ExxonMobil Ampasindava Offshore Block, Sifaka Prospect Offshore Geohazard Seismic Survey and Environmental Baseline Study Site.

Environmental Field Activities Report

May-June 2008

Submitted By:
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Introduction

This report presents data on marine mammal, turtle and bird sightings; sediment chemistry and benthic infauna sampling; geochemical and geophysical coring; fishing vessel observations and water, emissions and discharges performed and collected onboard the MV Teknik Perdana from 28th May to 21st June 2008, in accordance with the requirements of Article 41 of the Cahier Des Charges Environnementales (CCE).

Under Permit 30/08 from Office National Pour L'environnement, Exxonmobil undertook a geohazard seismic and bathymetric survey of the Sifaka site, including an environmental baseline study.

As part of the permit conditions, mitigation measures taken in order to avoid any disturbance to marine fauna, especially marine mammals and turtles, included following the Joint Nature Conservation Committee (JNCC) guidelines (2004). A marine mammal observer (MMO) was on watch all daylight hours, securing a 500m exclusion zone from the center of the air gun array and confirming compliance of soft start procedures during transiting, air gun testing or on-line firing.

In accordance with the CCE, a Malagasy student (Jo-Martin Andriatsimialoma) joined the crew of the MV Teknik Perdana and was given basic training as a MMO with supporting informative documentation and electronic data sheet templates. Three representatives, one each from the Malagasy Ministry of Energy and Mines (Barthel Rajaomahandry), Regional Administration (Leon Mananjara) and Fisheries Administration (Marcel Rakotondrasoa), were also onboard to perform duties as laid out by the CCE and all collected data are included in this report.

Long-snouted spinner dolphins, Sifaka (D Reeb)

Marine mammal observation protocol:

Observations were conducted all daylight hours, weather permitting, either from the bridge (9m above sea level) or the monkey island (10.7m above sea level) where a nearly 360º view was possible.

Using reticulated binoculars, Desray Reeb (lead), Ray Valente and Jo Martin Andriatsimialoma monitored the area around the vessel to 2450m in all directions. When the air gun array was deployed, the exclusion zone was measured from the center of the air gun array outward forming a circle 500m in diameter. When the air guns were on deck, the observers recorded their sightings and exclusion zone relative to the center of the vessel. If any marine mammals or turtles entered the exclusion zone during any air gun activity, the gun activity was to be halted and only resumed after the animals had moved beyond the exclusion zone for at least a 30 minute period.

Soft-start or ramp-up procedures were monitored for compliance by observers whereby the exclusion zone was monitored at least 30 minutes before any shooting occurred and the soft start procedure lasted for at least 20 minutes but not longer than 40 minutes.

Gun testing required a full soft start if a larger gun was being tested, e.g., shooting had to begin with the lowest to the highest powered guns.

Line changes that took longer than the time it took for a full soft start should be done with no guns shooting and all effort should be made to reduce the introduction of any unnecessary noise into the marine environment. Night time shooting was to follow the same protocol as day-time shooting, with the exception of visual observations.

Observers worked on a two-hour rotation and were relieved for meals. Bird sightings were recorded when possible.

Results

Dedicated observations were conducted for 151 hours and 07 minutes during the reporting period (Addendum I). Shooting (testing and on-line) took place during 15 hours and 56 minutes of these observations (Table 1).

Altogether there were nine sightings of whales and dolphins (Table 2) during the reporting period. No shutdowns or soft start delays were necessary; and only one sighting occurred during on-line shooting.

Observers were on watch from sunrise to sunset so all soft start procedures were preceded by exclusion zone clearance. Communication between the marine mammal observers (MMOs) and the navigators was established via hand-held VHF radios and this method worked very well.

Ramp-up or soft start procedures adhered to JNCC regulations, except for three occasions, in which the navigators were learning the protocol and gun tests occurred without a full soft start.

At the request of the lead MMO, the Party Chief (Woo Chaw Hong) calculated a firing interval for the 8 air guns of 3 min/air-gun in order to comply with the minimum duration

of 20 minutes for a soft start. After soft starts were completed, a firing interval of 8.3 seconds was followed.

A soft start log, as laid out in the CCE, was completed by the navigators for every soft start event (Table 3). According to the calculated and observed shot intervals during soft starts, after 5 minutes the array was shooting 80 cubic inches. By 15 minutes, the array was shooting 310 cubic inches and after 30 minutes, the array had been at full power (760 cubic inches) for 6-10 minutes.

Table 1: Summary of events

Report period:	28th May – 21st June, 2008
Total no. of gun soft starts:	16
Total no. of gun soft starts at night:	11
Total no. of hours watched:	151 hours, 07 minutes
Total no. of hours watched during shooting:	15 hours, 56 minutes
Total no. of cetacean sightings:	9

Table 2: Sightings of marine mammals between 28th May and 21st June, 2008

Species	No. of sightings			Average number of individuals
	Guns on	Guns off	Total	
Long-snouted spinner dolphin (*Stenella longirostris*)	1	3	4	40
Unidentified baleen whale	0	1	1	1
Sperm whale (*Physeter macrocephalus*)	0	3	3	7
Unidentified dolphin	0	1	1	1
Total	**1**	**8**	**9**	**49**

Complete daily survey effort and sighting forms are presented in Addendum 1.

Sightings of other wildlife:

No turtles were seen for the duration of the reporting period.

'Tuna-like' fish (M. Rakotondrasoa) were seen on many occasions seemingly chasing prey fish and creating white water patches (Figure 1). Tern-like birds (identification to follow) were often seen hovering and diving into these patches, also presumably feeding. Flying fish were seen while in transit to Diego Suarez from the Sifaka site.

Table 3: Soft Start Observation Log

Client: ExxonMobil **Vessel Name:** Teknik Perdana
Project: Sifaka **Survey Type:** 2D

Date	Time UTC	T. Perdana Position		Distance to coast (km)	Depth (m)	Acoustic intensity (cu.in)			Observations of effects on marine fauna
						5 mins	15 mins	30 mins	
3-Jun-08	13h27	14º11.028S	47º19.453E	46.3	1790	80	310	760	None
	15h09	14º08.764S	47º17.388E	40	2202	80	310	760	None
	18h34	14º15.109S	47º27.702E	24.3	268	80	310	760	None
	21h54	14º08.762S	47º17.334E	49	2196	80	310	760	None
4-Jun-08	00h23	14º08.713S	47º16.971E	45	2198	80	310	760	None
	03h44	14º14.997S	47º27.253E	21	382	80	310	760	None
	07h02	14º08.913S	47º17.652E	49	2097	80	310	760	None
	10h11	14º15.369S	47º27.735E	20	367	80	310	760	None
	13h47	14º08.128S	47º13.784E	52	1916	80	310	760	None
	14h56	14º07.739S	47º17.929E	48	2032	80	310	760	None
	18h31	15º15.260S	47º27.370E	24	518	80	310	760	None
5-Jun-08	00h45	14º08.866S	47º16.833E	49	2178	80	310	760	None
	01h02	14º15.800S	47º28.133E	27	265	80	310	760	None
	04h25	14º09.000S	47º16.817E	48	2186	80	310	760	None
	08h30	14º40.280S	47º25.170E	35	754	80	310	760	None
	09h39	14º14.275S	47º27.580E	29	342	80	310	760	None
	14h08	14º08.210S	47º13.160E	57	2205	80	310	760	None
	22h15	14º09.250S	47º16.883E	48	2118	80	310	760	None
6-Jun-08	01h29	14º16.078S	47º27.933E	27	290	80	310	760	None
	05h20	14º15.088S	47º26.577E	49	2169	80	310	760	None
	06h55	14º09.150S	47º16.466E	46	2088	80	310	760	None
	10h15	14º16.030S	47º28.010E	25	297	80	310	760	None

Figure 1: White water caused by fish, Sifaka (D Reeb)

Red-footed boobys (Figure 2) were seen on three occasions and on one occasion landed on the bow for close, positive identification. A log of opportunistic bird sightings was kept on a daily basis (Addendum I) but no bird identification guide was available so positive identifications were not possible and may be made at a later date.

Figure 2: Red-footed booby, Sifaka (D Reeb)

Fisheries Advisor observations:

Mr Marcel Rakotondrasoa was the Fisheries Advisor who performed the task of contacting any vessels encountered on the prospect. One cargo ship, one tanker and one sail boat were seen during the reporting period. Additionally, the only vessel contacted was a Malagasy 'Coast Guard' vessel, ATSANTSA, (Figure 3) which asked for

clarification of the survey vessel's identification, activities and port of call. The Geophysical crew was in the process of collecting cores at the time. There were no other incidents to report.

A small group of flying fish was recorded and 7 small sharks (approximately 1 m in length) were recorded on 2 different days. Schools of juvenile fish were also seen swimming near the vessel.

Figure 3: Atsantsa Coast Guard vessel, Sifaka (D Reeb)

Environmental baseline sampling:

Seawater samples:

Niskin bottles (Figure 4) were used to collect seawater samples from three different depths at each of two stations (EBS 6 and 10) (Table 4). A conductivity, temperature, depth (CTD) profiler was used to determine the depth of the thermocline. Based upon this data, the depths of the seawater samples were selected. These samples were collected to measure total suspended solids, hydrocarbons and metals. Archived bottles of seawater were left refrigerated on the vessel. The analytical samples were shipped using chain-of-custody and appropriate customs forms by DHL to Alpha Analytical Laboratory in Manchester, Massachusetts on 17 June 2008.

Table 4: Sifaka Site CTD and Water Sampling

Core Number	Time (LT)	Location (x,y)		Location (Latitude,Longitude)		Water depth (m)	Remarks
S_EBS_10	18:25	750898.98	8420791.91	14;16.3984633S	47;19.5328106E	1501.4	CTD, top and middle sample only
S_EBS_10	20:08	750966.67	8420904.24	14;16.3368433S	47;19.5698097E	1534.6	Bottom water sample only

Above Water sample and CTD acquired on 8th of June 2008

S_EBS_6	7:10	755895.01	8427954.94	14;12.4884342 S	47;22.2690711 E	1347.6	Sample Ok

Above Water sample and CTD acquired on 9th of June 2008

Figure 4: Niskin bottle seawater sampling, Sifaka (D Reeb)

Sediment samples:

A 0.25 m^2 box corer was used to obtain sediment samples (Figure 5). The samples are to be analyzed for metals, hydrocarbons, total organic carbon (TOC), grain size, and benthic infauna. Replicate samples for chemical and physical analyses were collected and archived on the vessel (in the freezer in Lab 5). All primary samples were shipped either frozen with blue ice (chemical/physical sediment samples) or preserved (benthic infauna samples) by DHL to Alpha Analytical Laboratory in Manchester, Massachusetts on 19 June 2008.

Figure 5: Box Corer with sediment sample (front), Sifaka (D Reeb)

Samples were collected from 12 EBS sediment stations (Table 4)

Table 5: Sifaka Site Box Core positions

Core #	Time (LT)	Proposed Location (x,y)		Actual Location (x,y)		Difference (m)	Bearing to Actual (deg)	Water depth (m)	Remarks	roposed Location (Latitude/Longitud		Actual Location (Latitude/Longitude)	
										Latitude	Longitude	Latitude	Longitude
S_EBS_1	9:55	751170.00	8429732.00	751224.85	8429625.09	120.2	152	1733	Sample ok	14;11.5504410 S	47;19.6338343 E	14;11.6081455 S	47;19.6648741 E
S_EBS_2	11:17	752798.00	8428882.00	752789.62	8428913.25	32.4	344.414	1548	Sample ok	14;12.0023661 S	47;20.5430960 E	14;11.9856081 S	47;20.5382560 E
S_EBS_3	13:09	755226.00	8427414.00	755228.73	8427502.80	88.8	181.2	1266.4	No Sample	14;12.7848195 S	47;21.9003970 E	14;12.7371047 S	47;21.9014014 E
S_EBS_3	13:56	755226.00	8427414.00	755275.05	8427466.13	71.6	222.7	1247.5	Sample ok	14;12.7848195 S	47;21.9003970 E	14;12.7563638 S	47;21.9273305 E
S_EBS_4	15:05	758040.00	8425924.00	758142.44	8425933.02	102.8	264.4	1030.4	Not enough sample,commence to do another test	14;13.5768987 S	47;23.4724521 E	14;13.5714507 S	47;23.5293008 E
S_EBS_4	16:39	758040.00	8425924.00	757942.07	8425809.45	150.7	39.9	973.9	Sample ok	14;13.5768987 S	47;23.4724521 E	14;13.6397778 S	47;23.4186525 E
S_EBS_8	18:00	759503.00	8421702.00	759484.91	8421699.07	18.3	80.2	1037.2	Sample ok	14;15.8571803 S	47;24.3096324 E	14;15.8589080 S	47;24.2995905 E
S_EBS_7	18:57	756771.00	8423192.00	756809.15	8423192.16	38.1	269.2	1248	Sample ok	14;15.0647895 S	47;22.7828283 E	14;15.0645782 S	47;22.8040017 E
Above box corer acquired on 7th of June 2008													
S_EBS_6	8:33	754012.00	8424461.00	754018.24	8424479.77	19.8	197.8	1435	Sample ok	14;14.3921478 S	47;21.2424209 E	14;14.3823569 S	47;21.2457651 E
S_EBS_5	9:58	751638.00	8425925.00	751586.51	8425966.45	66.1	128.3	1850	Sample ok	14;13.6115277 S	47;19.9150021 E	14;13.5895827 S	47;19.8861561 E
S_EBS_9	11:24	748576.00	8423275.00	748675.50	8423298.26	102.2	256.3	1750	Sample ok	14;15.0645183 S	47;18.2280347 E	14;15.0515165 S	47;18.2832061 E
S_EBS_10	13:26	750866.00	8420791.00	750891.00	8420829.25	45.7	212.6	1523	Sample ok	14;16.3986418 S	47;19.5145246 E	14;16.3779079 S	47;19.5282083 E
S_EBS_11	14:40	752963.00	8417811.00	753000.80	8417836.49	45.56	235.4	1255	Sample ok	14;18.0025235 S	47;20.6967784 E	14;17.9887651 S	47;20.7176495 E
S_EBS_12	15:46	756219.00	8415052.00	756284.13	8415091.32	76.1	238.3	989.3	Sample ok	14;19.4800371 S	47;22.5223763 E	14;19.4585355 S	47;22.5583436 E

Above box corer acquired on 8th of June 2008

Discharges, emissions and general vessel activity

Figure 6: Incinerator onboard (D Reeb)

The Administration Representative, Mr Barthel Rajaomahandry, monitored the general activities onboard, including discharges and the incineration of garbage (Figure 6). There were 17 recorded incineration events and emissions were perceived to be at acceptable levels (Table 5). Solid waste that could not be incinerated (plastics and metals) was taken ashore in Diego Suarez 21st June 2008. This waste amounted to 10 m^3 and was cleared and certified by the Association Vagnono Antsiranana (Appendix I).

Table 5: Resource usage 28th May to 21st June 2008

Resource	Volume or amount
Fuel used	89.4 cubic meters
Water	224 cubic meters
Solids incinerated	23.5 cubic meters
Ash residue	1.32 cubic meters
Oil / sludge incinerated	1.14 cubic meters
Used oil filter landed ashore	1

Observance of the boundaries of Sahamalaza/Iles Radama Marine Protected Area (MPA)

Once the navigators were provided with the latitude and longitude positions that define the Sahamalaza/Iles Radama MPA, the area was entered into the navigational system. The Regional and Administrative Representatives, Mr Leon Mananjara and Mr Barthel Rajaomahandry, were satisfied that the MPA boundaries were not breached and that the project was in compliance with the legal specifications laid out in the CCE.

Mr Mananjara attempted to make contact with the Port Captains at Antsiranana and Mahajanga every day at 08h00 and 16h00 to relay the vessels position via satellite phone,

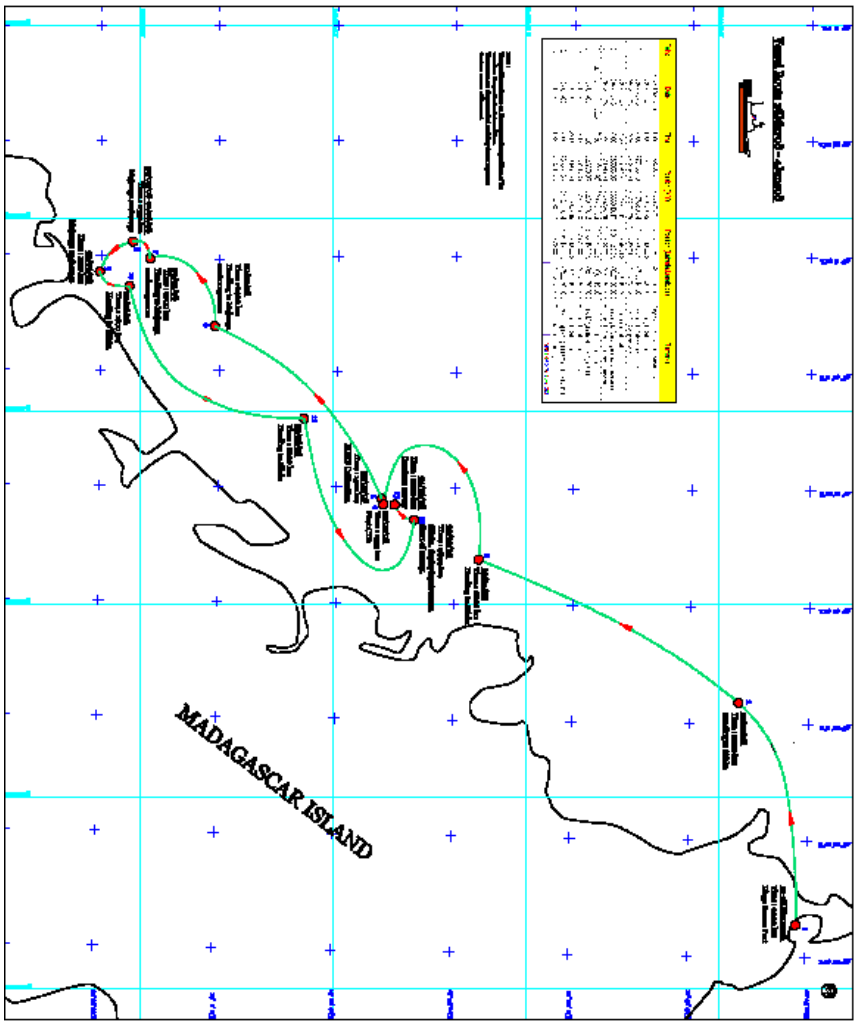
VHF radio and/or e-mail. Limited means of communication at Mahajanga were particularly challenging.

Survey Summary

The EBS, geochemical and geophysical sampling was completed but seismic survey operations were only undertaken for 10 days of the reporting period. Standbys due to delays with equipment delivery, as well as a mass stranding event of melon headed whales (*Peponocephala electra*) in the LaLoza River, were the primary causes for the standbys. The survey was halted on 06 June 2008, by which time only 18 lines had been completed (Appendix I). After two weeks of being on standby, the survey was cancelled on 20th June 2008.

Vessel movements and the locations of the completed survey lines are plotted in Figure 7 and listed in Appendix II below:

Figure 7: Trackline of MV Teknik Perdana's movements 28th May to 21st June 2008



Appendix I: Hygiene certification for garbage taken onshore, Diego Suarez 21st June 2008

A.V.A « ASSOCIATION VAGNONO ANTSIRANANA »

BUREAU MUNICIPAL D'HYGIENE
COMMUNE URBAINE
DE DIEGO - SUAREZ

ATTESTATION

Nous soussigné l'Association A.V.A en présence du Médecin chef du B.M.H (Bureau Municipal d'hygiène) de Diégo Suarez, attestons avoir fait , assisté le ramassage d'ordure ménagère à bord du navire scientifique « Teknik Perdana » et encadré le transport jusqu'au lieu de décharge officiel, ce Samedi 21 Juin 2008 vers 11h00mn

Cet Attestation est établi pour servir et valoir ce que de droit.

Fait à Diégo Suarez le 21 Juin 2008

LE PRESIDENT

RANDRIANASOLO Gérald

LE MEDECIN CHEF DU B.M.H

BOANARIJESY Jean Claude

Appendix II: Line start and end points – only the first 18 lines were completed during this reporting period.

TL GEOHYDROGRAPHICS PTE.LTD.

PROPOSED 2D HIGH RESOLUTION SURVEY GRID

CLIENT	EXXONMOBIL NORTHERN MG (AMPASINDAVA) HOLDING LTD	**SURVEY VESSEL**	M.V. TEKNIK PERDANA
PROJECT	SIFAKA - EBS AND MBES/2DHR GEOPHYSICAL SURVEY	**SURVEY DATUM**	WGS 84
SITE NAME	SIFAKA	**SURVEY PROJECTION**	UTM 38 S
TLGH JOB REF	MAD-GH/3330/08	**SURVEY LOCATION**	AMPASINDAVA BLOCK, MG

Line Name	SOL Easting	SOL Northing	SOL Latitude	SOL Longitude	EOL Easting	EOL Northing	EOL Latitude	EOL Longitude	Length (m)]
S08101A	763549.88	8426376.17	14;13;18.050 S	47;26;31.884 E	750305.87	8433418.63	14;09;33.402 S	47;19;08.004 E	15000.00
S08102A	763455.98	8426199.58	14;13;23.825 S	47;26;28.815 E	750211.98	8433242.04	14;09;39.176 S	47;19;04.933 E	15000.00
S08103A	763362.09	8426022.99	14;13;29.600 S	47;26;25.747 E	750118.08	8433065.45	14;09;44.950 S	47;19;01.861 E	15000.00
S08104A	763268.19	8425846.40	14;13;35.375 S	47;26;22.678 E	750024.18	8432888.86	14;09;50.723 S	47;18;58.790 E	15000.00
S08105A	763174.29	8425669.81	14;13;41.150 S	47;26;19.609 E	749930.29	8432712.27	14;09;56.497 S	47;18;55.718 E	15000.00
S08106A	763080.40	8425493.22	14;13;46.925 S	47;26;16.541 E	749836.39	8432535.69	14;10;02.270 S	47;18;52.647 E	15000.00
S08107A	762986.50	8425316.64	14;13;52.699 S	47;26;13.472 E	749742.49	8432359.10	14;10;08.044 S	47;18;49.575 E	15000.00
S08108A	762892.60	8425140.05	14;13;58.474 S	47;26;10.403 E	749648.60	8432182.51	14;10;13.818 S	47;18;46.503 E	15000.00
S08109A	762798.71	8424963.46	14;14;04.249 S	47;26;07.334 E	749554.70	8432005.92	14;10;19.591 S	47;18;43.431 E	15000.00
S08110A	762704.81	8424786.87	14;14;10.024 S	47;26;04.265 E	749460.80	8431829.33	14;10;25.365 S	47;18;40.360 E	15000.00
S08111A	762610.91	8424610.28	14;14;15.798 S	47;26;01.196 E	749366.91	8431652.75	14;10;31.138 S	47;18;37.288 E	15000.00
S08112A	762517.02	8424433.69	14;14;21.573 S	47;25;58.127 E	749273.01	8431476.16	14;10;36.912 S	47;18;34.216 E	15000.00
S08113A	762423.12	8424257.11	14;14;27.348 S	47;25;55.058 E	749179.11	8431299.57	14;10;42.685 S	47;18;31.144 E	15000.00
S08114A	762329.22	8424080.52	14;14;33.122 S	47;25;51.989 E	749085.22	8431122.98	14;10;48.459 S	47;18;28.072 E	15000.00
S08115A	762235.33	8423903.93	14;14;38.897 S	47;25;48.920 E	748991.32	8430946.39	14;10;54.232 S	47;18;25.000 E	15000.00
S08116A	762141.43	8423727.34	14;14;44.672 S	47;25;45.850 E	748897.42	8430769.80	14;11;00.006 S	47;18;21.928 E	15000.00
S08117A	762047.53	8423550.75	14;14;50.447 S	47;25;42.781 E	748803.53	8430593.22	14;11;05.779 S	47;18;18.856 E	15000.00
S08118A	761953.64	8423374.17	14;14;56.221 S	47;25;39.712 E	748709.63	8430416.63	14;11;11.553 S	47;18;15.784 E	15000.00