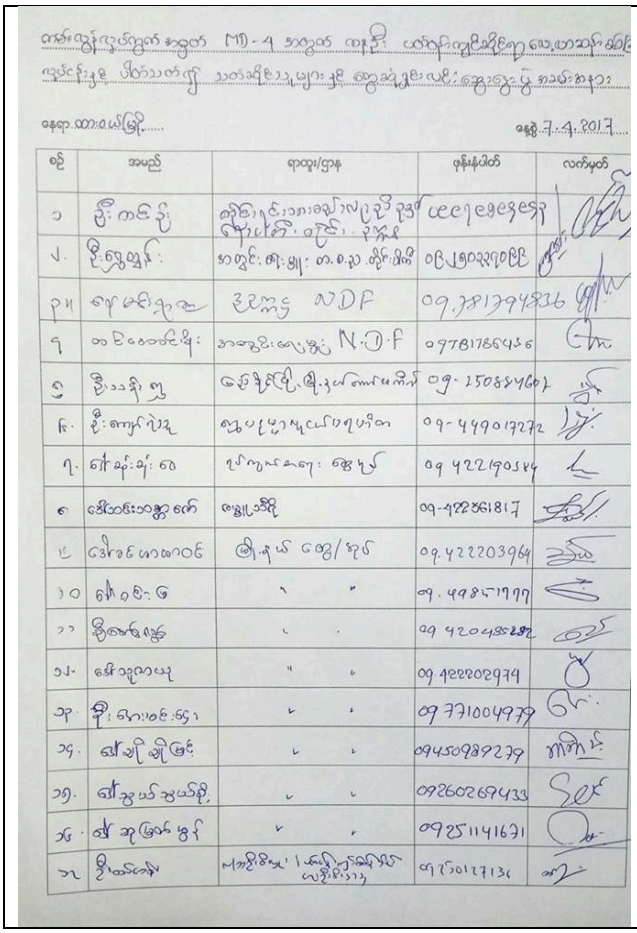
		also review the impact assessments and technical information provided in the IEE report.
4	**Question-U Ba Sein (Deputy Chairman, NLD Party)** - Please seriously consider impacts and benefits to local people, and carry out the project according to local people's considerations and concerns. **Question U Nay Min Yarzar (NDF Party)** - Road development should be priority as CSR activity and local investment.	**MOGE** - As already declared, if the exploration leads to a commercial production project, the Company will share a percentage of profit with the Government, and some percentage of profit will be used for the development of country and local people.

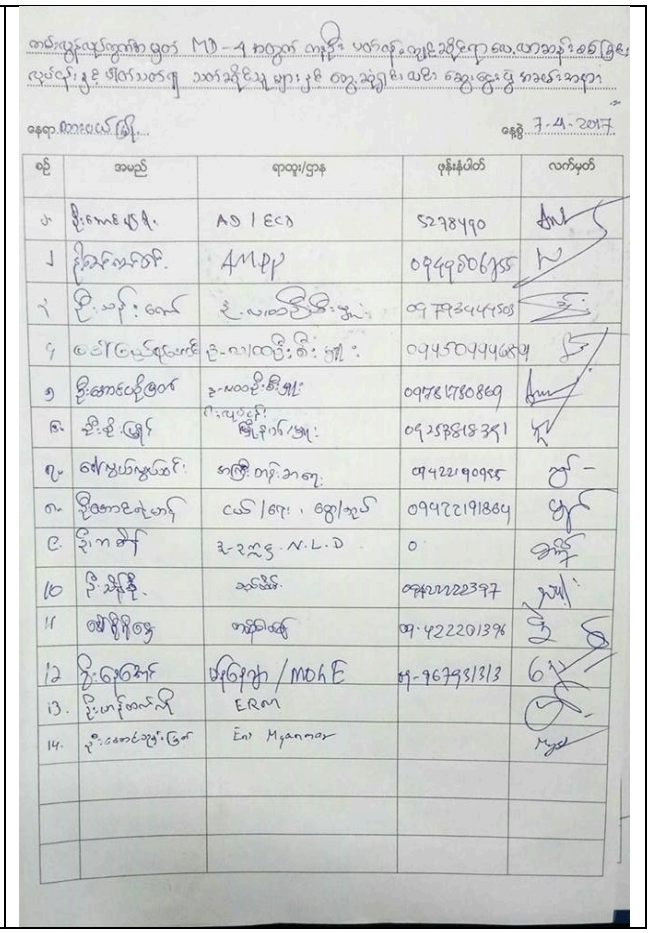
Attendance List

Dawei Township 7.4.2017

Sr.	Name	Department	Contact Number
1	U Tin Oo	President, National Unity Party, Taninthayi Region	09-979594943
2	U ShweTun	Secretary, National Unity Party,Taninthayi Region.	09-250337099
3	U Nay Min Yarzar	Vice President, National Democratic Force Party, Taninthayi Region	09-781794836
4	U Tin Aung Moe	Secretary, National Democratic Force Party, Taninthayi Region	09-781786436
5	U Than Shwe	Member of Union Solidarity and Development Party.	09-250884607
6	U Kyaw Ye Thu	ShwePadonmar, Philanthropic Group	09-449017272
7	Daw San San Wai	Township GAD	09-422190384
8	Daw Thin ThandarZaw	Myeik	09-422362827
9	DawKhin Mar Mar Win	Township GAD	09-422203964
10	Daw Win Mya	Township GAD	09-49851777
11	U Aung Lwin	Township GAD	09-420485282
12	Daw Thuzar Yu	Township GAD	09-422202974
13	U Aye Min Htay	Township GAD	09-771004979
14	Daw Cho ChoMyint	Township GAD	09-260269433
15	DawTweTweSoe	Township GAD	09-450989279
16	Daw Su Myat Mon	Township GAD	09-251141671
17	U Htet Han	ECD	09-250127136
18	U Aung NaingSoe	AD/ECD	09-5278490
19	U NaingZawMyint	AMPP	09-49506755
20	U Than Zaw	DOF	09-793449503
21	Daw Kyi Sau Aung	DOF	09-450994503
22	U Aung Ho Myat	DOF	09-781780869
23	U SoeMyaing	Officer/DOF	09-253818391
24	DawLweLwe Thin	DOF	09-422190925
25	U Aung Ye Han	Township GAD	09-422191864
26	U Ba Sien	NLD	
27	U Thein Soe	Myeik	09-42222397
28	Daw Ye YeHtay	Myeik	09-422201396
29	U Nay Aung	MOGE	
30	U Han HtetKo	ERM	
31	DawPhyuPhyuShein	REM	
32	U Aung Phone Myat	Eni Myanmar	
33	U Khant Taw Htoo	Eni Myanmar	

Attendance lists of MD-4 (Dawei)





Dawei Township Photo






Grand Jade Hotel, Myeik (08/04/2017)

Time (11:30am)

Meeting Minutes Item	Key Discussion	Response
1	Question-U San Aung (Chairman of Fishery Federation, Myeik) - The project area lies within a fishing area, and there is seasonal fishing in this area. Total Company had previously said that there were no fishing boats observed during their survey period. However, this is only because fishing was already excluded from the area due to maritime notice. - We catch Phone Gyi crabs (local name) from November to February. This crab can be catch only at that time and exported directly. We may be impacted by the seismic survey. How will you take responsibility if fishing area will be disrupted for the project? - We are concerned that the project may impact some fish species. - Moreover, consultation meeting should be held with more participants.	MOGE - Regarding the number of participants, we understand the concern apologize for inconvenience at this time. We will try to ensure future meetings have more participants. ERM - We are conducting research on fish species and fishing methods found in the project area, which will be described in the IEE Report. - Although sound waves may affect aquatic mammals that use sonar, this is unlikely to happen during a seismic survey due to the implemented mitigation measures. Fishes and marine mammals will not be impacted by the sound waves generated by the airgun. - In addition, marine experts will be onboard of the seismic vessels. If aquatic mammals are observed during the seismic survey, Eni will stop the acquisition and will start again only when they will move sufficiently away to not be affected. The procedure to resume the operation is called: soft start procedure and this will be implemented to ensure that no mammals will be impacted by the operations re start. Eni

		- Thank you for your comments. We will record and consider all of your suggestions in developing our mitigation measures for the project.

Attendance List

Myeik Township 8.4.2017

Sr.	Name	Department	Contact Number
1	U San Aung	President, Township Fishery Federation	09-5040186
2	U ThaungMyint	Secretary, Township Fishery Federation	09-5641570
3	U Tin Shae	Patron, Township Fishery Federation	09-5641167
4	U Min MinHlaing	Ward Track/Talainesu Ward	09-260092727
5	U MyatHtut	OFI (Media)	09-42294074
6	U Nay Aung	MOGE	
7	U Han HtetKo	ERM	
8	DawPhyuPhyuShein	REM	
9	U Aung Phone Myat	Eni Myanmar	
10	U Khant Taw Htoo	Eni Myanmar	
11	Nan ThazinOo	REM	
12	Aung Thu Phyo	REM	

Attendance lists of MD-4 (Myeik)

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နေရာ မြိတ်မြို့

နေ့စွဲ 8.4.2014

စဉ်	အမည်	ရာထူး/ဌာန	ဖုန်းနံပါတ်	လက်မှတ်
၁	ဦး [illegible]	[illegible]	0956[illegible]186	[signature]
၂	" [illegible]	[illegible] "	095641570	[signature]
၃	" [illegible]	[illegible]	095641167	[signature]
၄.	ဦး [illegible]	[illegible]	0926009 2727	[signature]
၅.	ဦး [illegible]	OFI (our future Initiative)	09422099074	[signature]
၆.	ဦး [illegible]	[illegible] (MOGE).	09.9679 31313	[signature]
၇.	ဦး [illegible]	ERM		[signature]
၈	ဦး [illegible]	Eni Myanmar		[signature]
၉	ဦး [illegible]	Eni Myanmar	09420306272	[signature]
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Myeik Township	
	
	
	

Initial Environmental Examination (IEE) Study for
Offshore block MD-4, 3D Seismic Acquisition

1. Meeting Minutes of Public Consultation Meeting in Myeik

Time	10:00 AM – 12:00 AM
Date	27th, April, 2017
Venue	Meeting Room, Myeik District Fisheries Federation, Myeik Township, Tanintharyi Region
Agenda	(1) 10:20 - Opening Ceremony (2) 10:25 - Opening speech by U Nay Aung, Manager (MOGE) (3) 10:40 - Presentation about Company Profile by U Khant Thaw Htoo, HSE Engineer (Eni Myanmar b.v.) (4) 11:05 - Presentation about EIA process by Daw Nu Yin, Senior Social Consultant (SEM) (5) 11:45 - Question and Answer Time (6) 11:50 - Closing Ceremony
Agenda (1)	10:20 - Opening Ceremony
Agenda (2)	10:25 - Opening speech by U Nay Aung, Manager (MOGE)
Agenda (3)	10:40 - Presentation about Company Profile by U Khant Thaw Htoo, HSE Engineer (Eni Myanmar b.v.)
Agenda (4)	11:05 - Presentation about EIA process by Daw Nu Yin, Senior Social Consultant (SEM)
Agenda (5)	11:45 - Question and Answer Time
Agenda (6)	11:50 - Closing Ceremony

Meeting Minutes Item	Key Discussion	Response
1	**Officer of Fishery Department** - It is noted that the project is in fishing block E-7 and E-8. - Will there be any difficulties in coastal and off-shore fishing?	**U Han Htet Ko (ERM)** - To manage the fishing activities and the seismic operations, Eni will arrange the notice to mariner to be announced by relevant departments through MOGE, before starting the project. When the project starts, a supporting vessel will be monitoring activities at all times.
2	**U San Maung (MFF)** - When getting approval (or permission) of this project, is local private company's objection considered? The project site is in our fishing block and we do not agree to do the project activities. - Whenever oil & gas companies previously met with us, the impacts to fish resources were not precisely presented. Although the assessment is carried out by experts, we are still concerned whether the project will affect our fishing area. - Can oil and gas exploration and seismic survey affect fish species while breeding? - There will be agreement between company and government - can this agreement be disclosed to public (both private company and local residents)? Previous projects have not had transparency and appropriate public disclosure. We wish all information to be disclosed to public. - If we have to avoid the affected area, how will the company (developer) consider compensation for our losses? - Offshore fishing activities will take place in the Project area. We want to know who gave the permission. We dislike that the project site is in E7 and E8. Our fishing areas in the sea are narrower and narrower now. Offshore fishing cannot be carried out in coastal areas. Fishing is carried out in the deep sea, and,	**U Han Htet Ko (ERM)** - Local private company's concerns are taken in due consideration by the Project Proponent. Information on the organization we met, including fisheries organizations, their feedback and opinions will be described in detail in the IEE report. The IEE report is still being processed. When IEE will be submitted to ECD, complete information will be reported and disclosed. **U Nay Aung (MOGE)** - Regarding expertise of impact assessment consultants, ECD will request a detailed curriculum of each person to identify what kind of experts and their qualifications. Organization carrying out impact assessment must be approved. - MOGE cannot disclose in detail information on the PSC signed with the companies as this is confidential. MOGE will follow existing laws and regulation of National Government. **U Han Htet Ko (ERM)** - Present activity is seismic measurement process. Impact on the aquatic species is negligible, thanks to all the mitigation measure adopted to not disturb the marine species and detailed in the IEE report. - If the exploration activities will determine a discovery, Eni will continue to adhere to the EIA procedures of Myanmar as well as all the legal requirements. **U Khant Taw Htoo (Eni)** - Internally in Eni, it has been discussed the problem of the impact on the fisheries because Eni already received this input during previous consultations. The

	although it has been said that there are no fishing vessels in the project area, this is not true. Fishing vessel cannot be seen because of announcement that limits the passing at certain day, time, latitude and longitude. There has been no observed fishing only because of restrictions.	discussion is still ongoing, but for sure all affected stakeholders will be duly considered and appropriate mitigation measures implemented. - The public, mainly the fisheries, will be informed about the route of the vessels, how they will mobilize, and in case of any problem connected to their presence, all the mitigation measures needing will be taken, prior to the project activities begin. Now we are proceeding with the IEE report, which will be disclosed to the public via relevant government department. **Daw Nu Yin (SEM)** - While processing IEE report, if there any grievances, environmental conservation department (ECD) will investigate. There are related laws and regulations in Myanmar that ensure accountability and responsibility.
3	**U Thaung Myint (Secretary, MFF)** - While seismic survey is being conducted, are there any impacts to other aquatic animals at the sea?	**U Han Htet Ko (ERM)** - As mentioned in my previous comment, impact on the aquatic species is negligible, thanks to all the mitigation measure adopted to not disturb the marine species and detailed in the IEE report.
4	**U Htay Hlaing** I would like to suggest that information disclosure to local community should be more transparent. Previous projects do not have transparency. An understandable explanation of the extent of the impacts due to current project activities should be disclosed to local affected people through regional government	**U Nay Aung (MOGE)** - According to MOGE policy, future oil and gas exploration must benefit Myanmar as much as possible. Oil and gas exploration activities should be carried out in such a way that is beneficial to the local community. **U Khant Taw Htoo (Eni)** - Local concerns are considered throughout all project activities, including project disclosure and transparency. - One of the benefits of oil and gas exploration development for the local community are the CSR initiatives. The information on how Eni's CSR program has been developed once the production phase started internationally can be browsed on the Eni web site. We have presently four blocks in Myanmar - 2 blocks are onshore and remaining two are offshore. - Eni founded its own no profit organization, Eni Foundation, to carry out CSR project in the Countries where Eni operates. Eni Foundation is already active in Myanmar, some meetings with the Myanmar Authorities at ministerial level have been organized and it will start a

		cooperation in the next future.

Attendant List

Government Department				
No.	Name	Position	Department	Phone No:
1	U HLaing Thu Ya	Financial Officer	Region Fisheries Federation	
2	U Myo Aung		Myanmar Squid Association	0999881580
3	U San Maung		Myeik District Fisheries Federation	095640168
4	U Taung Myint		Myeik District Fisheries Federation	095641570
5	U Han Sein		Private company owner	095641217
6	U Htun Aung Kyaw		Fisheries Federation	095641670
7	U Htun Htun		Region Fisheries Federation	0949319047
8	U Htay Hlaing	Associate Secretary (1)	Myanmar Squid Association	09254698298
9	U Thet Soe	Secretary	Region Fisheries Federation	098762663
10	Daw Than Than Aung	Deputy director	Department of Social welfare	099654421612
11	Daw Khin Khin Lae	District representative	Myeik District of Meteorology and Hydrology	09253564006
12	Daw Mon Mon Naing	Deputy Director	Planning Department	098762955
13	Daw Yu Yu Nawe		Myanma Post & Telecommunication	09422220007
14	U Pyone Cho		Myanma Timber Enterprise	0943027994
15	Dr. Yin Min Thein		Township Public Health	095640919
16	U Nyunt Shein	Vice Chairman	Fisheries Department	095641371
17	U Sein Taung	Deputy director	District Fisheries Department	09250208397
Media				
18	U Zaw Zaw	M & N TV News	Myeik	09422215489
19	U Myint Oo	M/k/MWD	Myeik	092504636
20	U Myo Myint Oo	Reporter, Dawei Watch	Myeik	09422226245
21	U Zaw Oo	Mizzima	Myeik	09454446505
22	U Khaing Htoo	□□□□□□□	Myeik	0941005990

23	U Zaw Moe Oo	Eleven Media	Myeik	09254494181
24	U Myat Htut	DVB CJ	Myeik	09422199074
Company & NGO				
25	U Win Myint	Thidar Company	Myeik	098760773
26	Aung Phone Myat	HSE Specialist	Eni Myanmar b.v.	
27	U Nay Aung	Manager	MOGE	09967931313
28	U Han Htet Ko		ERM	
29	U Khant Thaw Htoo	HSE Engineer	Eni Myanmar b.v.	
30	Daw Nu Yin	Consultant	SEM	09421150138
31	Daw Wah Wah Sann	Consultant	SEM	09263676674
32	Daw Nan Thazin Oo	Consultant	SEM	09425302677

Government and Other Departments

ကမ်းကွန်လုပ်ကွက်အမှတ် MD-4အတွက် ကနဦး ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် 3D ဆိုက်စမစ် တိုင်းတာချင်းအတွက်

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၂၀၁၇ခုနှစ် 4 (လ)၊ ~~28~~ 27 (ရက်)၊

အချိန်- 10:00 AM - 12:00 AM

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အချိန်- 10:00 AM - 12:00 AM

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(၂)	[illegible]	[illegible]	[illegible]	09253564006	
(၃)	[illegible]	[illegible]	[illegible]	098762955	
(၄)	[illegible]	[illegible]	[illegible]	09-422220067	
(၅)	[illegible]	[illegible]	[illegible]	09-43027994	
(၆)	Dr. [illegible]	[illegible]	[illegible]	095640919	
(၇)	[illegible]	[illegible]	[illegible]	09-5641371	
(၈)	[illegible]	[illegible]	[illegible]	09250208397	
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၂၀၁၇ခုနှစ်၊ 4 (လ)၊ 27 (ရက်)၊

အချိန်- 10:00 AM - 12:00 AM

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Media

ကမ်းကွန်လုပ်ကွက်အမှတ် MD-4အတွက် ကနဦး ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် 3D ဆိုက်စမစ် တိုင်းတာချင်းအတွက်

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၂၀၁၇ခုနှစ်၊ 4 (လ)၊ 27 (ရက်)၊

အချိန်- 10:00 AM - 12:00 AM

နေရာ- [illegible]

သတင်းနှင့်စာနယ်ဇင်းများ

စဉ်	အမည်	အလုပ်အကိုင်	နေရပ်လိပ်စာ	ဆက်သွယ်ရန်ဖုန်း	လက်မှတ်
(၁)	[illegible]	MRN TV News	မြိတ်	094222154 89	[signature]
(၂)	ဦးမြင့်ဦး	M/K/.MWD	မြိတ်	09-2504636	[signature]
(၃)	Myo Myint Oo	Dawei Watch [illegible] Reporter	Myeik	-422226245	[signature]
(၄)	[illegible]	Mizzima	မြိတ်	-454446505	[signature]
(၅)	[illegible]	[illegible]	မြိတ်	0941005990	[signature]
(၆)	Zaw Moe Oo	Eleven Media	မြိတ်	09254494181	[signature]
(၇)	[illegible]	DVB CJ.	မြိတ်	09422199074	[signature]
(၈)					
(၉)					
(၁၀)					

Company and NGOs

ကမ်းကွန်လုပ်ကွက်အမှတ် MD-4အတွက် ကနဦး ပတ်ဝန်းကျင်ဆန်းစစ်ခြင်းနှင့် 3D ဆိုက်စမစ် တိုင်းတာချင်းအတွက်
အများပြည်သူနှင့်တွေ့ဆုံဆွေးနွေးခြင်း အခမ်းအနားသို့ တက်ရောက်သူစာရင်း

၂၀၁ရခုနှစ်၊ 4 (လ)၊ 27 (ရက်)၊

အချိန်- 10:00 AM - 12:00 AM

နေရာ- [illegible]

ကုမ္ပဏီနှင့် NGO

စဉ်	အမည်	အလုပ်အကိုင်	နေရပ်လိပ်စာ	ဆက်သွယ်ရန်ဖုန်း	လက်မှတ်
(၁)	ဦးဝင်းမြင့်	[illegible]		098760773	.
(၂)	[illegible]	En: Myanmar		-	[signature]
(၃)	[illegible]	MOGE-, Manager	.	09.967931313	[signature]
(၄)	[illegible]	ERAN			[signature]
(၅)					
(၆)					
(၇)					
(၈)					
(၉)					
(၁၀)					

Record Photo

Annex D3

Disclosure Advertisements in Newspapers

Project Disclosure in Myanmar Newspapers for Eni Block MD-4 Seismic IEE

Disclosure in "The Global New Light of Myanmar", March 10, 2017

vestigating whether those who started the blaze were the ones who had tried to escape, Ramos added.

"What happened is extremely serious, and even more so for the fact that it could have been avoided," Anabella Morfin, Guatemala's solicitor general, showed.

"We will fully support the institutions responsible for investigating, and we will contribute to finding the truth," President Jimmy Morales said in a brief statement on national television Wednesday night.

Morales earlier de-

bled girls had been bused to another shelter as detectives scoured the site.

Plagued by Latin America's worst rates of child malnutrition and street gangs like the Mara Salvatrucha that often prey on minors, Guatemala can be a traumatic place to grow up. Conditions in the

dents escaped, but 54 were recaptured and isolated, Ramos said.

The Virgen de Asuncion home has long suffered from overcrowding, with Guatemalan media reporting that more than 500 people were crammed into the centre designed to house 400.—*Reuters*

rules.

If he can stay in power it could allow him to press on with fiscal reforms and austerity policies that have lifted Brazil's currency and stocks and raised chances the country will emerge from a deep recession this year.

Supreme Court Justice

dent, the head Mendes told R

Because ity to Octobe dential electio would have to didate to serv of the term — eligible to con in a chamber p his allies.—*Reute*

IEE Study of 3D Seismic Survey in Offshore Blocks MD-2 & MD-4 by Eni

Eni Myanmar B.V. (Eni) is planning to conduct a 3D Offshore Seismic Survey in Myanmar Offshore Block MD-2, located in the southern part of Bay of Bengal, in the Rakhine Basin & MD-4, located in Gulf of Moattama, Myanmar. These are scheduled to commence in late 2017. An Initial Environmental Examination (IEE) for the proposed activity is currently being prepared by Eni Myanmar, Environmental Resources Management (ERM), and Resource & Environment Myanmar (REM) and will be submitted to the Environmental Conservation Department (ECD) in April 2017. After the IEE report is completed, it will be publically viewable on Eni's website as follows: https://www.eni.com/en_IT/media/focus-on/eni-myanmar.page.

In the meantime, questions and comments can be submitted to Eni in writing by contacting the following e-mail address: info.enimyanmar@eni.com.

THE REPUBLIC OF THE UNION OF MYANMAR
MINISTRY OF ELECTRICITY AND ENERGY
MYANMA OIL AND GAS ENTERPRISE
(INVITATION FOR OPEN TENDER)
(6 / 2017)

Open tenders are invited for supply of the following respective items in United States Dollars and Myanmar Kyats.

Sr.No	Tender No	Description	Remark
(1)	DMP/L044(16-17)	Assorted Sizes of Batteries (6) Items	Ks

INVITATION FOR PRICE QUOTATIONS

The Republic of the Union of Myanmar has received financing from th tional Development Association (IDA) towards the cost of the National C Driven Development Project (NCDDP). The IDA No. of the financing is No. H814MM. The Department of Rural Development (DRD) of th of Agriculture, Livestock and Irrigation, in its role as implementing ag NCDDP, intends to apply a portion of the proceeds of this financing towa payments under the Purchase Order/Contract for the supply and installa ellite equipment and high-speed connection in three (3) township offices invites eligible suppliers to express their interest in supplying the follow

REFERENCE NUMBER: G 70 – SUPPLY and INSTALLATIO SATELLITE EQUIPMENT and HIGH-SPEED CONNECTION in 3 Township Offices

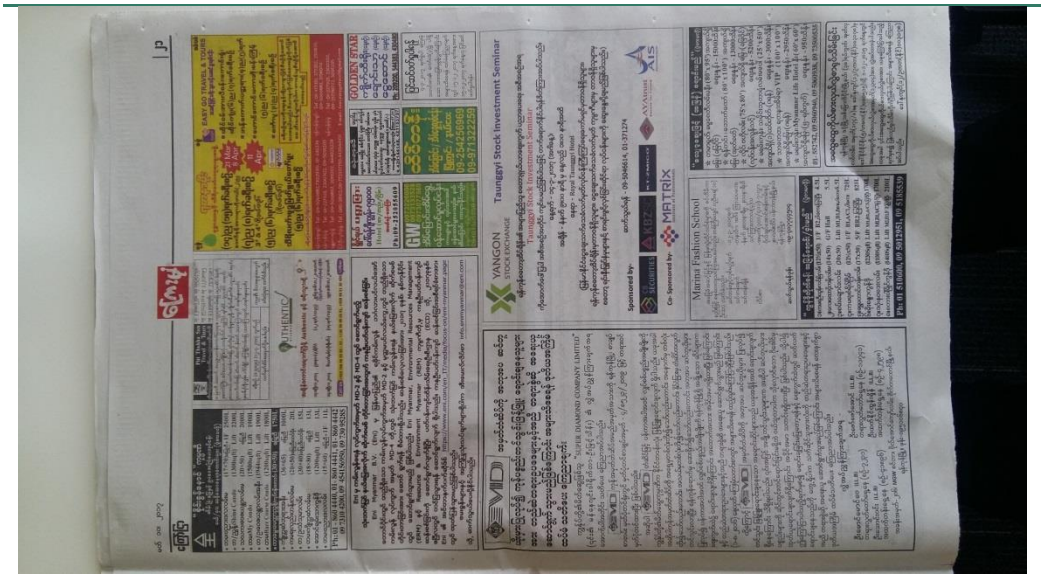
Reference No.	Lot No.	Item No.	Description
G-70	1	1	Supply and installation of Satellite Equipment and High Speed Connection in 3 Township Offices
Supply and installation to Township Offices (Project Sites)			Township Offices: Paletwa, Hpasawng, Madupi.

Expressions of Interest must be submitted in a written form to the email ad and clearly indicate the reference number above. Eligible suppliers having

Disclosure in "The Global New Light of Myanmar", March 10, 2017

Disclosure in "The Mirror", March 10, 2017

Disclosure in "The Mirror", March 10, 2017



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