FUGRO CONSULTANTS, INC.

PRE-PROJECT GEOPHYSICAL/ARCHAEOLOGICAL SURVEY REPORT

SANTA YNEZ UNIT OFFSHORE POWER SYSTEM RELIABILITY-B (OPSRB) PROJECT SANTA BARBARA CHANNEL, CALIFORNIA

Prepared for:
EXXONMOBIL PRODUCTION COMPANY

November 2011 (Revised December 2011)
Fugro Job No. 04.64110024

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December 13, 2011
Project No. 04.64110024

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(281) 654-0970

Attention: Ms. Andrea Pecunia

Subject: Pre-Project Geophysical/Archaeological Survey Report for ExxonMobil SYU Offshore Power System Reliability-B (OPSRB) Project, Santa Barbara Channel, California

Dear Ms. Pecunia:

Please find enclosed a copy of our Pre-Project Geophysical/Archaeological Survey Report for ExxonMobil SYU Offshore Power System Reliability-B (OPSRB) Project Santa Barbara Channel, California. The report includes the associated Archaeological Survey Report prepared by Heather Macfarlane. This work was authorized under ExxonMobil's Order Number 4502141523.

The geophysical survey operations included the following components: Shallow Water Survey, Deep Water Survey, Platform Landing Area Survey and Existing Buried Pipeline and Power Cable Verification Survey. The near-shore Shallow Water Survey aboard the *M/V Danny C* mobilized September 7, field equipment testing occurred on September 8, survey field operations were executed September 9 through 10, and demobilization September 11, 2011. The Deep Water and Platform landing Area Surveys aboard the Toby Tide mobilized September 11 through 15, survey field operations were executed September 16 through 29, and demobilization September 30, 2011. Data processing was performed in October 2011. Data interpretation and reporting were completed in November 2011.

It has been a pleasure working on this phase of the project. We look forward to continuing to support ExxonMobil as the OPSRB Project progresses.

Sincerely,

FUGRO CONSULTANTS, INC.

REGISTERED GEOLOGIST
PHILLIP JOSEPH HOGAN
EG No. 2338
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Eddie Stutts
Project Manager

Dr. Phillip J. Hogan, CEG
Principal Engineering Geologist

Copies Submitted: (2 and PDF) Addressee

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Santa Ynez Unit (SYU) contains Platforms Hondo, Harmony, and Heritage located in three OCS lease blocks designated OCS-P-188, 190, and 182, respectively. Two of the electrical power cables connecting Platforms Hondo, Harmony, and Heritage to shore are to be replaced as part of the OPSRB Project. This Pre-Project Geophysical/Archaeological Survey Report in support of ExxonMobil SYU Offshore Power System Reliability-B (OPSRB) Project summarizes potential geologic and geotechnical conditions within a corridor that includes the proposed power cable routes for the OPSRB described in previous and this survey's geoscience studies performed in the area. The survey accomplished the project objectives as described in the OPSRB Geophysical/Archaeological Survey Work Plan (August 2011).

The SYU is located in the Santa Barbara Channel, which extends along a northwest-southeast trending embayment of the southern California coast between Point Conception and Ventura. The proposed OPSRB cable alignment corridors extend from the shoreline to Platforms Hondo, Harmony, and Heritage. Seafloor slopes are variable. From the shoreline to cable alignment A2, station 275+00 and cable alignment F2, station 310+00 the slope is 1 to 2 degrees. From these stations and between Platform Hondo and Harmony the cable alignment corridor is characterized by slope angles of 10 to 20 degrees. Between Platform Harmony and Heritage the cable alignment corridor is generally characterized by slope angles of 2 to 20 degrees, although steeper slopes are encountered when crossing submarine channels.

The side-scan-sonar imaging, sub-bottom profiling, single-beam bathymetry, and magnetometer survey data were acquired in September 2011. These new data were processed and interpreted. Charts and figures presented in this report document the results and site conditions within the proposed OPSRB cable alignment corridor.

Various potential geohazards have been identified and are interpreted to be present. The most significant potential geohazards that have been identified by Fugro in the project survey area include:

- Mass Movement, and
- High seismicity and associated strong ground motions.

Other constraints include existing facilities and anthropogenic alterations to the seafloor.

A side scan sonar survey was performed as part of Fugro's 2011 OPSRB Pre-Project Geophysical/Archaeological survey program. A total of 114 targets were identified in the side scan sonar data. The disposition of the identified targets, based on analysis of the data and discussions with ExxonMobil, is shown below:

- 63 Targets- Investigated as part of the OPSRB ROV Anomaly/Archeological Survey.
- 11 Targets- Investigated as part of the OPSRB Marine Biological Survey (2 of the targets should have been excluded under the next category).

- 33 Targets- Excluded from investigation since the targets were located outside of the cable route corridor as presented in the SYU OSPRB Geophysical/Archeological Survey Plan.
- 7 Targets- Excluded from investigation since the targets were positively identified as anode sleds off of Platform Heritage

In addition to the identified targets referenced above to be inspected by the ROV Anomaly/Archeological Survey, the BSEE review of the preliminary data resulted in a request to investigate two areas of scattered rock marked on Alignment Chart 1 of 10 and 7 of 10.

The ROV Anomaly/Archeological Survey will also investigate the six geophysical survey data gap areas where side scan sonar data was missing. These areas will be inspected in accordance with the HA & HE ROV Contingency Plan.

The above referenced targets include existing mooring systems, unknown linear objects, crab pots, and unknown debris. Fugro contracted an on-board marine archaeologist and third party marine archaeologist to provide a review of their findings concerning identification of side scan sonar targets. The marine archaeologists' findings are presented in the Archaeological Survey Report which is included as Attachment H..

Geophysical data acquired by Fugro in September 2011 indicated the presence of a Holocene sediment isopach layer 0 to 32 feet thick overlying harder, older material across the project survey area.

This report summarizes geologic conditions described in previous and this survey's geoscience studies performed in the SYU project area, and identifies potential geohazards and constraints of relevance to the OPSRB project. These geologic hazards and constraints can be mitigated by appropriate cable routing and engineering design. Based on review and analysis of available data as discussed and documented in this report, it is our opinion that the proposed OPSRB cable routes are geologically feasible.

SECTION 1
INTRODUCTION

1.0 INTRODUCTION

1.1 SANTA YNEZ UNIT AND PROJECT DESCRIPTION

Discovered in January 1969, the Santa Ynez Unit (SYU) is an active hydrocarbon-producing region in southern California located in Federal waters, approximately 6-8 miles offshore Santa Barbara, California (Figure 1-1). The SYU contains three platforms named Hondo, Harmony, and Heritage located in three OCS lease blocks designated OCS-P-188, 190, and 182, respectively (Figure 1-1). The platforms are owned and operated by ExxonMobil. The SYU also contains infrastructure associated with the platforms including interconnecting pipelines and power cables.

As part of the SYU OPSRB Project, two of the power cables that run in a corridor between shore and Platforms Hondo, Harmony, and Heritage (Figures 1-2a and 1-2b) will be replaced. The proposed cable route corridor from shore to and around Platforms Hondo, Harmony, and Heritage is the subject of this Pre-Project Geophysical/Archaeological Survey Report. The ExxonMobil OPSRB Project will improve the reliability of electricity distribution from shore and between the platforms.

Proposed alignment routes for the OPSRB cables have been prepared based on the best information currently available. These alignments are currently being reviewed and analyzed by cable engineering firms. Consequently, the proposed OPSRB cable alignments discussed and presented in this report are preliminary and could be modified, as appropriate. Any route modification is planned to be within the surveyed corridor. The locations of the proposed OPSRB cable alignments described above are shown on Figures 1-3a and 1-3b.

1.2 SCOPE OF WORK

In September 2011, Fugro performed bathymetric and geophysical surveys of a corridor that includes the proposed power cable routes for the OPSRB Project and the area surrounding Platforms Hondo, Harmony, and Heritage. The results of the surveys are presented in this report and were used to provide updated information on geology and geohazards in SYU and vicinity. The survey was conducted in conformance with the Survey Work Plan and Specification submitted by ExxonMobil to the agencies. The survey was designed to accomplish the following objectives:

- Map kelp location in the near shore conduit area.
- Identify and map seabed features in the surveyed area.
- Identify and map conduit openings where the existing power cables exit on seafloor to the extent possible with the survey equipment.
- Identify and map existing submarine power cables and pipelines within the surveyed area to the extent possible with the survey equipment.
- Identify and map location of existing power cable crossings of POPCO Gas Pipeline.

- Identify and map bathymetric data in the surveyed area.
- Identify and map anomalies (targets) in the surveyed area for later inspection (utilize marine archaeologist to review data as it is being generated).
- Map location of the proposed power cable routes and Route Position List (RPL).
- Certify maps by Registered Land Surveyor in California and, if needed by an ACSM Certified Hydrographer.

1.2.1 Permitting Requirements

The California State Lands Commission Issued the Non-Exclusive Geophysical Survey Permit (PRC 8392) to Fugro on August 20, 2010 that continued through September 30, 2011. This permit covers offshore state waters, excluding inland waterways between the Mexican and Oregon borders out to 3 nautical miles. This permit authorized the collection of geophysical data utilizing specified equipment and providing requirements for field operations and reporting. The survey was also conducted in conformance with applicable sections of the BOEM/BSEE Notice to Lessees (NTL) 2005-G07 and NTL 06-P03.

The BOEM/BSEE issued a letter on 9/1/2011 concurring with the approach for the Pre-Project Geophysical/Archaeological Surveys. In addition, the California State Lands Commission issued a letter on 8/30/2011 concurring with the approach for the Pre-Project Geophysical/Archaeological Surveys. The survey vessels that were used for the Shallow Water Survey and Deep Water survey, were Dedicated Project Vessels or spot charter vessels under the SYU air permits. All temporary engines were covered under the CA PERP and reported to the SBC APCD.

1.2.2 Report Description and Requirements

This Pre-Project Geophysical/Archaeological Survey Report is intended to provide detailed information on surface and subsurface site conditions based on marine geophysical survey results. This report defines and evaluates the geologic conditions and their implications that may affect project permitting, design, construction, and operation of the cables associated with the OPSRB project. The BOEM/BSEE provides applicable requirements for conducting the geophysical survey as presented in NTL 2005-G07, NTL 06-P01 and NTL 06-P03 as directed by BOEM/BSEE staff in Camarillo The information contained in this report is included in order to fulfill data requirements in the aforementioned NTLs.

1.2.3 Key Personnel

Key Fugro personnel who contributed to this Pre-Project Geophysical/Archaeological Survey Report include the following people:

Name	Company and Title	Primary Function for this Study
Eddie Stutts, CH	FCL, Offshore Survey Operations Manager	Project Manager, Report Preparation
Phillip Hogan, Ph.D., CEG.	FCL, Principal Marine Engineering Geologist	Principal-in-Charge: Project Coordination and Report Preparation
Cynthia Pratt	FCL, Survey Operations Coordinator	Data Analysis, Report Preparation
Cornelia Dean, CEG.	FCL, GIS Manager	Figure/Chart Review

Note: FCL = Fugro Consultants, Inc.

1.2.4 Authorization

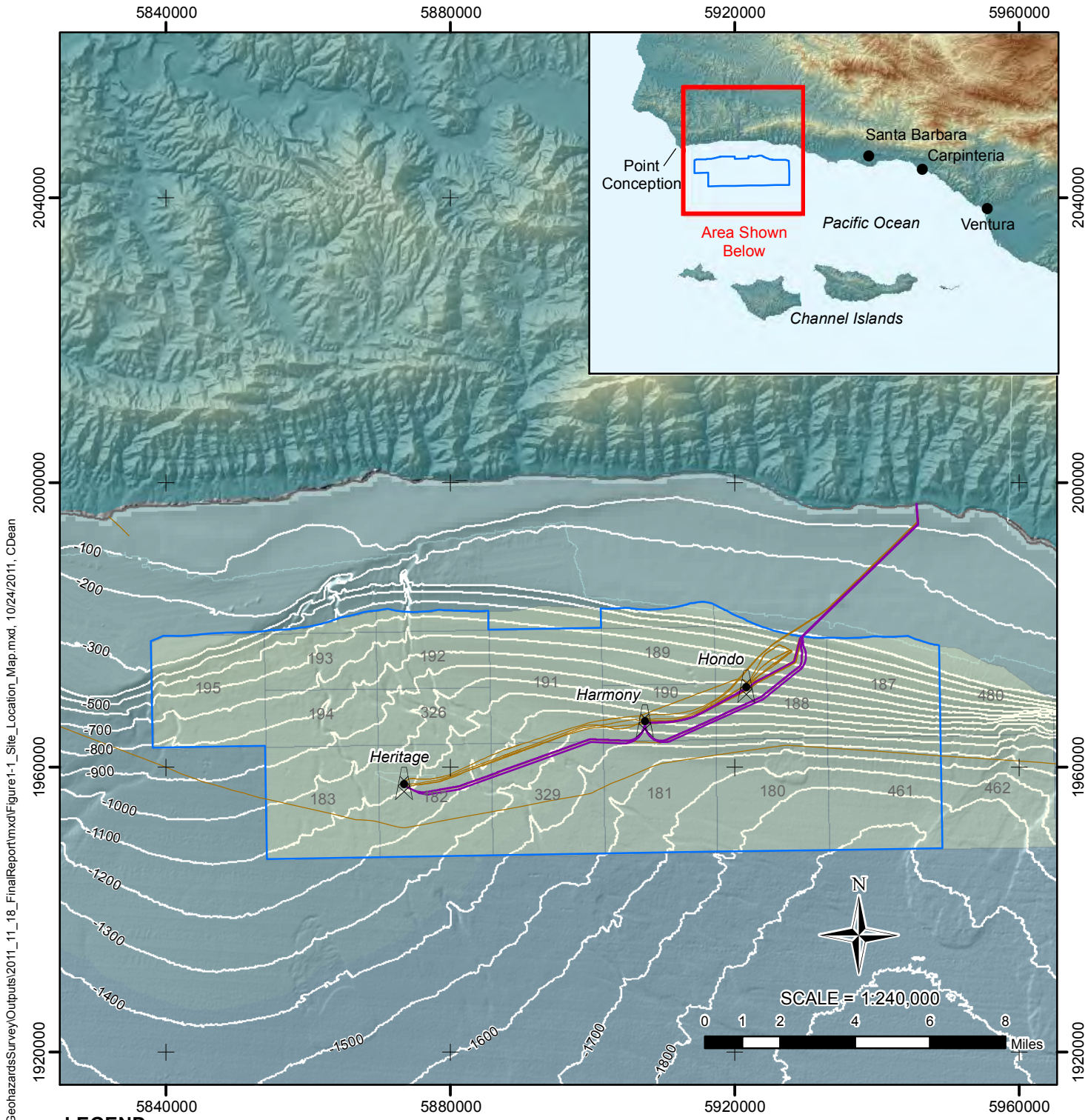
Fugro's SYU Pre-Project Geophysical/Archaeological Survey Report in support of ExxonMobil SYU Offshore Power System Reliability-B (OPSRB) Project was authorized under an RFP between Fugro Consultants, Inc., and ExxonMobil dated July 13, 2011, and ExxonMobil's Order Number 4502141523. The scope of the Pre-Project Geophysical/Archaeological Survey Report was in general accordance with Fugro's revised proposal number 04.20110429 dated July 22, 2011.

1.3 DELIVERABLES

The following sections describe survey deliverables, including reports and charts. The Pre-Project Geophysical/Archaeological Survey Report text includes the following sections:

- Section 1 provides an introduction to the project and this report,
- Section 2 summarizes the 2011 survey program,
- Section 3 summarizes relevant historical bathymetric data,
- Section 4 describes the physiographic and geomorphic setting of the SYU and surrounding area,
- Section 5 addresses structure and seismicity,
- Section 6 summarizes stratigraphy,
- Section 7 addresses survey results,
- Section 8 describes geologic hazards,
- Section 9 provides conclusions, and
- Section 10 contains report limitations.

Various illustrations are provided on figures and charts immediately following the conclusion of the text. Appendixes A - H provides additional information.



LEGEND

- Santa Ynez Field Project Area
- 241 — Federal Oil and Gas Lease Blocks with Block Number
- Existing Platforms
- -100 — Bathymetry Contours, Contour Interval = 100 feet
- Existing Infastructure
- Proposed Cable

Grid: California State Plane NAD 83 Zone 5 North, Feet

Notes: 1) Inset Topography from CaSIL (2006)
2) Bathymetry Data from MBARI (1998) and NOAA (2001)

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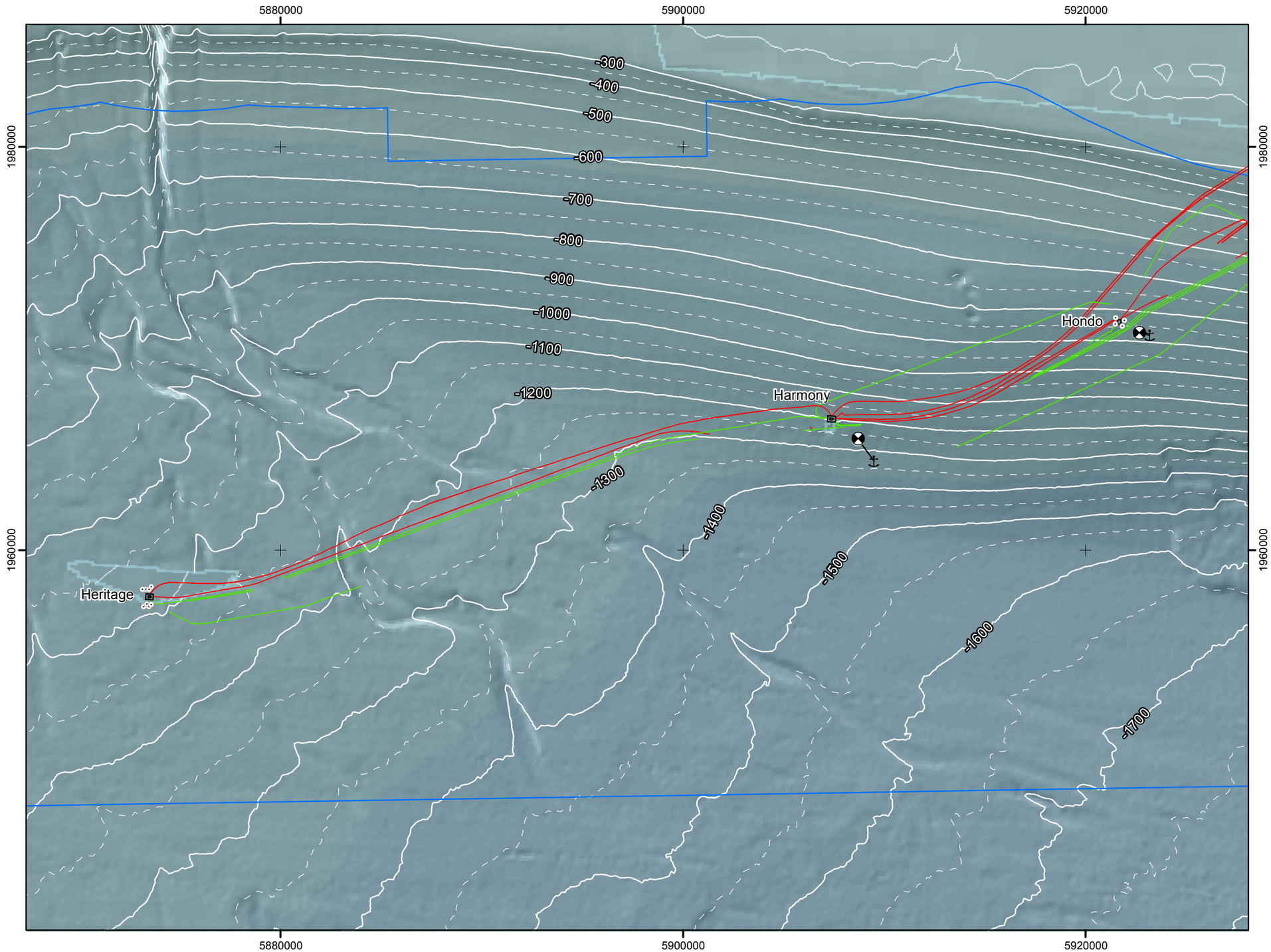
SITE LOCATION MAP
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 1-1

ExxonMobil
Project No. 04.64110024



LEGEND

Hillhouse

Existing Platforms

Bathymetric Contours

Major Contour: Contour Interval = 100 feet

Minor Contour: Contour Interval = 50 feet

Bathymetry Data from MBARI (1998) and NOAA (2001)

Santa Ynez Field Infrastructure

Existing Pipeline

Existing Power Cable

Mooring System

Santa Ynez Unit Boundary

Anodes

Anchor

BuoyRest

Grid: California State Plane NAD 83 Zone 5 North, Feet

N

HORIZONTAL SCALE = 1:60,000

5,000 2,500 0 5,000

Feet

EXISTING INFRASTRUCTURE
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 1-2a

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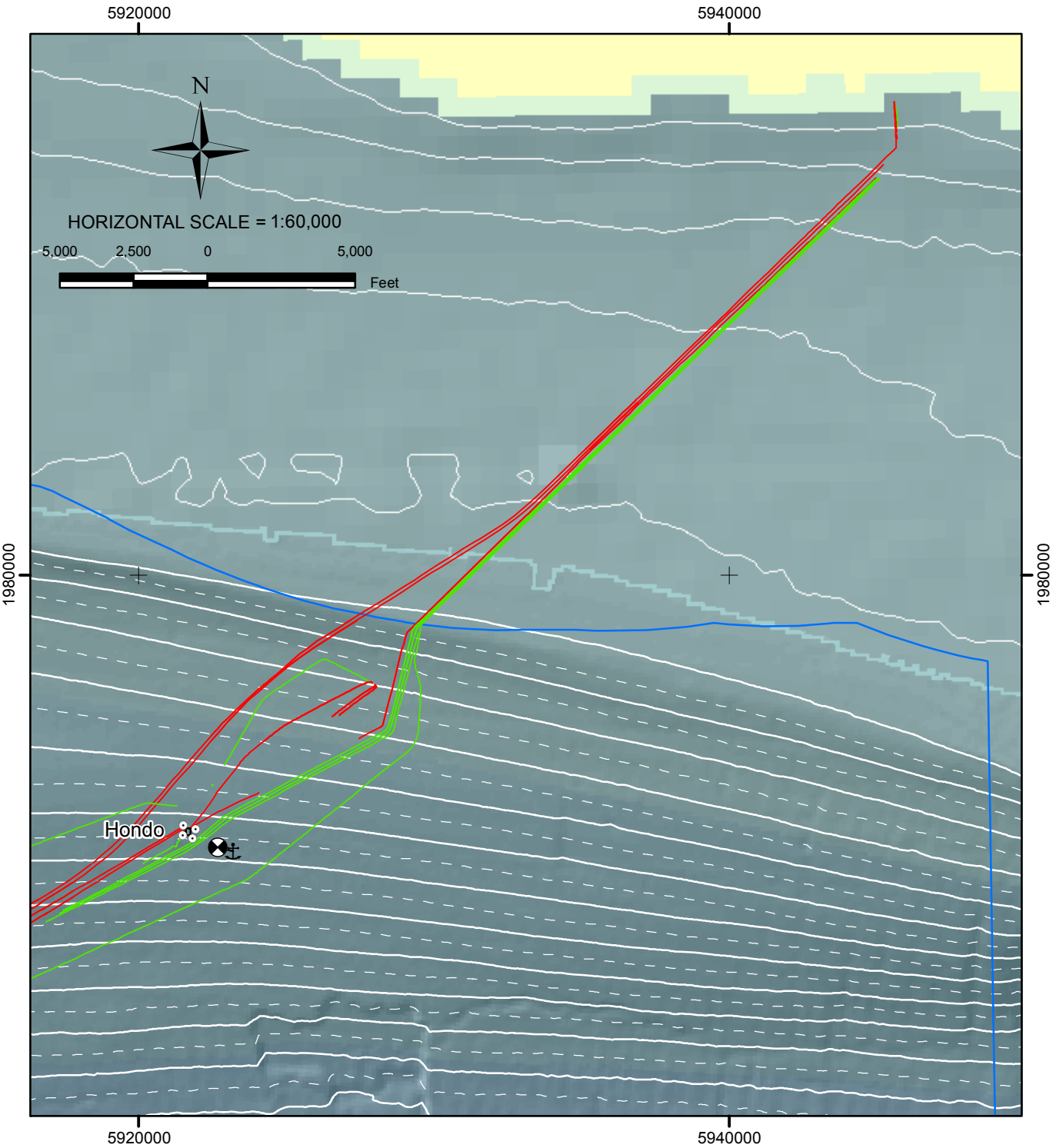

Note: See Figure 1-2a for legend.

Grid: California State Plane NAD 83, Zone 5 North, Feet

EXISTING INFRASTRUCTURE

SYU Cable Reliability OPSRB

Santa Barbara Channel, California

FIGURE 1-2b

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5880000 5900000 5920000

1980000

1960000

Hondo

A2

Harmony

F2 Alt

F2

G2 Alt.

G2

Heritage

LEGEND

Conceptual Proposed Infrastructure

- Proposed Cable Route

Existing Infrastructure

- Mooring System
- Santa Ynez Unit Boundary
- *Harmony* Existing Platforms
- Anodes
- Anchor
- BuoyRest

Bathymetric Contours

- Major Contour: Contour Interval = 100 feet
- Minor Contour: Contour Interval = 50 feet

Bathymetry Data from MBARI (1998) and NOAA (2001)

Grid: California State Plane NAD 83 Zone 5 North, Feet

N

HORIZONTAL SCALE = 1:60,000

6,000 3,000 0 6,000 Feet

CONCEPTUAL PROPOSED REPLACEMENT CABLE ROUTE CONFIGURATION

SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 1-3a

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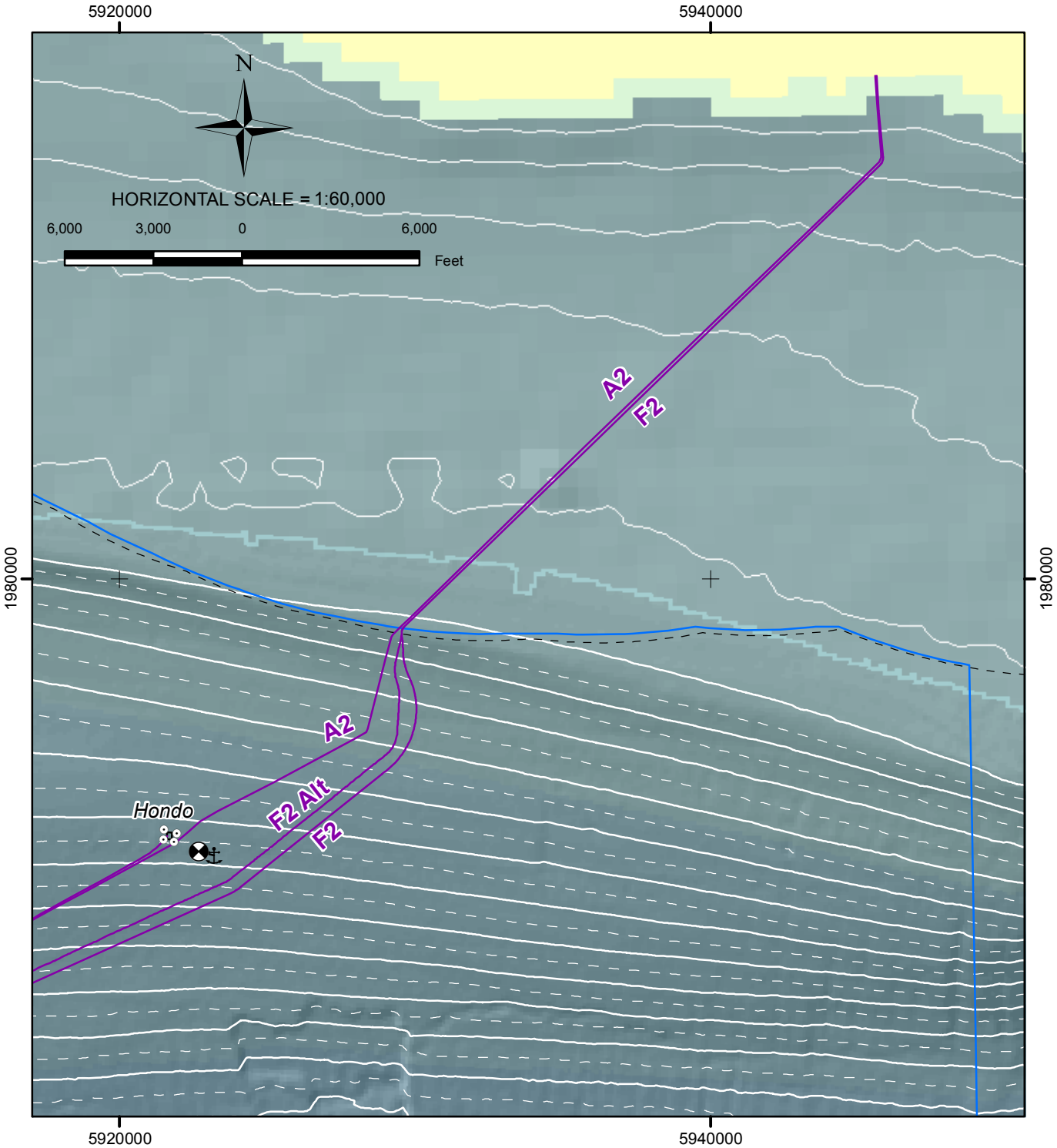

Note: See Figure 1-3a for legend.

Grid: California State Plane NAD 83, Zone 5 North, Feet

CONCEPTUAL PROPOSED REPLACEMENT CABLE ROUTE CONFIGURATION

SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 1-3b

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SECTION 2
SUMMARY OF 2011 SURVEY PROGRAM

2.0 SUMMARY OF 2011 SURVEY PROGRAM

2.1 PROJECT DATUMS

This section provides information on project datums, including surveying and charting parameters, as well as vertical control.

2.1.1 Surveying and Charting Parameters

Position information throughout all survey operations were output from a Differential Global Positioning System (DGPS) on the WGS 84 spheroid as Universal Transverse Mercator (Zone 11 N, meters [m]) grid coordinates.

The following spheroid and projection parameters apply for all field operations.

Datum	WGS84
Spheroid	WGS84
Semi-major Axis	6,378,137.000 m
Semi-minor Axis	6,356,752.314 m
Inverse Flattening	298.2572235630
Eccentricity^2	0.006694379990141
Projection	Universal Transverse Mercator (UTM)
Zone	11 N
Latitude of Origin	00° 00' 00.000"
Longitude of Origin	117° 00' 00.000" W
False Easting	500,000.000 m
False Northing	0.000 m
Scale Factor	0.9996
Convergence	World Standard

Units used on the survey are as follows:

- Linear units are meters.
- Angular units are degrees (°).

Time was recorded as UTC (Time offset: -8:00 UTC) to all data files and both UTC and local time were noted in field logs.

Coordinates were also projected from UTM Zone 11 N WGS84 meters to California State Plane Zone 5 North American Datum 83 (NAD83) feet.

The following spheroid and projection parameters apply for projected coordinates.

Datum	NAD83
Spheroid	GRS80
Semi-major Axis	6,378,137 m
Semi-minor Axis	6,356,752.314 m
Inverse Flattening	298.2572221
Projection	Lambert Conformal Conic
Zone	California Zone 5
Latitude of Origin	33.500
False Easting	6,561,666.66667m
False Northing	1,640,416.66667m

Where necessary, data in meters were converted into feet using the following conversion: 3.2808 feet = 1 meter.

It should be noted that some of the source data used to create the figures and charts contained in this report were originally presented in North American Datum 27 (NAD 27) State Plane, California Zone 5, feet. NAD 27 is an older horizontal datum that used a conventional ellipsoid, and has been replaced by NAD 83 which uses a more accurate ellipsoid with more precise control networks (Torge, 2001). ESRI's ArcMap Version 10 GIS Software (ArcMap) was used to create a GIS database for this project. This software has the ability to "project on the fly" allowing quick reprojection of data into NAD 83 State Plane (feet), once proper geodetic transformations are applied.

2.1.2 Vertical Datum

The vertical datum reference for this project is Mean Lower Low Water (MLLW).

2.2 2011 MARINE BATHYMETRIC AND GEOPHYSICAL SURVEYS

2.2.1 Survey Area

This Pre-Project Geophysical/Archaeological Survey in support of the ExxonMobil SYU OPSRB project, covered areas within a corridor that included the proposed power cable routes from shore to Platforms Hondo, Harmony, and Heritage located in three Outer Continental Shelf (OCS) lease blocks designated OCS-P-188, 190, and 182, respectively. These platforms are located in the SYU along the northern slope of the Santa Barbara Channel.

The survey was conducted in accordance with BOEM/BSEE's NTLs as well as ExxonMobil's Scope of Services, SYU OPSRB Geophysical/Archeological Survey Plan and Specifications:

- Cable Routing:
  - Survey corridor centered on proposed cable routes (Base and Alternate).

- Width of survey corridor:
  - 650 feet (198 meters) from either side of each of the proposed cable routes
- Line spacing:
  - Shallow Water Survey: 131 feet (40 meters) parallel to routes in water depths less than 656 feet (200 meters)
  - Deep Water Survey: 328 feet (100 meters) parallel to routes in water depths greater than 656 feet (200 meters)
  - Tie lines at 3,936 feet (1,200 meters).
  - Platform Landing Area Survey: 328 feet (100 meters)
  - Pipeline or power cable verification cross lines at 492 feet (150 meters) with sub bottom profiler and magnetometer in locations where the existing cable is determined to be buried.

A total of 109 lines parallel to the proposed cable routes and 33 tie lines were collected with data collection as close as safely possible to the existing platforms.

Shot points were digitally recorded at 328 feet (100 meters) intervals with line numbers, directions, start and end shot point numbers, and notes annotated in the geophysical line log sheets.

2.2.2 Shallow Water Survey

The shallow water survey covered an area centered on the seaward end of the power cable conduits on the seafloor. The conduits connect to the tunnel under Highway 101. The survey began 300 feet (91.5 meters) north of the end of the conduits and continued south out to approximately 90 feet (27.5 meters) of water depth. The survey included a distance of 650 feet (198 meters) east of proposed design route for F2 cable and 650 feet (198 meters) west of proposed design route for A2 cable. Fugro conducted the shallow water survey operations onboard the *M/V Danny C.* Survey operations were conducted during daylight hours only and at the conclusion of each survey day the *M/V Danny C* was tied up to a mooring located near Ellwood Pier.

Systems operated for this phase of survey operations consisted of the following:

- Side Scan Sonar
- Subbottom Profiler
- Marine Magnetometer
- Dual Frequency Single Beam Echosounder

For this phase of survey operations, 131 feet (40 meters) line spacing was used. Magnetometer data were acquired on every line. Side scan sonar and subbottom data were acquired on every other line equaling 262 feet (80 meters) line spacing and using 246 feet (75 meters) range scale for the side scan sonar acquisition. Additional side scan sonar data were collected parallel to the kelp beds in nearshore very shallow water areas and was determined based on real time data quality analysis.

2.2.2.1 Side Scan Sonar

Surficial features and targets have been interpreted from a digital, dual-frequency side scan sonar system. The system consisted of a Klein 3000 sonar towfish and armored tow cable interfaced to the Klein topside unit, which was networked to a data logging computer and Klein's SonarPro acquisition software. During the survey, the towfish was deployed from the center stern of the *M/V Danny C* as the vessel traversed the survey grid. The side scan sonar was operated at a frequency of 100 and 500 kHz at a slant range of 246 feet (75 meters) for all survey lines.

2.2.2.2 Subbottom Profiler

A subbottom profiler was employed to obtain shallow seismic reflection data on the sediment layers immediately beneath the seafloor. These shallow data provide information on the spatial distribution and thickness of the unconsolidated surficial sediments.

An EdgeTech X-Star (CHIRP) full-spectrum, digital subbottom profiler with an SB-216S towfish was used to collect subbottom data for this project. It generates cross sectional images of the seabed and collects digital normal incidence reflection data over many frequency ranges. The system transmits an FM pulse that is linearly swept over a spectrum frequency range (also called a "chirp pulse"), 2-16 kHz, over 20 milliseconds. The acoustic return received at the hydrophone is matched filtered with the outgoing FM pulse, generating a high resolution image of the subbottom stratigraphy. The system was integrated with the navigation computer, which provided real-time towfish positions and speed.

The towfish was deployed from the starboard side stern of the *M/V Danny C* at a depth of approximately 16 feet (5 meters) below the waterline. Subbottom and positioning data were both logged to the system's computer hard drive.

2.2.2.3 Marine Magnetometer

A Marine Magnetic Corporation SeaSPY magnetometer was deployed in line with the Klein side-scan towfish and towed along the survey grid to aid in mapping ferrous debris. A Marine Magnetics' magnetometer measures the ambient magnetic field using a specialized branch of nuclear magnetic resonance technology applied specifically to hydrogen nuclei producing very high sensitivity and accuracy. The tow sensor was further equipped with a pressure/depth sensor and an altimeter to maintain optimum towing altitude. Total field readings were logged together with the sensor altitude and depth data to the navigation computer through the Starfix.NAV program.

In accordance with NTL 2005-G07, the marine magnetometer was towed at an altitude above the seafloor of no more than 20 feet (6 meters) throughout the survey area. However, it should be noted, in areas where magnetometer operations were conducted in close proximity to existing subsea facilities containing ferrous material the identification of discrete magnetic targets was compromised.

2.2.2.4 Dual Frequency Single Beam Echosounder

An Odom CVM survey grade dual frequency echo sounder was used to acquire single beam bathymetric data during survey operations. Digital depth data were logged direct to the navigation computer along with date, time, and position for post processing and mapping.

2.2.3 Deep Water Survey

The deep water survey covered an area centered on the proposed route(s) of the OPSRB power cables from approximately 90 feet (27.5 meters) of water depth to Platform Heritage. The survey included a distance of 650 feet (198 meters) east of the proposed design route for F2 cable, 650 feet (198 meters) west of the proposed design route for A2 cable, as well as 650 feet (198 meters) east and west of the proposed design route for G2.

Systems operated for this phase of survey operations consisted of the following.

- Side Scan Sonar
- Subbottom Profiler
- Dual Frequency Single Beam Echosounder
- Marine Magnetometer (only required from 656 feet. (200 meters) water depth to nearshore limits of the survey area)
- ORE Broadband Acoustic Tracking System (BATS)

For this phase of survey operations 131 feet (40 meters) line spacing was used from 656 feet (200 meters) water depth to the nearshore limits of the survey area (approximately 90 feet water depth). Magnetometer data were acquired on every line within these water depths or where 131 feet (40 meters) line spacing existed. Side scan sonar and subbottom data were acquired on every other line equaling 262 feet (80 meters) line spacing and using 328 feet (100 meters) range scale for the side scan sonar acquisition.

In accordance with NTL 2005-G07, the marine magnetometer was towed at an altitude above the seafloor of no more than 20 feet (6 meters) from the top of slope (approximately 300 feet water depth) to the nearshore limits of the survey area.

When conducting survey operations along the sloping seafloor between 656 feet (200 meters) water depth to the top of slope (approximately 300 feet water depth) the magnetometer trailed behind the side scan sonar/subbottom sensor and as close to the seafloor as safely possible. However, it should be noted, in areas where magnetometer operations were conducted in close proximity to existing subsea facilities containing ferrous material, the identification of discrete magnetic targets was difficult.

Survey operations conducted from the 656 feet (200 meters) water depth to Platform Heritage utilized side scan sonar, subbottom, and echosounder systems only. Side scan sonar and subbottom data were acquired on every survey line at 328 feet (100 meters) line spacing, using 492 feet (150 meters) range scale for the side scan sonar acquisition.

The only areas where data did not extend to the 650 foot boundary are in the vicinity of Platform Harmony where subsea facilities are present. These areas were unobtainable with the towed array system due to the close proximity of these subsea facilities to the platform. Survey lines were created and followed to maximize data coverage while at the same time providing safe avoidance from any possible entanglement of the towfish and cable with these facilities. The areas where data gaps existed were located north and east of the existing mooring system (southeast of platform), and along the steel catenary riser (SCR) entering Platform Harmony on the southwest corner.

2.2.3.1 Side Scan Sonar

Surficial features and targets have been interpreted from a digital, dual-frequency side scan sonar system. The system consisted of an Edgetech DS2000 combined side scan sonar and sub-bottom profiling system with an armored coax tow cable interfaced to the topside unit, which was networked to a data logging computer and Edgetech's Discover acquisition software. During the survey, the towfish was deployed from the center stern of the *M/V Toby Tide* as the vessel traversed the survey grid. The side scan sonar was operated at a frequency of 100 and 400 kHz utilizing chirp technology.

2.2.3.2 Sub-bottom Profiler

The Edgetech DS2000 Combined Side Scan Sonar and Sub-bottom Profiling System was employed to obtain shallow seismic reflection data on the sediment layers immediately beneath the seafloor. These shallow data provide information on the spatial distribution and thickness of the unconsolidated surficial sediments.

The DS2000 sub-bottom profiler is a wide band FM high resolution subbottom profiler. It generates cross sectional images of the seabed and collects digital normal incidence reflection data over many frequency ranges.

The system transmits an FM pulse that is linearly swept over a spectrum frequency range (also called a "chirp pulse"), 2-16 kHz, over 20 milliseconds, for example. The acoustic return received at the hydrophone is matched filtered with the outgoing FM pulse, generating a high resolution image of the subbottom stratigraphy. The DS2000 combines a precision wide band, low noise, low distortion analog sonar front end with a powerful RISC workstation and a digital signal processing pipeline array coprocessor. The system was integrated with the navigation computer, which provided real-time towfish positions and speed.

2.2.3.3 Marine Magnetometer

A Marine Magnetic Corporation SeaSPY magnetometer was deployed in line with the Edgetech towfish and towed along the survey grid to aid in mapping ferrous debris. A Marine Magnetics' magnetometer measures the ambient magnetic field using a specialized branch of nuclear magnetic resonance technology applied specifically to hydrogen nuclei producing very high sensitivity and accuracy. The tow sensor was further equipped with a pressure/depth sensor and an altimeter to maintain optimum towing altitude. Total field readings were logged

together with the sensor altitude and depth data to the navigation computer through the Starfix.NAV program.

2.2.3.4 Dual Frequency Single Beam Echosounder

An Odom CVM survey grade dual frequency echo sounder was used to acquire single beam bathymetric data during survey operations. The Odom CVM echo sounder collects digitized depth information for output to the navigational computer. Digital depth data were logged directly to the navigation computer along with date, time, and position for post processing and mapping.

2.2.4 Platform Landing Area Survey

The platform landing area survey consisted of surveying a 1,000 foot by 1,000 foot (3,048 x 3,048 meters) area adjacent to each platform where the proposed power cables will enter the respective platforms. 328 feet (100 meters) line spacing and 492 feet (150 meters) range scale was used for covering the platform landing area with all required survey systems.

In order to gain complete side scan sonar coverage extending to the base of Platform Heritage range scale settings of 820 feet (250 meters) were required for survey lines running parallel to the platform on the north, west, and south sides. This change in settings was due to existing anodes located approximately 500 feet on the north and south sides of Platform Heritage.

Systems operated for this phase of survey operations consisted of the following, and are described in further detail in Section 2.2.3:

- Side Scan Sonar
- Subbottom Profiler
- Dual Frequency Single Beam Echosounder
- ORE BATS

2.2.5 Existing Buried Pipeline and Power Cable Verification Survey

The existing buried pipeline and power cable verification survey consisted of acquiring data with the subbottom and magnetometer systems along lines perpendicular to the pipelines or power cables at 492 foot (150 meters) intervals throughout the areas of burial. It should be noted, in areas where magnetometer operations were conducted in close proximity to existing subsea facilities containing ferrous material, the identification of discrete magnetic targets was compromised. In addition, successful detection of buried pipelines or power cables with the subbottom system depended on depth of burial, material covering the facility, and diameter of facility. Fugro makes no guarantee that the subbottom system located all existing buried pipelines and/or power cables.

Systems operated for this phase of survey operations consisted of the following and are described in further detail in Section 2.2.2:

- Subbottom Profiler
- Marine Magnetometer

2.3 DATA PROCESSING

2.3.1 Single Beam Bathymetry Data Processing

Using Hypack's single-beam processing suite, single-beam bathymetric data were edited to remove outliers. The soundings were reduced to MLLW from NOAA tide gauge 9411340 in the Santa Barbara harbor.

For charting and mapping purposes for this project, public bathymetry data (NOAA, 2001 and MBARI, 1998) was acquired.

Tide corrections were applied in post processing based on NOAA predicted tides for the area and correlated with multibeam data from MBARI and NOAA.

2.3.2 Side Scan Sonar Data Processing

All side scan sonar data were processed using Chesapeake Technologies, Inc. Sonarwiz5. Raw side scan files were imported into the program and corrected for layback as well as proper bottom tracking and navigation review. The files were then slant range corrected and compiled into a preliminary mosaic for target location and determination of any buried cables or pipelines. The resulting files were processed to construct a final side scan mosaic of the survey area. The complete mosaic image was imported into the ArcView system where the positions of seafloor anomalies were digitized. The side-scan sonar positioning was confirmed with the USBL system relative to the surface vessel's position to each sensor.

2.3.3 Magnetometer Data Processing

Using Chesapeake Technologies, Inc. Sonarwiz5, the locations of observed magnetic anomalies were determined from the magnetometer data, utilizing anomaly-modeling techniques that incorporate the anomaly duration, signature, and peak-to-peak amplitudes. The interpreted location of bipolar (dipole) anomalies is an average of the anomaly duration midpoint and the peak-to-peak midpoint. Interpreted anomaly locations were cross-checked with the side scan sonar targets to determine if exposed targets had a ferrous content. The anomalies were plotted on the post plot navigation maps and imported to the ArcView software for final mapping.

2.3.4 Subbottom Profiler Data Processing

The subbottom profiler data were processed using the following procedures:

1. Analyze SEG-Y file trace headers for valid data. Noticed that coordinates were not layback corrected.

2. Wrote program to apply layback to SEG-Y data files by accessing a time-based cable-out file, determining cable out value based on the trace times. Assumption made that towfish position exactly follows vessel track. For layback value at start of line, determine layback azimuth by taking the reference trace and a corresponding trace 100 traces forward, invert and project backward.
    a. Catenary scalar of 0.95
    b. Write corrected coordinates to trace byte offsets 73, and 77 (bytes 81 and 85 are unchanged and represent the vessel VRP).
    c. Coordinate scalar set to .01
3. Write sensor depth times in milliseconds to trace headers by reading recorded depth in meters from byte offset 61.
    a. Time values written in milliseconds in byte offset 105
    b. Remainder time written in microseconds to byte offset 107
    c. Seawater sound velocity of 1525 meters/second as determined by running tests on the recorded depth readings.
    d. Depths smoothed using sliding average over 40 traces.
    e. Reference shotpoints written to byte offset 5. 1 trace/shotpoint.
4. Load corrected SEG-Y files to Kingdom Suite
    a. Layback corrected position used as coordinate
    b. Shotpoints from byte 5
    c. Support variable length traces and start times as written in bytes 105 and 107
5. Pick seafloor as horizon
6. Pick Horizon A along angular unconformity at top of bedrock on the shelf. No horizon picked below the shelfbreak, as bedrock is not present or detectable.
7. Math on two horizons by subtracting seafloor time values from horizon A time values. Export resulting thickness of sediment above Horizon A as time values.
8. Convert thickness values to feet using a velocity function of 5,000 ft/second.
9. Produce contours of the thickness of sediment overlying Horizon A
10. Grid bathymetry and thickness values to same parameters on a 50' grid spacing. Subtract Horizon A from bathymetry to produce elevation of Horizon A.
11. Produce profiles with seafloor and Horizon A (where present).
12. Manually correct seafloor and Horizon A in mid-shelf area where an erroneous bathymetry data point was present.

13. Generate topographically-corrected images along route scaled to a 1:5 vertical exaggeration underlay the profiles with these images and manually draw lines along reflectors to produce interpreted profiles.
14. Annotate profiles with interpretation text.

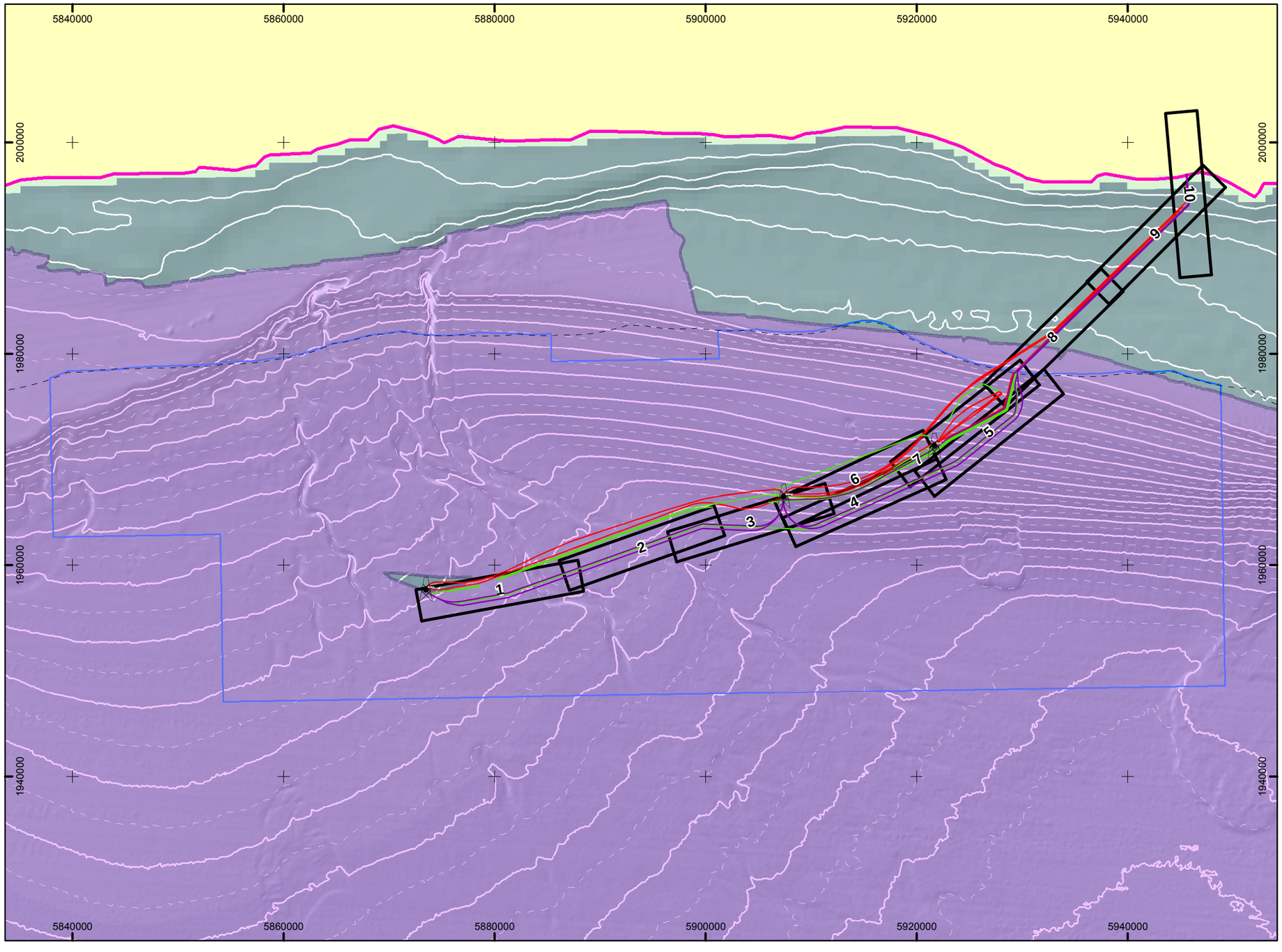
2.4 SURVEY CHARTS AND MAPS

Several charts have been produced that present survey acquisition information and results. The location of the Alignment Charts 1 through 10 is depicted on Figure 2-1.

Alignment Charts 1 through 10 consist of panels that display tracklines (navigation post plot) and bathymetry, seafloor features, side scan sonar mosaic, Holocene isopach maps (where applicable), and interpretation profiles.

- Panel 1 shows the trackline post plots, bathymetry, and seafloor features. Panel 1 shows acquired bathymetry data (NOAA, 2001 and MBARI, 1998). Coverage area for MBARI, 1998 and NOAA, 2001 data is shown on Figure 2-1. Panel 1 also shows seafloor features within the project survey area as interpreted from the 2011 survey data discussed above. Features of note include but are not limited to topographic seafloor features such as mounds, depressions, rises, scour and areas of disrupted sea bed, anchor drag, and trawl scars. Areas of seafloor change, debris, and bedrock outcrop were also noted and mapped as part of the survey. These features are also discussed in Section 7.1 below.
- Panel 2 - Side Scan Sonar Mosaic presents a side scan sonar mosaic for the survey area. This mosaic was created from side scan sonar images acquired along survey tracklines. The targets are analyzed and discussed in detail in other portions of the submittal package (Macfarlane Archaeological Consultants, 2011).
- Panel 3 shows an isopach map (the thickness) of Holocene sediments within the project survey area. The map is contoured at an interval of 2 feet. Subbottom data were interpreted to produce this map as discussed in Section 7.3 below.
- Panel 4 shows interpreted profiles from subbottom data collected by Fugro's 2011 survey.

Platform Landing Charts 1 through 3 show the bathymetry, seafloor features, and side scan sonar mosaics for the area within 1,000 feet of Platforms Harmony and Heritage.



LEGEND

Bathymetry and Chart Extents

- Extent of Chart Plan Views
- Extent of MBARI, 1998 Bathymetry Data
- Extent of NOAA Bathymetry Data

Existing Santa Ynez Unit Infrastructure

- Pipeline
- Buried Power Cable
- Power Cable Exposed on Seafloor
- Seep Tent
- *Hillhouse* Existing Platforms
- Regional Infrastructure

Bathymetric Contours

- Major Contour: Contour Interval = 10 feet
- Minor Contour: Contour Interval = 5 feet

Regional Bathymetry Data from NOAA (2001)

Bathymetric Elevation:

Shallow: -158 feet
Deep: -233 feet

Conceptual Proposed Infrastructure

- 6" Gas Pipeline
- 12" Oil Pipeline
- 8" Oil and Gas Pipeline
- 12" Gas Pipeline

Grid: California State Plane NAD 83, Zone 5, Feet

N

HORIZONTAL SCALE 1=120,000

0 5,000 10,000 20,000 Feet

BATHYMETRY AND CHART LIMITS MAP

SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 2-1

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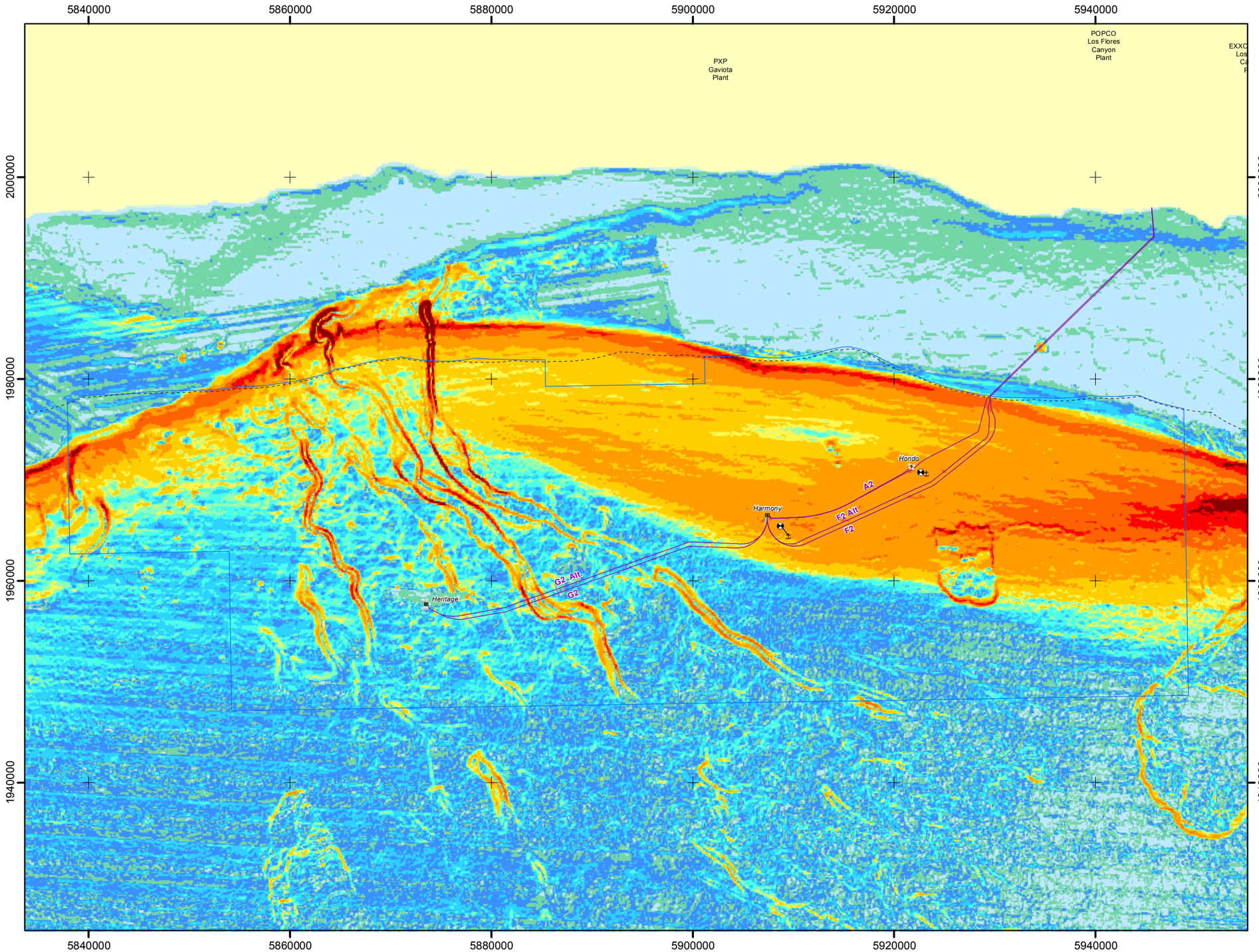

LEGEND

Conceptual Proposed Infrastructure

- Proposed Cable Route

Existing Infrastructure

- Mooring System
- Santa Ynez Unit Boundary
- *Harmony* Existing Platforms
- Anodes
- Anchor
- BuoyRest

Slope in Degrees

0 to 1	6 to 7
1 to 2	7 to 10
2 to 3	10 to 15
3 to 4	15 to 20
4 to 5	20 to 25
5 to 6	Greater than 25

Grid: California State Plane NAD 83
Zone 5 North, Feet

N

HORIZONTAL SCALE = 1:120,000

10,000 5,000 0 10,000 Feet

SEAFLOOR SLOPE MAP
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 2-2

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SECTION 3
SUMMARY OF HISTORICAL BATHYMETRIC DATA

3.0 SUMMARY OF HISTORICAL BATHYMETRIC DATA

FCL has an extensive GIS database containing regional bathymetric data from offshore California. One of these datasets is a NOAA grid with a cell size of 656 feet (200 meters) created using data from the NOAA National Ocean Service (NOS) Soundings database. The data were obtained from a CD (NOAA, 2001) and gridded in ArcMap.

Another regional dataset used in several figures contains bathymetry data for the Santa Barbara Channel from the Monterey Bay Aquarium Research Institute (MBARI) with a cell size of 131 feet (40 meters). These data were obtained from a CD (MBARI, 1998).

Priority was given to the MBARI dataset. The NOAA regional dataset is used in the figures and charts in areas outside the extents of the higher resolution MBARI dataset (e.g., Figures 2-1 and 4-1).

SECTION 4
PHYSIOGRAPHIC AND GEOLOGIC SETTING

4.0 PHYSIOGRAPHIC AND GEOLOGIC SETTING

4.1 PHYSIOGRAPHIC SETTING

The proposed OPSRB cable alignments are located on the Mainland Shelf within the SYU, in the western part of the Santa Barbara geomorphic basin. The basin is bounded on the north by the Santa Ynez Mountains and on the south by the Santa Barbara Channel Islands (Figure 4-1).

The SYU, located in the Western Transverse Ranges (WTR) geographic province of southern California is shown on Figure 4-2. Geologically active faults and folds are present in the central and western Santa Barbara Channel. The WTR and Inner Continental Borderland (ICB) are part of the active transform plate boundary between the Pacific and North American tectonic plates. The different structural trend of the WTR results from the convergence created by the "big bend" of the San Andreas fault at the northeastern limit of the province.

The SYU extends along a northwest-southeast-trending embayment of the southern California coast between Point Conception and Ventura. The shelf width in the SYU averages about 4 miles (6.5 km) wide. Within the SYU, water depths range from approximately 250 to 1,400 feet.

The seafloor along the proposed OPSRB cable alignment corridors from the shoreline to Platforms Hondo, Harmony, and Heritage are variably sloping. From the shoreline to cable alignment A2, station 275+00 and cable alignment F2, station 310+00 the slope is 1 to 2 degrees. From these stations and between Platform Hondo and Harmony the cable alignment corridor is characterized by slope angles of 10 to 20 degrees. Between Platform Harmony and Heritage the cable alignment corridor is generally characterized by slope angles of 2 to 20 degrees, although steeper slopes are encountered when crossing submarine channels.

4.2 TECTONIC DEVELOPMENT

Southern California has experienced a long and complex geologic history. The recent tectonic history of southern California is defined by the interaction between the Pacific and North American tectonic plates (Figure 4-3). The resulting tectonic setting and deformational history of the Region form the basis for interpreting the stratigraphy, geologic structures, and present seismotectonic setting of the Project Area.

In the Cretaceous and early Tertiary, the western side of the Continental Borderland was a convergent (subduction) plate boundary. During Cretaceous and Paleogene time, the oceanic Farallon plate was subducting beneath the continental crust of western North America, resulting in a continental margin arc-trench system. The subduction related geology of California, when reconstructed, includes the Sierra Nevada granitic batholith that formed the roots of a magmatic arc, the metamorphic rocks along the arc front that form the foothills belt of the Sierra Nevada, the Great Valley Sequence of marine sedimentary rocks formed in the submarine fore-arc basin, the Coast Range ophiolite that was the oceanic floor of the fore-arc basin, and the

Franciscan complex of accreted terrain metamorphic rocks formed in the accretionary wedge at the subduction front. These major geologic units are still recognizable in southern and central California, but have been broken up and re-organized by subsequent tectonic events (Nicholson *et al*., 1994; Atwater, 1989).

Beginning in the late Oligocene and early Miocene, subduction gradually ceased along the western margin of North America when the East Pacific Rise (source of the Farallon and Pacific plates) encountered the continental margin and along with the Farallon plate, was, in turn, subducted beneath North America. A new plate boundary configuration resulted with the Pacific plate in contact with the North American plate. The relative motion between the Pacific and North American plates was no longer convergent, but rather largely right-lateral translational in nature. The new transform plate boundary was initially west of Baja California (south of the Borderland) and on land (north of the borderland in central and northern California - modern San Andreas fault) a zone of oblique extension (transtension) developed in the Borderland. This oblique extension continued into the middle Pliocene and caused extensive ridge and basin (horst and graben) morphology (similar to block faulting in the Basin and Range Province) to occur in the Inner Continental Borderland (ICB). This formed many of the generally northwest-trending basins and ridges of the margin that are apparent today.

During the Miocene, various crustal blocks along the North American margin became attached to the northward-moving Pacific plate (Atwater, 1998). The WTR was one of the several such crustal blocks. These blocks were simultaneously translated northward and rotated. As much as 90 to 110 degrees of clockwise rotation of the Western Transverse Ranges block occurred in the Neogene (Kamerling and Luyendyk, 1985; Crouch and Suppe, 1993). As the WTRs block rotated in the Miocene, the transform plate boundary continued to develop along the eastern edge of the rotating block, while significant extension occurred in the LA Basin and Inner Borderland. The entire plate boundary became well-established by about 19 Ma (Nicholson *et al*., 1994). Significant volcanism and normal faulting accompanied the Miocene transtension (Crouch and Suppe, 1993). Rapid basin subsidence and sedimentation occurred in the region (including the project area) during the Miocene and early Pliocene as a consequence of crustal transtension and extension.

Approximately 4 to 5 Ma (during the early Pliocene) another reorientation of the plate boundary in southern California and northern Mexico occurred. The plate boundary south of the Borderland and west of Baja California migrated eastward, splitting Baja California and coastal southern California off from the rest of North America, attaching these crustal blocks to the Pacific plate. Since that time (about 5 Ma), the relative plate motion vector between the North American and Pacific plates has been oriented approximately N37°W (Cande *et al*., 1995; Atwater and Stock, 1998). The southern San Andreas fault was the manifestation of this new plate boundary in southern California. The connection between the southern San Andreas and northern San Andreas (now referred to as the Mojave segment) has resulted in a large bend in the plate boundary and convergence across a wide area of the southern California margin (Clark *et al*., 1991; Wright 1991; Schneider *et al*., 1996; Sorlien *et al*., 1999; Seeber and Sorlien, 2000).

Thus, overall, the tectonic setting in the Pliocene changed from a predominately transtensional regime to a predominately transform, transpressional regime. The increased convergence commonly resulted in diversely-striking Miocene normal faults being reactivated as reverse faults, and inversion of half-graben basins into anticlines (Yeats, 1987; Clark *et al*., 1991; Seeber and Sorlien, 2000). Baja California began to impinge on the continental blocks of southern California, while rotation of the WTRs continued. Significant contraction across the newly-developing Transverse Ranges and LA Basin occurred on numerous oblique reverse and blind faults, many of which are inverted normal faults (Pasadenan orogeny). Large-scale thrust faults suggest rapid and "significant crustal shortening" throughout Late Pleistocene and Quaternary time (Bartolomeo and Longinotti, 2010).

The geology of the Santa Barbara region generally comprises a thick sequence of Cenozoic nearshore and shallow marine sequences that were successively rotated, folded, and thoroughly faulted throughout the last 20 million years. The Santa Barbara Channel itself currently contains asphalt volcanoes, a submerged island and myriad sea channels, and is prone to low-amplitude seismic events that have caused large landslides and possible tsunami.

4.3 GEOMORPHIC FEATURES

4.3.1 Mass Movement

Historic submarine landslides within the Santa Barbara Channel correlate closely with the development of geologic structures under the channel's northern margin. Five major landslides are visible on the walls of the Santa Barbara Channel. The largest of these, the Goleta Slide comprises three slide features that coalesced as the west, central and east sections of a single complex that reflects at least four episodes of slope failures within Late Quaternary sediment (Figure 4-4). These principal lobes protrude approximately 32 feet (9-10 meters) above the undisturbed seafloor, and consist of muddy debris flows and as many as 21 individual minor flow lobes and slump blocks. The complex is 14 km long by 11 km wide, and its headwall scarp incises the shelf break near a 328 foot (100 meters) depth. Fisher *et al.* (2005) estimated that the volume of displaced material is upwards of $3x10^8$ m^3. Geophysical interpretations of the Goleta Slide suggest that buried slides are as old as 200 ka, and that the most recent lobe emplacement(s) occurred within the past 6 to 8 ka (Green *et al*., 2006).

The two slides to the east of the Goleta Slide (i.e. East Slides 1 and 2) initiated near a 1,475 foot (450 meters) depth. They likely developed much more recently than the most recent Goleta lobe emplacement.

The Gaviota Slide is a mudflow that lies 8 km west of the Goleta Slide complex that may have failed as recently as 300 years ago. Its headwall scarp occurs near a 1,247 foot (380 meters) depth, from which the slide descends to a depth of some 1,640 feet (500 meters), covering an area of 4 km^2. The headscarp is 6 to 8 meters high, and its hummocky surface indicates its chaotic internal structure. Fisher et al. (2005) estimated that the $1x10^7$ m^3 of displaced material likely resulted from secondary slumping and retrogressive failure of the head scarp, from which a fissure presently runs eastward.

The Concepcion Fan (Figure 4-4) is likely supplied with sediment from three submarine channels and canyons. The Concepcion Fan Slide is 2.3 km wide and 6 km long, and covers 14 km^2 along the southern margin of the Santa Barbara Channel. Its headscarp is located near a 1,247 foot (380 meters) depth, and it extends to a depth of 1,445 feet (440 meters). The zone of depletion along this scarp is hummocky with both transverse and compression ridges along the perimeter, and the toe rises 33 feet (10 meters) above the undisturbed sea floor (Green *et al*., 2006).

4.3.2 Isla Calafia

The Mid-Channel Trend (MCT) is an anticlinal structure with a buried north-plunging reverse fault that resulted from crustal shortening at a rate of approximately 6 mm/yr (Keller *et al*, 2007). Several north/south-trending, sinistral transform faults with minimal vertical displacement superimpose and segment this feature. The summit of the MCT was likely exposed during Late Pleistocene time (~20 ka) as an island now referred to as Isla Calafia (Figure 4-5). Wave erosion may have removed several hundred meters of (now) breaching Pleistocene rocks from the island summit when sea level was lower, and erosional features, such as short channels and gullies, suggest surface erosion above sea level. Rapid (~1 cm/yr) sea level rise over the course of 15 ka due to deglaciation likely preserved the topography of Isla Calafia.

4.3.3 Hydrocarbon Seeps and Asphalt Volcanoes

Possible hydrocarbon seeps forming mounds on the shelf have been mapped near the proposed OPSRB cable route (Figure 4-6a).

Other hydrothermal structures, such as asphalt volcanoes, are common along the Mid-Channel Trend (MCT), and seven undersea mounds were discovered approximately 10 to 20 km to the east southeast of Isla Calafia in 2007 (Keller *et al*, 2007; Figure 4-6b). The mounds are composed of heavy petroleum, marine debris, sand and microscopic marine organisms that hardened into dome-like asphalt volcanoes as the petroleum congealed. Petroleum and methane plumes often escape from oceanic sediments along faults to the seafloor, but they may also enter the ocean through associated asphalt volcanoes. Asphalt volcanoes have created extensive hard bottoms along the seafloor that serve as important substrates for marine life, but they may also produce oil and gas seeps, slicks, and large oceanic dead zones. Large eruptions of methane from the Santa Barbara asphalt volcanoes may have recruited/boosted methane-eating microbial populations, which would deplete the oxygen saturation of ocean water.

The largest dome, Il Duomo, is approximately the size of two-parallel football fields and as tall as a six story building (Figure 4-6; left isolated "Mound"). The second largest dome is Il Duomito (Figure 4-6; largest in "Mound" cluster). Valentine *et al.* (2010) estimate that Il Duomo and Il Duomito resulted from the seepage of 0.07-0.4 Tg of oil and the emission of 0.35-1.8 Tg of methane, and that they likely formed during the last glacial period (44-31 ka ago). Valentine *et al.* (2010) also reported two active methane vents and trace amounts of dissolved methane in

their pore fluids, but there is no current evidence of active petroleum seepage from either volcano.

4.3.4 Slope Channels and Submarine Canyons

Numerous channels and submarine canyons incise the continental slope between Point Arguello and Gaviota. The Arguello Canyon System is the northernmost group of such channels, followed by the Concepcion and Drake Canyon Systems (Figures 4-6a and 4-7). The canyons initiate near a 328 foot (100 meters) depth near the distal edge of the continental shelf, and their head morphologies reveal collapse structures. Prominent mounds and depressions paralleling the canyon system likely result from escaping subsurface hydrocarbon gas and fluids. While these canyons drain into the Pacific Basin, a (not yet named) network of much smaller channels extends from the northwest margin of the Santa Barbara Channel across the SYU and into the Santa Barbara Basin.

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Project No. 04.64110024

5900000 6000000 6100000 6200000

2000000 1900000 1800000

Santa Barbara
Point Conception
Harmony
Hondo
Heritage
Gaviota Submarine Slide
Goleta Submarine Slide
Holly
Santa Barbara Channel
Ventura
Ventura River
A
B
C
Hillhouse
Houchin
Henry
Hogan
Rincon Island
Habitat
Santa Barbara Basin
-1500
-500
-1000
Santa Clara River
Oxnard Plain
Gilda
Grace
Gina
Gail
San Miguel Island
Santa Rosa Island
Santa Cruz Island
Anacapa Island
-2000
-2500

LEGEND

- Project Area
- Existing Platform
- Existing Infrastructure

Bathymetry

- Minor Contour: Contour Interval = 50 feet Between 0 and -300 feet
- Minor Contour: Contour Interval = 100 feet
- Major Contour: Contour Interval = 500 feet

Topography

High

Low

Regional Bathymetry Data from NOAA (2001) and MBARI (1998)

Grid: California State Plane NAD 83, Zone 5, Feet

N

HORIZONTAL SCALE = 1:480,000

0 5 10 20 Miles

PHYSIOGRAPHY
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-1

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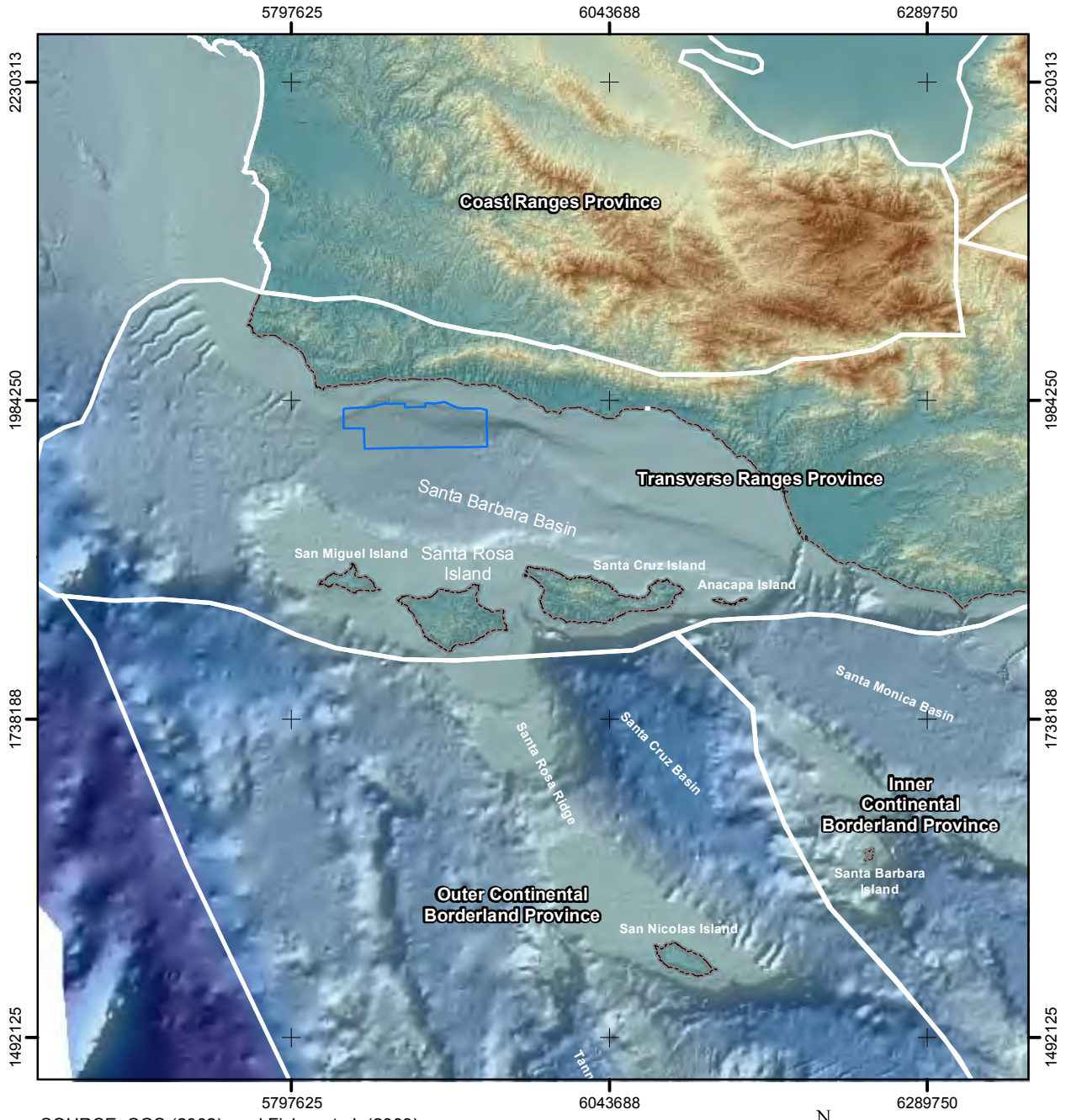

SOURCE: CGS (2002), and Fisher et al. (2009)

LEGEND

- Geomorphic Province Boundary
- Santa Ynez Unit

Coordinate Grid: CA State Plane Zone 5, NAD83, Feet

GEOMORPHIC PROVINCES OF SOUTHERN CALIFORNIA

SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-2

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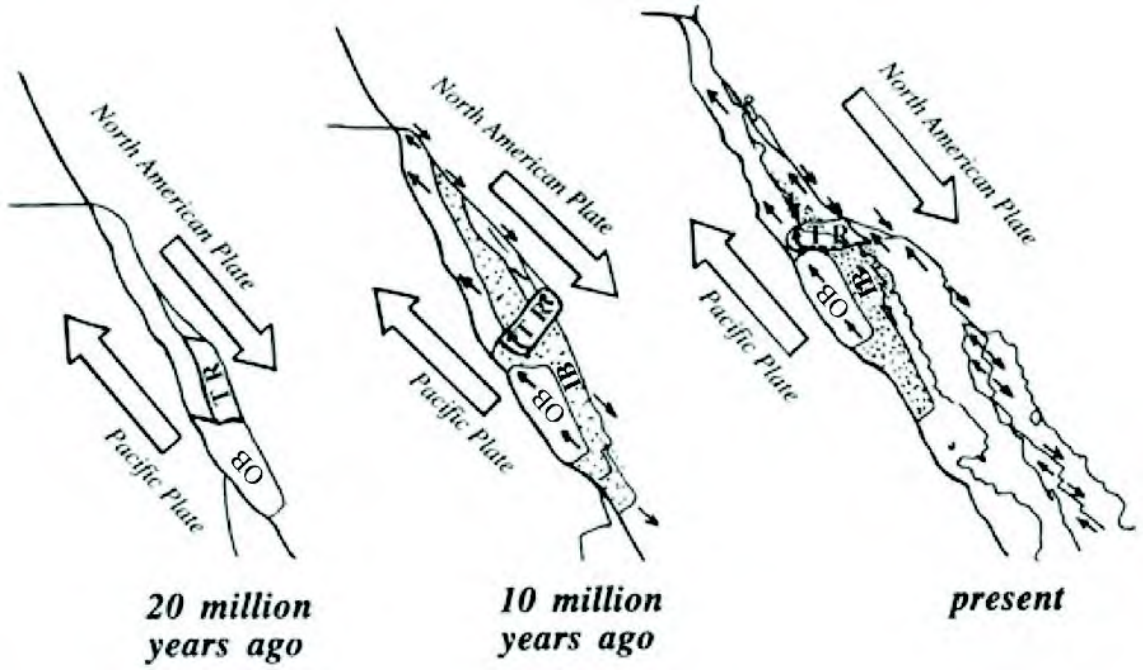
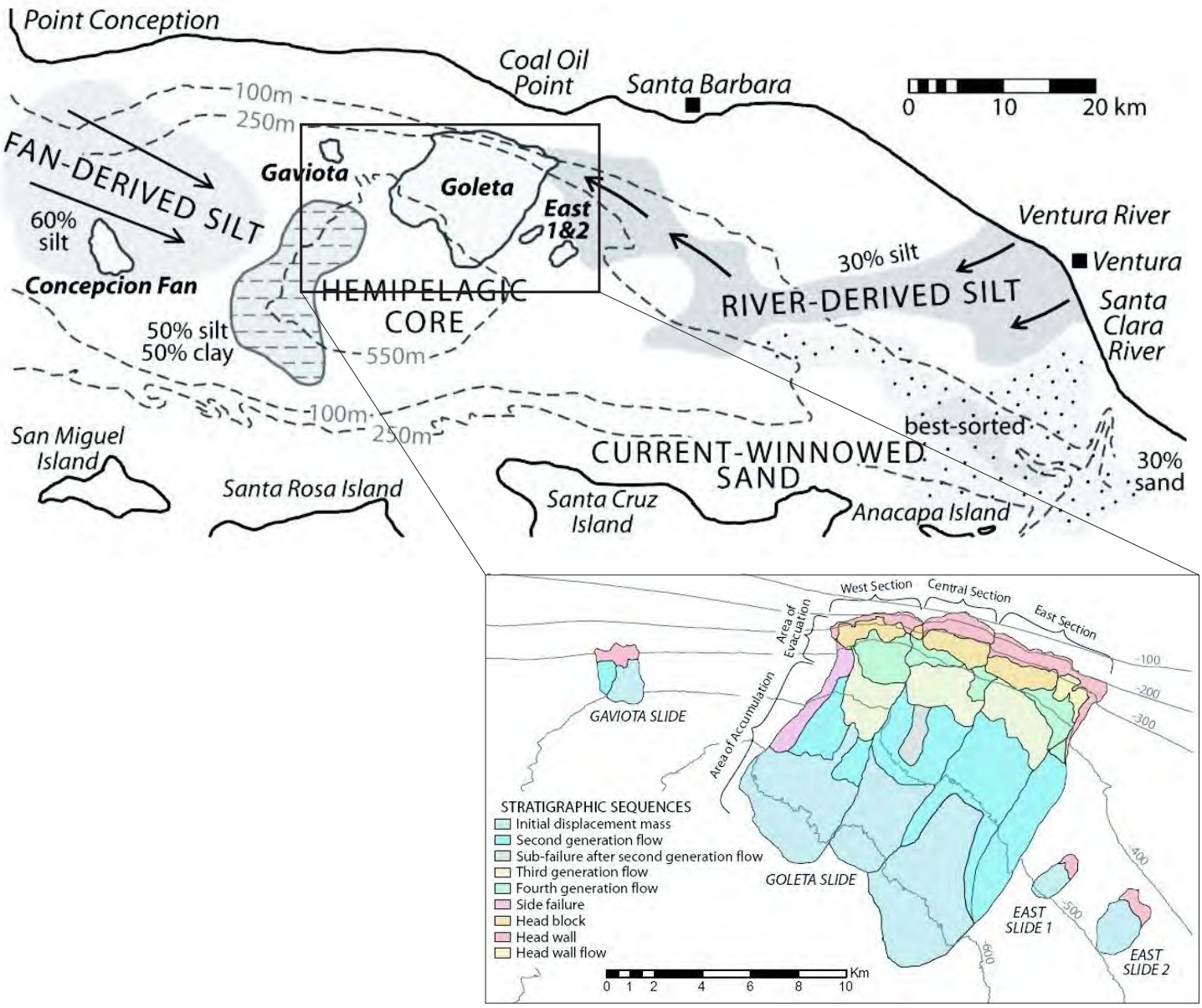


This image depicts the Late Cenozoic development of the Santa Barbara Basin from the initial collision of the Pacific and North American plates (left) through the transtensional rotation of the Transverse Ranges Block (center) to the development of the present dextral, transpressional San Andreas fault system. TR represents the Transverse Ranges Block; OB, the Outer Borderlands; IB, the Inner Borderlands.

SOURCE: Bortolomeo and Longinotti, 2010

TECTONIC DEVELOPMENT CALIFORNIA COAST
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-3



This image shows the distribution of sediment during flood events. The inset frame shows the location of the blow, which depicts the sub-components of Goleta and other slides in the Santa Barbara Channel.

SOURCE: Modified from Greene, et al (2006)

MASS MOVEMENT IN SANTA BARBARA CHANNEL
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-4

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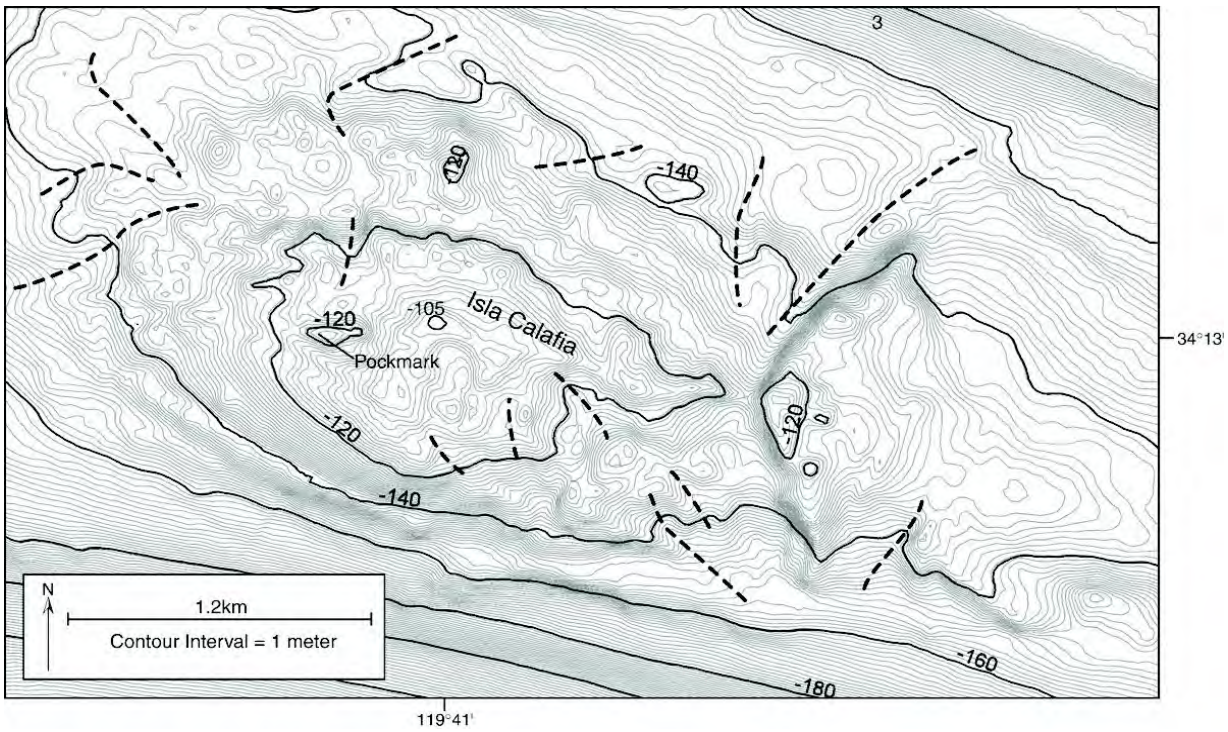

Topographic map with (contour interval) of 1 m for the crestal area of the Mid-Channel Trend (MCT). The topography indicates that the area above the 140-m isobath was probably eroded in part from surface processes during the Last Glacial Maximum (LGM) about 20 ka. Possible channels that drained the area are shown as dashed lines.

SOURCE: Keller et al., 2007

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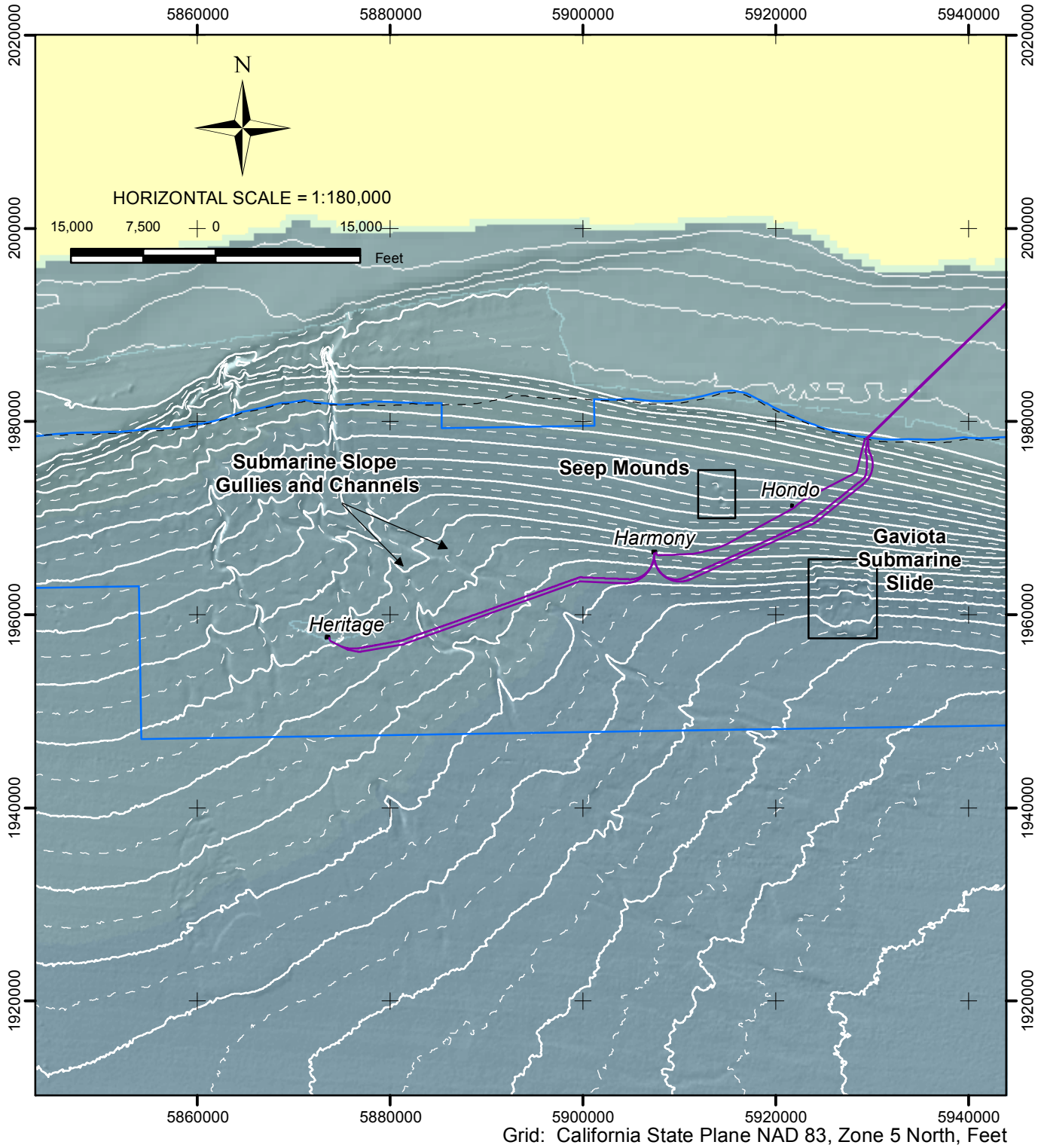
MAP OF ISLA CALAFIA
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-5



HYDROCARBON SEEPS IN THE SANTA YNEZ UNIT

SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-6a

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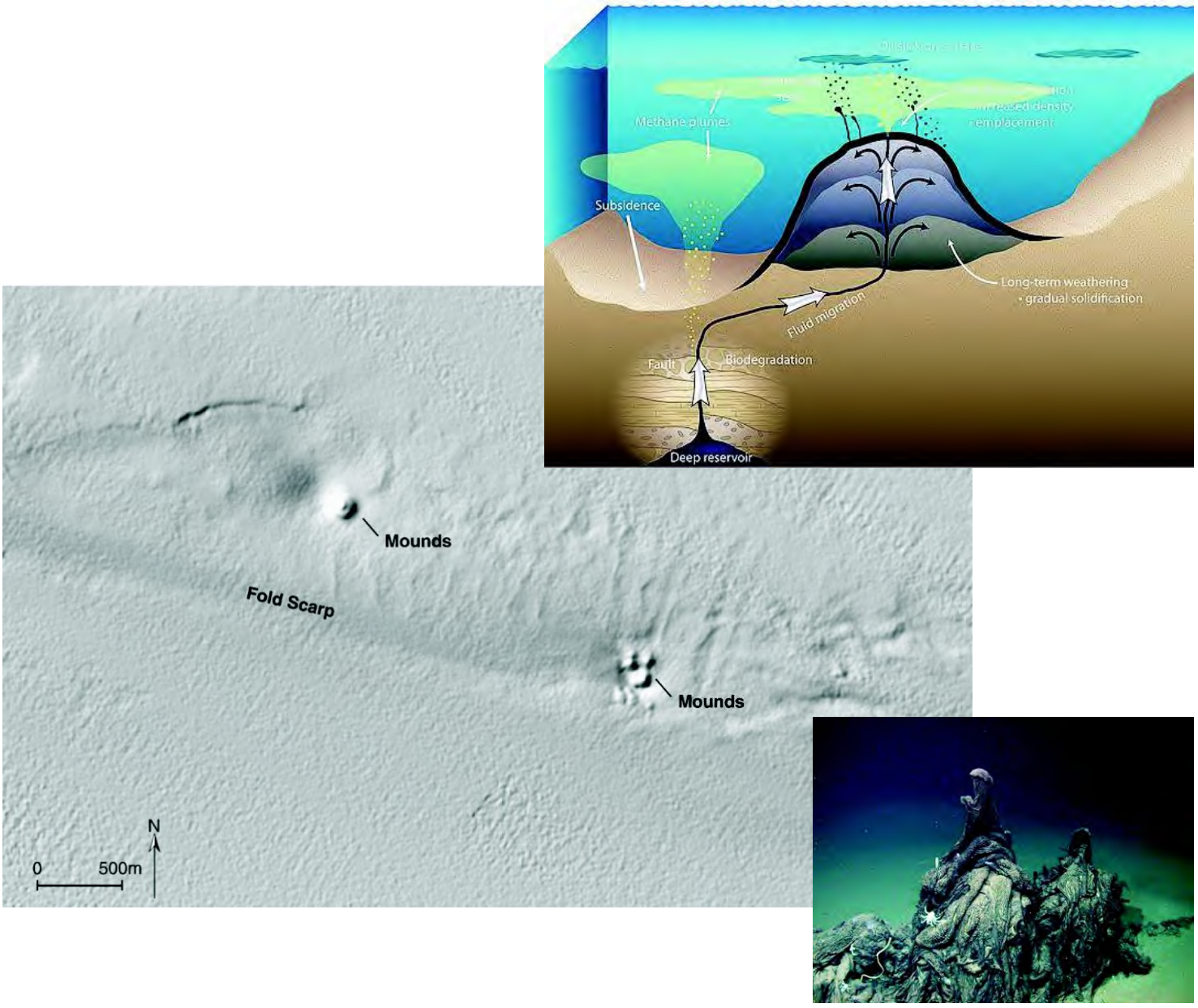
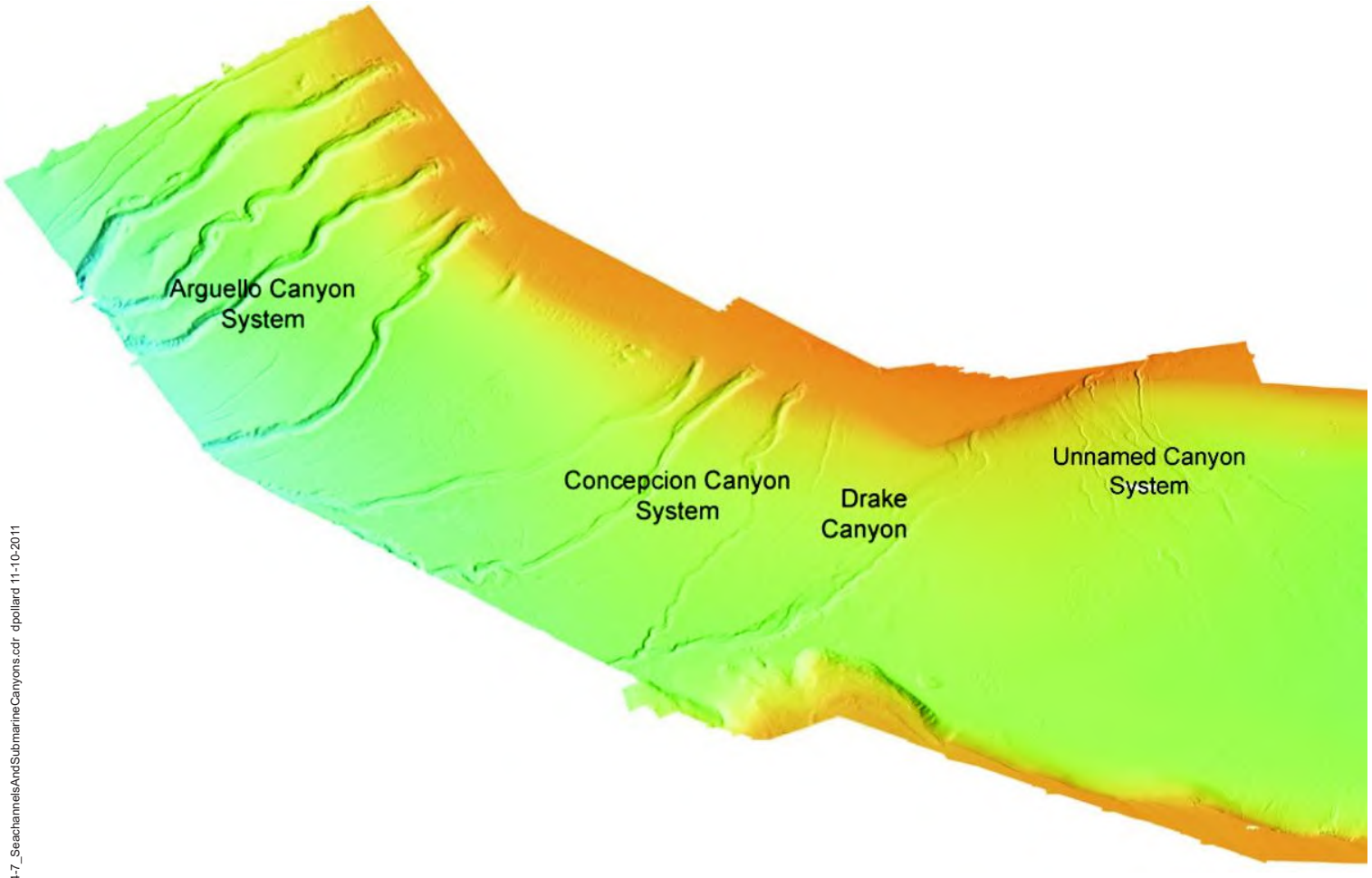


Asphalt volcanoes appear as mounds in plan view (gray background at left). The inset shown in the upper right is a schematic of asphalt volcano formation. The photograph (lower right) shows an arm of an asphalt volcano.

SOURCE: Keller et al., 2007; news.nationalgeogrpahic.com, 2011; and imagegeo.net, 2011

ASPHALT VOLCANOES
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-6b



SOURCE: Modified from plate-tectonic.narod.ru, 2005

SLOPE CHANNELS AND SUBMARINE CANYONS
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 4-7

SECTION 5
STRUCTURE AND SEISMICITY

5.0 STRUCTURE AND SEISMICITY

Southern California is structurally complicated and seismically active. The regional structure and local faults of relevance to the project are described below. Given that Fugro is not conducting the Probabilistic Seismic Hazard Assessment (PSHA) for the project, we do not describe seismicity in detail and have not compiled a seismic source model for this project. However, it should be noted that strong ground motions and associated seismic hazards pose a significant risk to the OPSRB power cables from a geohazard standpoint. In recognition of this risk, we have included a detailed description of the regional structural setting and local faults.

Local faulting issues were investigated during and after offshore cable route surveys, and will be reported on in Section 8.

5.1 FAULTING

The Santa Barbara Basin is an elongated depression that bisects the WTR between Point Conception and the San Gabriel fault. It formed in post-Miocene time and is superposed on Miocene rift basins and on a Mesozoic-early Cenozoic forearc basin (Yeats, 1987). The western portion of the Santa Barbara Basin underlies the northern Santa Barbara Channel (Figure 5-1a and 5-1b). In the east (onshore), the basin is bordered by the north-dipping San Cayetano and Red Mountain reverse faults on the north and by the south-dipping Oak Ridge reverse fault on the south (Yeats, 1983, 1988; Huftile and Yeats, 1996). The Red Mountain fault extends westward offshore north of and parallel to the Pitas Point-North Channel fault system (Sorlien and Kamerling, 2000). This onshore-offshore system is characterized by high rates of Pliocene-Quaternary north-south contraction and rapid Quaternary fault slip and may be capable of relatively frequent large earthquakes (Namson and Davis, 1990; Huftile and Yeats, 1996; Hornafius *et al*., 1996).

A description of several of these structures in close proximity to the proposed OPSRB project facilities is provided below.

5.1.1 Red Mountain Fault

This large north-dipping reverse fault is part of the regional system that includes the San Cayetano fault to the east (Figure 5-1a). Its onshore part likely has several millimeters per year of Quaternary and Holocene slip. The near-surface vertical component dies out westward towards Santa Barbara and the UCSB campus, where deep slip may be taken up on the more gently dipping North Channel fault system. Namson and Davis (1990) interpret a blind fault to connect the Red Mountain and the San Cayetano fault to the east.

5.1.2 North Channel Slope/Pitas Point Faults

These two faults intersect upwards and diverge downdip so that they share an upper tipline. Fault modeling shows generally about 1.9 miles (3 km) of shortening across these faults and folds above them in the last 1.8 million years. Sorlien and Kamerling (2000) suggest that

this shortening, which is fault slip at depth, postdates 1 Ma, and that the slip rate may be faster in the last 500,000 ka. This fault system projects downdip to intersect the Red Mountain fault(s). The combined Red Mountain and Pitas Point faults (and San Cayetano fault to the east) probably take up most of the 0.25 in./yr (6 or 7 mm/yr) of shortening measured across the Ventura Basin by global positioning system (GPS) data. They may also be responsible for the Santa Ynez Mountains and, together with south-dipping coastal faults, for the rapid uplift of the coastline between Carpinteria and Ventura (including the Rincon Mountain/La Conchita area).

5.1.3 Oak Ridge Fault

The Oak Ridge fault (Figure 5-1a) is an active, arcuate south-dipping fault that is part of a wider fault system that failed in the M6.7 Northridge earthquake in 1994. The offshore Oak Ridge fault is steeply south-dipping, is seismically active, and is responsible for significant structural relief. Near Longitude 119º 30' there are 50 feet (15 meters) of vertical separation of an unconformity inferred to date from between 12,000 and 15,000 years with an additional 6.5 to 9.8 feet (2 to 3 meters) of south-side-up separation on a splay to the south (Sorlien and Kamerling, 1998). The Oak Ridge fault becomes blind south and southwest of Santa Barbara.

5.2 LOCAL STRUCTURE

The SYU is part of the WTRs geographic province of southern California (Figure 4-2). The geologic structure in the SYU and along the proposed OPSRB cable route consists of diversely-striking Miocene normal faults that have been reactivated as oblique in reverse faults in the Plio-Pleistocene (Yeats, 1987; Clark *et al*., 1991; Seeber and Sorlien, 2000). Significant contraction across the newly-developing Transverse Ranges and LA Basin occurred on numerous oblique reverse and blind faults in the last several million years. Large-scale thrust faults suggest rapid and "significant crustal shortening" throughout Late Pleistocene and Quaternary time (Bartolomeo and Longinotti, 2010). The local structure in the SYU (Figure 5-3) reflects the complex history of deformation.

5.3 SEISMICITY

Strong ground motions resulting from earthquakes may result in damage to structures and facilities unless they are adequately designed to withstand these forces. The Santa Barbara Basin is a highly seismic area (Figure 5-1a). Strong ground motions are discussed in Section 8.3 below.

Numerous significant earthquakes have historically impacted the study area (Table 5-1). The most severe of these earthquakes, at M8.3, shook the Bakersfield region in 1857. Although the region experiences regular low-amplitude seismic activity, high-amplitude events appear restricted to the Lion Head, Santa Ynez, Pitas Point and Malibu Coast fault zones, and along an unnamed fault within the Santa Barbara Basin (Figure 5-1a and 5-1b).

Table 5-1. Significant Historical Earthquakes

Lat	Long	Magnitude	MMI	Depth (km)	Year	Location	Tsunami
34.4	-119.7	NR	6	NR	1806	California: Santa Barbara	Yes
34.2	-119.9	7.1	8	NR	1812	California: Purisima	Yes
35	-119	8.3	7	NR	1857	California: San Francisco	No
34.5	-120.5	NR	7	NR	1902	California: Southern	No
34.5	-119.6	6.2	NR	NR	1925	California: Santa Barbara	No
34.9	-120.7	7.5	8	33	1927	California: Southern	Yes
35	-119.017	7.7	11	16	1952	California: Kern County	No
34.1	-119	5.7	7	8	1973	California: Oxnard	No
34.35	-119.7	5.6	7	7	1978	California: Southern	No

This table summarizes significant earthquakes; that is, those "that meet at least one of the following criteria: Moderate damage (approximately $1 million or more), 10 or more deaths, Magnitude 7.5 or greater, Modified Mercalli Intensity 6 or greater, or the earthquake generated a tsunami." Source: NGDC.org (2011).

5.4 TSUNAMI RECORD

Tsunami source events are relatively scarce within the study area; only five have been recorded. Of these, the majority were caused by earthquakes along the Lion Head and Red Mountain fault zones and earthquake-induced landslides along the Santa Ynez fault zone and along an unnamed fault within the Santa Barbara basin (Table).

Table 5-2. Tsunami Source Events

Lat	Long	Cause	Primary Magnitude	Water Height (m)	Year	State	Location
34.4	-119.7	Earthquake	NR	NR	1806	CA	Santa Barbara
34.2	-119.9	Earthquake and Landslide	7.1	3.4	1812	CA	S. California
35	-120	Meteorological	NR	1.8	1877	CA	N. To S. California
34.9	-120.7	Earthquake	7.5	1.8	1927	CA	N. To S. California
34.5	-120.65	Landslide	NR	7	2000	CA	Point Arguello

"NR" indicates data that were not recorded. Data source: NGDC.org (2011).

Tsunami run-up events are far more common within the study area than source events. Since 1806, 54 such events have impacted the coastal areas near the Santa Barbara Channel, originating from as far away as 11,290 km. Although run-up heights are generally on the order

of 1 to 2 meters, the highest level recorded was 7 meters, and may have been the result of a landslide offshore Point Arguello in 2000 (Table 5-3).

Table 5-3. Tsunami Run-up Locations

Lat	Long	Source Distance (km)	Water Height (m)	Year	State	Location
34.42	-119.68	3	NR	1806	CA	Santa Barbara, Ca
34.47	-120.2	41	3.4	1812	CA	El Refugio (Gaviota), Ca
34.27	-119.28	58	2	1812	CA	Ventura, Ca
34.42	-119.68	32	2	1812	CA	Santa Barbara, Ca
34.42	-119.68	NR	NR	1854	CA	Santa Barbara, Ca
34.47	-120.2	8144	1.83	1877	CA	Gaviota, Ca
34.27	-119.28	NR	NR	1878	CA	Ventura, Ca
34.42	-119.68	NR	NR	1878	CA	Santa Barbara, Ca
34.38	-119.52	NR	NR	1878	CA	Carpinteria, Ca
34.42	-119.8	NR	NR	1878	CA	Mores Landing, Ca
34.903	-120.67	31	NR	1878	CA	Point Sal (Sal Cape), Ca
34.67	-120.58	58	NR	1878	CA	Surf, Ca
34.04	-120.37	NR	NR	1895	CA	San Miguel Island, Ca
34.04	-120.37	NR	NR	1895	CA	San Miguel Island, Ca
34.04	-120.37	NR	NR	1895	CA	San Miguel Island, Ca
34.42	-119.68	NR	2.5	1896	CA	Santa Barbara, Ca
34.67	-120.58	28	1.8	1927	CA	Surf, Ca
34.42	-119.68	9642	0.04	1931	CA	Santa Barbara, Ca
34.42	-119.68	2251	0.1	1932	CA	Santa Barbara, Ca
34.15	-119.18	887	NR	1941	CA	Port Hueneme, Ca
34.15	-119.18	9043	0.11	1944	CA	Port Hueneme, Ca
34.58	-120.63	3912	1.1	1946	CA	Point Arguello, Ca
34.38	-119.52	3999	NR	1946	CA	Carpinteria, Ca
34.15	-119.18	4039	0.8	1946	CA	Port Hueneme, Ca
34.27	-119.28	4024	NR	1946	CA	Ventura, Ca
34.42	-119.68	3986	0.91	1946	CA	Santa Barbara, Ca
34.15	-119.18	8054	0.11	1952	CA	Port Hueneme, Ca
34.15	-119.18	6507	0.66	1952	CA	Port Hueneme, Ca
34.15	-119.18	4850	0.53	1957	CA	Port Hueneme, Ca
34.15	-119.18	7594	0.1	1958	CA	Port Hueneme, Ca

Table 5-3. Tsunami Run-up Locations (Continued)

Lat	Long	Source Distance (km)	Water Height (m)	Year	State	Location
34.15	-119.18	9391	1.34	1960	CA	Port Hueneme, Ca
34.42	-119.68	9442	1.37	1960	CA	Santa Barbara, Ca
34.2	-119.18	3613	NR	1964	CA	Oxnard, Ca
34.27	-119.28	3602	NR	1964	CA	Ventura, Ca
34.35	-119.43	3588	0.91	1964	CA	Rincon Island, Ca
34.42	-119.68	3571	1.64	1964	CA	Santa Barbara, Ca
34.35	-119.43	6608	0.1	1966	CA	Rincon Island, Ca
34.35	-119.43	8145	0.1	1968	CA	Rincon Island, Ca
34.42	-119.68	7664	0.08	1994	CA	Santa Barbara, Ca
34.42	-119.68	7479	0.03	1995	CA	Santa Barbara, Ca
34.42	-119.68	11290	0.06	1996	CA	Santa Barbara, Ca
34.58	-120.63	9	7	2000	CA	Point Arguello, Ca
34.42	-119.68	8366	0.18	2006	CA	Santa Barbara, Ca
34.42	-119.68	7108	0.4	2006	CA	Santa Barbara, Ca
34.42	-119.68	7035	0.1	2007	CA	Santa Barbara, Ca
34.42	-119.68	6998	0.09	2007	CA	Santa Barbara, Ca
34.42	-119.68	7841	0.25	2009	CA	Santa Barbara, Ca
34.42	-119.68	9392	0.15	2009	CA	Santa Barbara, Ca
34.42	-119.68	9224	0.43	2010	CA	Santa Barbara, Ca
34.4	-119.7	8329	1.02	2011	CA	Santa Barbara, Ca
34.15	-119.217	8381	1.2	2011	CA	Channel Islands Harbor, Ca
34.27	-119.28	8368	1.3	2011	CA	Ventura Harbor, Ca
34.15	-119.18	8384	1.2	2011	CA	Port Hueneme, Oxnard Harbor, Ca
34.4683	-120.673	8252	0.15	2011	CA	Platform Harvest, Ca

"NR" indicates data that were not recorded. Data source: NGDC.org (2011).

ExxonMobil
Project No. 04.64110024

5900000 6000000 6100000

1940000

1840000

Santa Ynez fault
Pacifico fault
Gaviotito fault
Bulito fault
Santa Barbara
San Pedro fault
San Jose fault
More Ranch fault
Lavigia fault
Mesa-Rincon Creek fault
Red Mountain fault
Santa Barbara Channel
North Channel fault
Oak Ridge fault
Pitas Point fault
Santa Barbara Basin
Santa Cruz Island fault
Santa Rosa Island fault

Bathymetry

- Minor Contour: Contour Interval = 50 feet Between 0 and -300 feet
- Minor Contour: Contour Interval = 100 feet
- Major Contour: Contour Interval = 500 feet

LEGEND

- Platforms Hondo, Harmony and Heritage (Project Area)
- County Limits
- 240 — Federal Oil and Gas Lease Blocks with Block Number
- Hydrocarbon Seeps (Lorenson et al., 2009)

Faults

- Active Fault, dashed where inferred
- Potentially Active Fault, dashed where inferred
- Inactive Fault, dashed where inferred

Historical Earthquake Magnitude (1898 to February 2009)

- 2.0 - 2.99
- 3.0 - 3.99
- 4.0 - 4.99
- 5.0 - 5.99
- 6.0 - 6.99
- 7.0 or higher

SOURCES:

1) Earthquake epicenters from SCEC Online Catalog, 1932 to 2011 <http://www.data.scec.org/eq-catalogs/date_mag_loc.php> (extracted October 2011)

2) Faults Modified from:
a) Bryant, W.A. (compiler), 2005, Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0: California Geological Survey Web Page, http://www.consrv.ca.gov/CGS/information/publications/QuaternaryFaults_ver2.htm>; (2005).

b) Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas: California Dept. of Conservation, Division of Mines and Geology, Geologic Data Map No. 6, Scale 1:750,000 (CD-ROM)

c) Huftile and Yeats (1996)

Coordinate Grid: CA State Plane, Zone 5, NAD83, Feet

N

HORIZONTAL SCALE =1:300,000

0 2.5 5 10 Miles

FAULT AND HISTORICAL SEISMICITY MAP
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 5-1a

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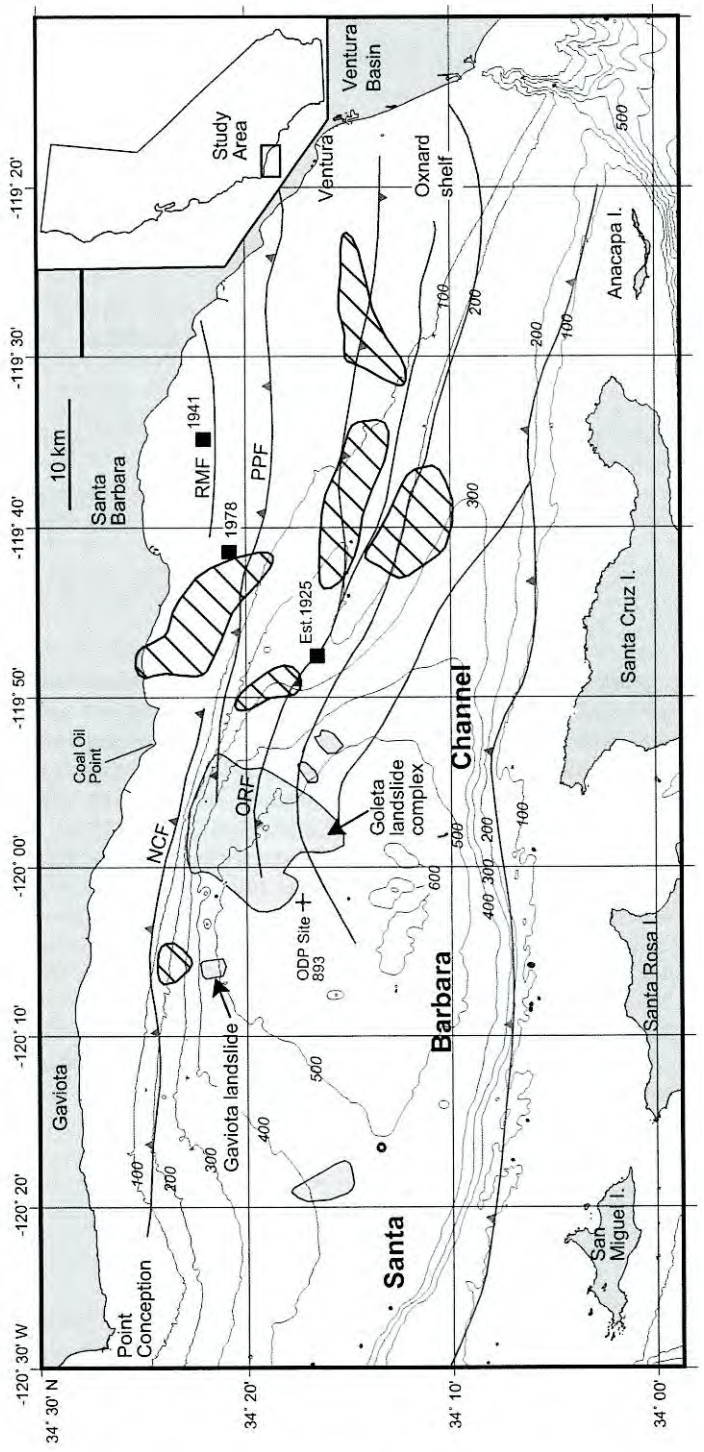

Map of the western Santa Barbara Channel, where submarine landslides (gray shaded areas) are mostly dislodged from the north side. Major faults (red lines) include the Pitas Point (PPF), the Red Mountain (RMF), the North Channel (NCF), and the Oak Ridge (ORF). Black squares show some of the main earthquakes that struck the study area. Crosshatched areas are clusters of seismicity, some of which concentrate along known faults.

SOURCE: Fisher et al., 2005

MAP OF SANTA BARBARA CHANNEL
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 5-1b

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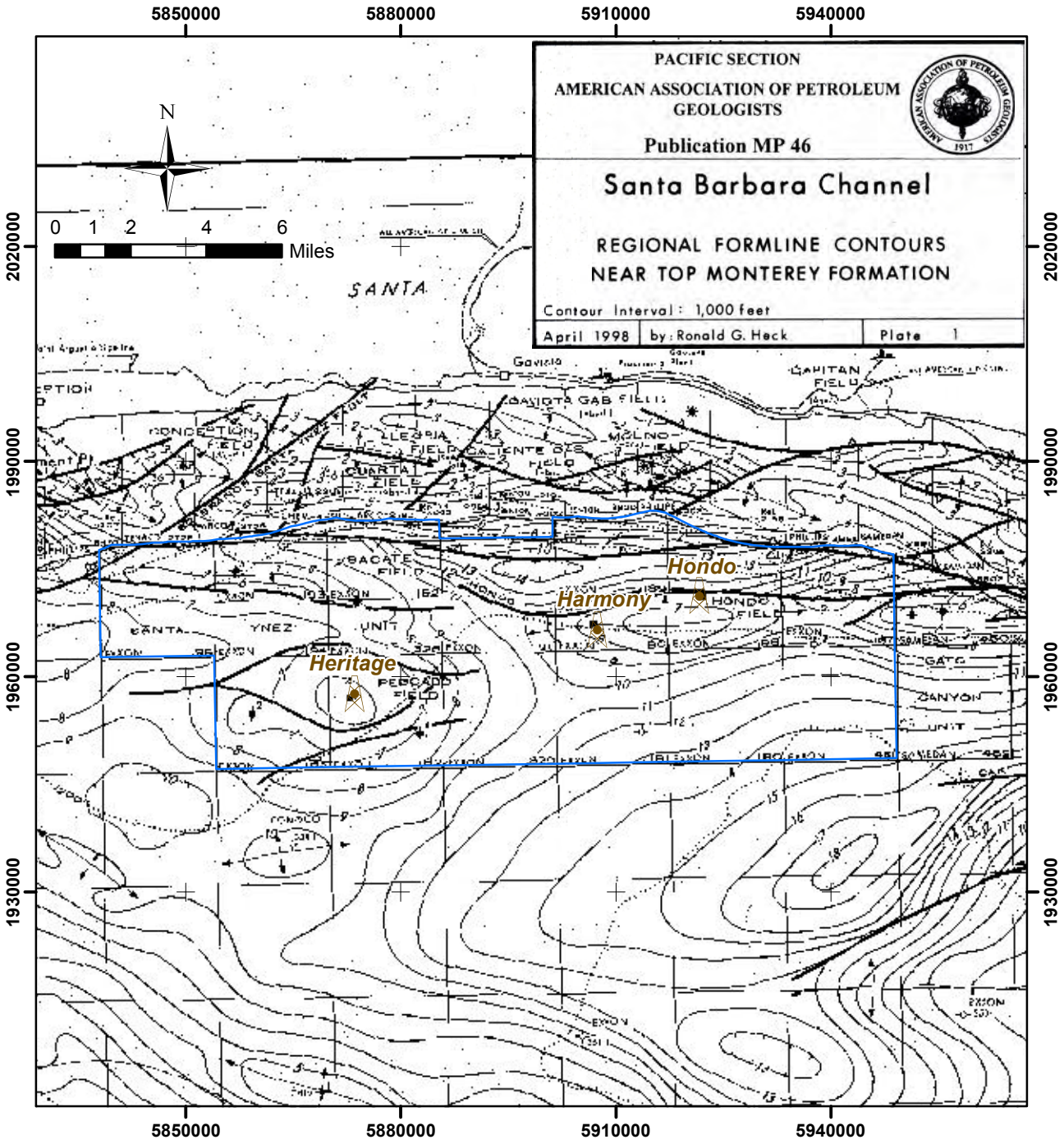


SOURCE: Heck, 1998

Approximate Project Survey Area

REGIONAL STRUCTURE MAP

SYU Cable Reliability OPSRB
Santa Barbara Channel

FIGURE 5-2

N:\Projects\04_2011\04_6411_0024_ExxonGeohazardsSurvey\Outputs\2011_11_18_FinalReport\mxd\Figure5-2_Regional_Structure.mxd, 10/25/2011, CDean

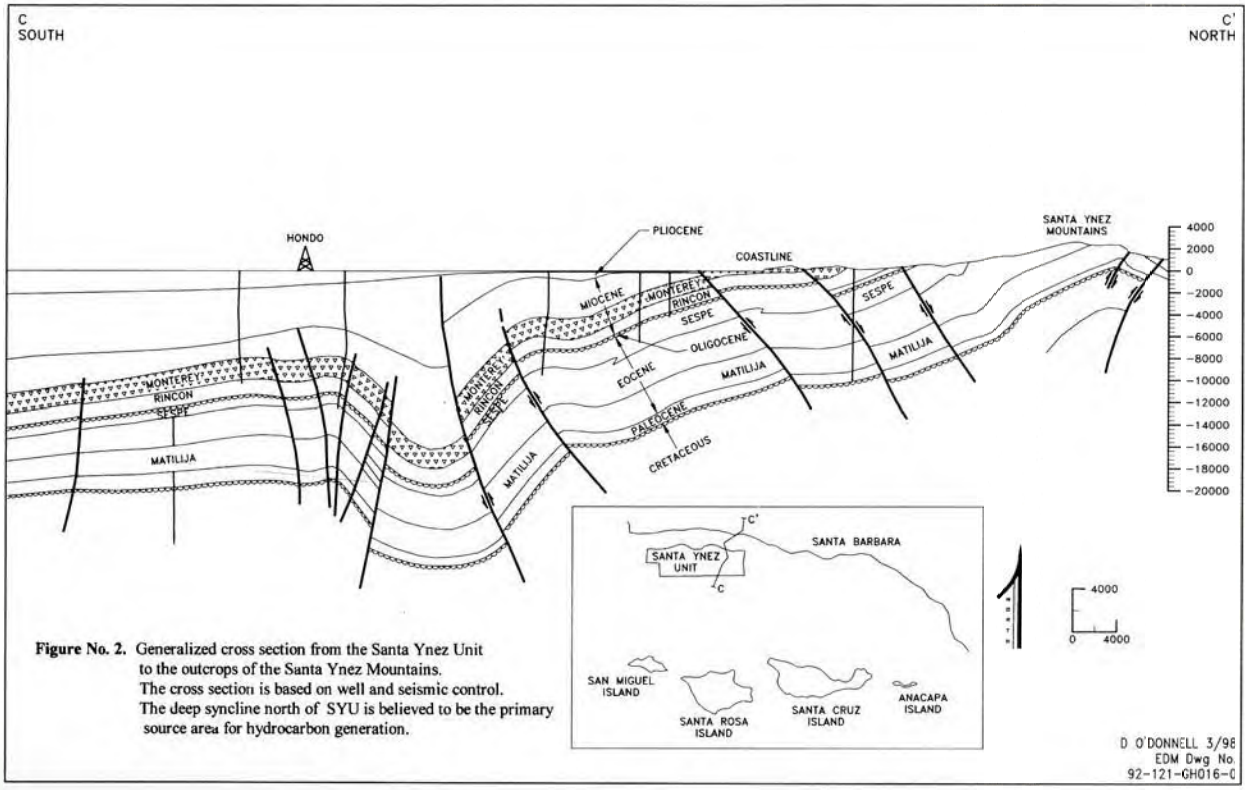


Figure No. 2. Generalized cross section from the Santa Ynez Unit to the outcrops of the Santa Ynez Mountains. The cross section is based on well and seismic control. The deep syncline north of SYU is believed to be the primary source area for hydrocarbon generation.

SOURCE: Lockman et al., 1998

GENERALIZED STRUCTURAL CROSS SECTION
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 5-3

SECTION 6
STRATIGRAPHY

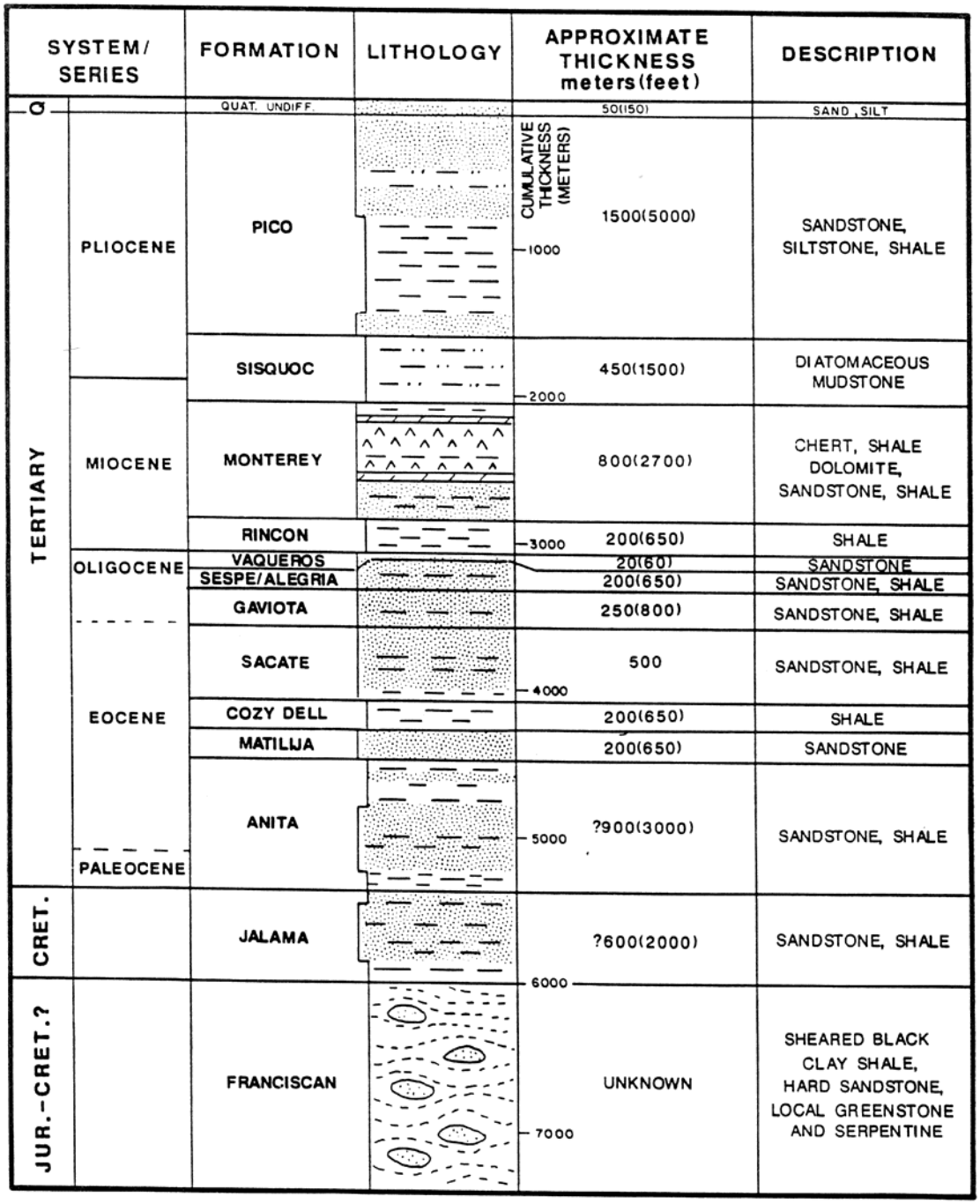
6.0 STRATIGRAPHY

6.1 SITE STRATIGRAPHY

The SYU contains a sequence of Cretaceous and Tertiary sediments estimated to be approximately 19,000 feet (5,800 meters) thick. The stratigraphic sequence in the SYU is summarized on Figure 6-1. Beneath a thin Holocene sediment layer is an extensive sequence of folded and faulted sedimentary marine strata of the Pico, Sisquoc and/or Monterey Formations. Beneath these units are other Tertiary sedimentary rocks (Dibblee, 1966; Heck, 1988). Some 10 km of similar transgressive and regressive sequences were deposited over a regional unconformity throughout Tertiary time (65-2.6 Ma). Nearly half of this sequence was deposited during Eocene time (~56-34 Ma), and the Oligocene (~34-23 Ma) package of nearshore and shallow-marine sequences above the Eocene averages approximately 1 km thick within the Santa Barbara Channel. Basement rocks are composed of Franciscan Formation. The basement Franciscan Complex of granitic and metamorphic rocks in the Santa Barbara-Ventura Basin province is overlain by the Cretaceous Jalama Formation (Fm), which records narrow shelf and marine sequences of sandstone and shale (Galloway, 1995).

6.2 HOLOCENE SEDIMENTS

The Holocene sediments were mapped in the 2011 geophysical data acquired by Fugro (Alignment Charts 8 through 10). The Holocene sediments unconformably overlie dipping Tertiary strata of Pliocene and/or Miocene age throughout the study area. The thickness of the Holocene sediments in the cable replacement project survey area is variable, ranging from approximately 0 feet at outcropping rock to 32 feet thick. Small outcrops of possible Pico, Sisquoc, and/or Monterey Formation rocks occur in the central part of the survey area near the shelfbreak.



Generalized stratigraphic section of SYU based on drill well penetrations, outcrop observations and seismic data (modified from Miles and Rigsby, 1990, and Dibblee, 1966).

SOURCE: Lockman, et al., 1998

STRATIGRAPHIC COLUMN
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 6-1

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SECTION 7
SURVEY RESULTS

7.0 SURVEY RESULTS

7.1 SEAFLOOR FEATURES

Seafloor features were mapped along a corridor for each of the proposed cable routes from the sonar and magnetometer data. Features of note include but are not limited to topographic seafloor features such as mounds, depressions, rises, scour and areas of disrupted sea bed, anchor drag, and trawl scars. Areas of seafloor change, debris, and bedrock outcrop were also noted and mapped as part of the survey. The results are graphically presented as a map of seafloor features in the upper most panel of the accompanying alignment charts and as representative seafloor mosaics in the second panel on each chart.

A table of sonar targets were compiled after a review of the individual sonar lines and mapped (Table 7-1). A table of the magnetometer targets was also compiled (Table 7-2). The anomaly table identifies the targets and references them to a target ID number in the table and labeled on the Bathymetry and Seafloor Features and Side Scan Sonar Mosaic panels of the alignment maps. The table additionally provides location, description, and dimensions associated with each of the targets.

7.1.1 Route G-2

- Prominent seafloor features identified along Route G-2 include mostly anchor scars and isolated rock or hard bottom areas near Platform Heritage. Beginning at Station 371+00 at Platform Heritage the seabed surrounding the platform is relatively free of features with the noted exception of several large areas of rock south of the structure.
- Seven of the recently installed anode sleds located approximately 500 feet north and south of Platform Heritage were detected on side scan sonar. Four of the anode sleds are depicted on Alignment Chart #1 of 10. - Seven of the anode sleds are identified on Platform Landing Chart- Heritage Chart #1 of 2.
- A very prominent drag scar is noted at Station 300+00 located approximately 300 feet north of the proposed G-2 alternate route.
- The existing C-1 power cable was found to be buried from the entry point at Platform Heritage and out to approximate station 360+00 of the G-2 route. For the remaining proposed G-2 cable route the existing C-1 power cable was identified with side scan sonar as exposed. The proposed G-2 route will replace the existing C1 cable near the Heritage Platform and only appears to cross the existing C-1 power cable at approximate station 35+00, and the existing power cable C at approximate station 04+00 upon its approach to Platform Harmony (Table 7-4).

7.1.2 Route F-2

- The F-2 proposed route crosses the existing power cable C at approximate station 04+00 and existing power cable C-1 at approximate station 41+00.

- A magnetometer anomaly, M-04, was recorded along the F-2 route at approximate station 245+00.
- At about station 239+00 an unidentified target (T-050) was found within close proximity to the proposed F-2 alternate route measuring approximately 9 feet in length and 2.6 feet in width with no apparent positive relief.
- At about station 160+00 an unidentified target (T-064) was found within close proximity to the proposed F-2 route measuring approximately 22 feet in length and 4 feet in width with no apparent positive relief.
- At the shelf break, Station 310+00, and continuing on along the proposed route to Station 296+00, areas of rock and rock outcrops have been mapped. From the shelf break shoreward, the three existing cables A, B and C and further to the north the pipelines (POPCO 12" gas, the 12" treated water and the 20" oil emulsion) can clearly be seen.
- Several drag marks were identified within the surveyed area located on either side of the proposed F-2 routes and extending from approximate station 300+00 to 325+00. Nevertheless, none appear to affect the proposed route.
- Five magnetometer anomalies (M-03, M-06, M-07, M-16, and M-02) shown on alignment sheet 8A & B were recorded within the rock outcrop area mapped between approximate station 296+00 and 300+00 along the F-2 route. These anomalies were not associated with any side scan sonar targets and were potentially detected due to possible composition of existing rock.
- At approximate station 329+00 side scan sonar target T-040 was located on the F-2 route and was interpreted as possible rock outcrop.
- A drag mark was detected on side scan sonar data at approximate station 355+00 diagonally crossing the F-2 route from southwest to north east. Other drag marks were also mapped and shown on alignment sheet 8A & B at approximate station 420+00 to 430+00 located south of the F-2 route.
- Several side scan sonar targets were detected from approximate station 505+00 to 542+00 where the majority of them are most likely associated with fishing activities such as crab or lobster fishing.
- All existing power cables and pipelines within the proposed corridor for the F-2 and F-2 alternate power cable routes were found to be exposed up to approximate station 530+00 where they became buried (with the exception of the 20" emulsion pipeline) and their locations verified with magnetometer crossings during the verification survey (Table 7-3). The 20" emulsion pipeline was found to be exposed throughout the survey area however the 12" water treatment pipeline, the 12" POPCO gas pipeline, and existing power cables remained intermittently exposed up to the terminus.
- Starting at approximate station 540+00, the F-2 cable route enters an area where existing power cables A, B and C1 are located very close together. The proposed

route for F-2 will take the place of C1 and appears to intermittently cross existing cables from this point to the terminus. However, according to ExxonMobil, since the C-1 cable will be removed in the State Waters, no crossings will actually occur at this location.

- The proposed F-2 route does cross the existing C-1 power cable at approximate station 42+00, and the existing power cable C at approximate station 03+00 upon its approach to Platform Harmony (Table 7-4).
- An area of seafloor vegetation was found between stations 550+00 to 559+00 and confirmed during the nearshore biological survey.
- From station 560+00 to the terminus an area of escarpment and kelp was mapped and shown on alignment sheet 10.

7.1.3 Route A-2

- The proposed cable route A-2 remains somewhat featureless with the noted exception of a few small sonar targets located around Platform Hondo up to station 254+00.
- It should be noted that the A-2 route is located very close to existing power cables and the A-2 route appears to intermittently cross these cables where they are laid close together between stations 0+00 and station 100+00. However, according to ExxonMobil, since the existing A cable will be removed one mile from Platform Harmony and replaced by the proposed A-2 cable, no crossings will actually occur at this location.
- At the shelf break, Station 265+00, and continuing on along the proposed route to Station 253+00, areas of rock and rock outcrops have been mapped. From the shelf break shoreward, the three existing cables A, B and C1 and further to the north the pipelines (POPCO 12" gas, the 12" treated water and the 20" oil emulsion) can clearly be seen.
- Several drag marks were identified within the surveyed area located on either side of the proposed A-2 route and extending from approximate station 255+00 to 280+00. Nevertheless, none appear to affect the proposed route.
- Five magnetometer anomalies (M-03, M-06, M-07, M-16, and M-02) shown on alignment sheets 8A & B were recorded within the rock outcrop area mapped between approximate stations 255+00 and 264+00 along the A-2 route. These anomalies were not associated with any side scan sonar targets and were potentially detected due to possible composition of existing rock.
- A drag mark was detected on side scan sonar data at approximate station 310+00 located south of the A-2 route. Other drag marks were also mapped and shown on alignment sheet 8A & B at approximate station 375+00 to 385+00 located south of the A-2 route.

- Several side scan sonar targets were detected from approximate station 460+00 to 495+00 where the majority of them are most likely associated with fishing activities such as crab or lobster fishing.
- All existing power cables and pipelines within the proposed corridor for the A-2 power cable route were found to be exposed up to approximate station 485+00 where they became buried (with the exception of the 20" emulsion pipeline) and their locations verified with magnetometer crossings during the verification survey (Table 7-3). The 20" emulsion pipeline was found to be exposed throughout the survey area however the 12" water treatment pipeline, the 12"POPCO gas pipeline, and existing power cables remained intermittently exposed up to the terminus.
- Starting at approximate station 493+00, the A-2 cable route enters an area where existing power cables A, B, and C1 are located very close together. The proposed route for A-2 will take the place of A and appears to intermittently cross existing cables from this point to the terminus. However, according to ExxonMobil, since the A cable will be removed in the State Waters, no crossings will actually occur at this location.
- An area of seafloor vegetation was found between stations 505+00 to 513+00 and confirmed during the nearshore biological survey.
- From station 515+00 to the terminus an area of escarpment and kelp was mapped and shown on alignment sheet 10.

Table 7-1. Side Scan Sonar Target Table

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-004	5945202	1993489	34° 27' 10.607" N	120° 2' 42.221" W	7.15	4.33	0.61	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-005	5945130	1993012	34° 27' 5.869" N	120° 2' 42.971" W	8.24	4.27	0.86	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-006	5944141	1993075	34° 27' 6.295" N	120° 2' 54.783" W	5.84	2.27	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-007	5945463	1992933	34° 27' 5.158" N	120° 2' 38.976" W	6.53	4.64	1.29	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-008	5944465	1992882	34° 27' 4.452" N	120° 2' 50.868" W	14.35	6.49	1.17	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-009	5944552	1992865	34° 27' 4.305" N	120° 2' 49.835" W	7.24	4.08	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-010	5944258	1992871	34° 27' 4.305" N	120° 2' 53.342" W	5.37	3.39	0.90	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-011	5943570	1992340	34° 26' 58.911" N	120° 3' 1.426" W	12.36	5.59	0.00	Contact Along Pipeline (Possible Crab Trap)	Inspected as part of ROV Anomaly Survey
T-012	5943230	1992268	34° 26' 58.132" N	120° 3' 5.464" W	7.52	2.58	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-013	5944875	1992135	34° 26' 57.149" N	120° 2' 45.796" W	9.77	4.80	0.43	Probable Crab Trap	Excluded- Outside of Cable Survey Corridor
T-014	5943192	1992240	34° 26' 57.844" N	120° 3' 5.915" W	6.57	4.79	0.61	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-015	5943470	1992091	34° 26' 56.430" N	120° 3' 2.560" W	6.45	2.22	0.81	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-016	5943554	1992058	34° 26' 56.122" N	120° 3' 1.544" W	17.72	1.50	0.00	Linear Contact	Inspected as part of ROV Anomaly Survey
T-017	5944464	1991907	34° 26' 54.811" N	120° 2' 50.649" W	9.35	5.63	0.75	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-018	5944557	1991872	34° 26' 54.484" N	120° 2' 49.529" W	9.40	3.87	0.59	Probable Crab Trap	Excluded- Outside of Cable Survey Corridor
T-019	5943828	1991725	34° 26' 52.880" N	120° 2' 58.194" W	8.64	2.91	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-020	5943194	1991812	34° 26' 53.616" N	120° 3' 5.783" W	8.54	4.44	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-021	5944228	1991674	34° 26' 52.461" N	120° 2' 53.407" W	5.55	4.58	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-022	5943618	1991638	34° 26' 51.974" N	120° 3' 0.680" W	7.68	4.59	0.77	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-023	5942538	1991644	34° 26' 51.819" N	120° 3' 13.577" W	8.73	4.73	0.58	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-024	5943979	1991332	34° 26' 49.029" N	120° 2' 56.298" W	9.39	5.01	0.00	Probable Crab Trap	Excluded- Outside of Cable Survey Corridor
T-025	5942843	1990662	34° 26' 42.166" N	120° 3' 9.698" W	6.75	4.32	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-026	5942603	1990484	34° 26' 40.361" N	120° 3' 12.513" W	8.10	4.56	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-027	5941905	1990359	34° 26' 38.982" N	120° 3' 20.826" W	8.31	2.08	0.00	Linear Contact next to Pipeline	Inspected as part of ROV Anomaly Survey
T-028	5941296	1990188	34° 26' 37.172" N	120° 3' 28.047" W	18.70	4.09	0.00	Contact along Pipeline	Inspected as part of ROV Anomaly Survey
T-029	5941909	1990106	34° 26' 36.479" N	120° 3' 20.713" W	7.21	2.59	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-030	5941142	1989965	34° 26' 34.928" N	120° 3' 29.830" W	20.09	6.00	1.22	Unidentified Contact next to Pipeline	Inspected as part of ROV Anomaly Survey
T-031	5941375	1989769	34° 26' 33.041" N	120° 3' 27.005" W	6.56	2.81	0.74	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-032	5939364	1988587	34° 26' 20.944" N	120° 3' 50.721" W	4.91	5.19	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-033	5938653	1986357	34° 25' 58.743" N	120° 3' 58.663" W	59.04	27.65	0.00	Probable Seafloor Outcropping	Inspected as part of ROV Anomaly Survey
T-034	5937148	1986379	34° 25' 58.654" N	120° 4' 16.632" W	7.49	2.98	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-035	*Removed position per BOEM/BSEE*				231.94	33.42	0.00	Seafloor Outcropping	Inspected as part of ROV Anomaly Survey
T-036	5937362	1986142	34° 25' 56.354" N	120° 4' 14.016" W	7.90	4.11	0.57	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-037	5933364	1982708	34° 25' 21.569" N	120° 5' 0.893" W	12.76	4.65	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-038	5932268	1981596	34° 25' 10.348" N	120° 5' 13.696" W	7.52	4.53	0.00	Probable Crab Trap	Inspected as part of ROV Anomaly Survey

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-039	5931785	1979737	34° 24' 51.868" N	120° 5' 19.000" W	10.67	5.04	2.54	Seafloor Outcrop	Inspected as part of ROV Anomaly Survey
T-040	5930723	1979456	34° 24' 48.865" N	120° 5' 31.601" W	12.73	4.75	1.80	Probable Seafloor Outcropping	Inspected as part of ROV Anomaly Survey
T-041	5929495	1978853	34° 24' 42.655" N	120° 5' 46.107" W	13.46	8.56	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-042	5930191	1977282	34° 24' 27.258" N	120° 5' 37.415" W	27.72	6.11	2.04	Seafloor Outcrop	Inspected as part of ROV Anomaly Survey
T-043	5927878	1977694	34° 24' 30.856" N	120° 6' 5.119" W	9.54	4.19	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-044	5928233	1975251	34° 24' 6.766" N	120° 6' 0.268" W	6.81	2.10	0.47	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-045	5929574	1974731	34° 24' 1.903" N	120° 5' 44.138" W	15.29	13.10	1.94	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-046	5928091	1975533	34° 24' 9.530" N	120° 6' 2.028" W	14.93	3.42	0.00	Linear Contact	Inspected as part of ROV Anomaly Survey
T-047	5926331	1973809	34° 23' 52.110" N	120° 6' 22.604" W	31.29	3.91	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-048	5925532	1973884	34° 23' 52.691" N	120° 6' 32.153" W	16.07	2.25	0.00	Linear Contact	Inspected as part of ROV Anomaly Survey
T-049	5924682	1974422	34° 23' 57.835" N	120° 6' 42.431" W	12.53	5.49	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-050	5927242	1972682	34° 23' 41.158" N	120° 6' 11.445" W	9.00	2.60	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-051	5923919	1973798	34° 23' 51.506" N	120° 6' 51.380" W	10.34	7.16	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-052	5921861	1971402	34° 23' 27.371" N	120° 7' 15.333" W	15.22	6.25	1.88	Unidentified Contact around Structure	Inspected as part of ROV Anomaly Survey
T-053	5921417	1971076	34° 23' 24.057" N	120° 7' 20.544" W	29.52	2.82	0.00	Linear Contact around Structure	Inspected as part of ROV Anomaly Survey
T-054	5922938	1971532	34° 23' 28.882" N	120° 7' 2.510" W	62.22	11.89	3.26	Probable Crab Trap	Inspected as part of ROV Anomaly Survey
T-055	5927464	1970924	34° 23' 23.809" N	120° 6' 8.358" W	28.23	13.48	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-056	5916779	1968724	34° 22' 59.823" N	120° 8' 15.276" W	12.20	5.49	0.00	Unidentified Contact next to Pipeline	Inspected as part of ROV Anomaly Survey
T-057	5910255	1969720	34° 23' 8.292" N	120° 9' 33.358" W	39.89	20.19	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-058	5920864	1969737	34° 23' 10.701" N	120° 7' 26.808" W	25.75	10.11	2.79	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-059	5919203	1968011	34° 22' 53.278" N	120° 7' 46.185" W	40.13	12.14	0.00	Unidentified Contact (Possible Geologic)	Inspected as part of ROV Anomaly Survey
T-060	5923374	1969042	34° 23' 4.354" N	120° 6' 56.682" W	13.50	5.30	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-061	5922429	1966890	34° 22' 42.866" N	120° 7' 7.412" W	14.40	11.84	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-062	5916037	1967043	34° 22' 43.048" N	120° 8' 23.708" W	22.89	4.57	4.84	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-063	5916773	1966812	34° 22' 40.913" N	120° 8' 14.865" W	18.32	7.66	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-064	5920770	1967960	34° 22' 53.108" N	120° 7' 27.475" W	22.40	4.43	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-065	5911982	1966762	34° 22' 39.408" N	120° 9' 12.004" W	14.65	2.72	0.00	Linear Contact next to Pipeline	Inspected as part of ROV Anomaly Survey
T-066	5907856	1966396	34° 22' 34.915" N	120° 10' 1.124" W	21.47	3.83	0.00	Linear Contact next to Structure	Inspected as part of ROV Anomaly Survey
T-067	5903295	1965735	34° 22' 27.403" N	120° 10' 55.361" W	10.67	3.86	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-069	5909780	1964433	34° 22' 15.908" N	120° 9' 37.665" W	23.36	3.52	0.00	Linear Contact	Excluded- Outside of Cable Survey Corridor
T-070	5910365	1964082	34° 22' 12.563" N	120° 9' 30.600" W	18.63	3.31	0.00	Linear Contact	Inspected as part of ROV Anomaly Survey
T-071	5911266	1963277	34° 22' 4.792" N	120° 9' 19.646" W	29.15	7.38	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-072	5908946	1963120	34° 22' 2.744" N	120° 9' 47.276" W	15.16	5.49	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-073	5890200	1961405	34° 21' 41.735" N	120° 13' 30.401" W	56.36	6.41	0.00	Unidentified Contact (Probable Sediment)	Excluded- Outside of Cable Survey Corridor
T-074	5891877	1959848	34° 21' 26.708" N	120° 13' 9.999" W	18.89	2.76	0.99	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-076	5881741	1958369	34° 21' 9.841" N	120° 15' 10.467" W	10.40	4.38	0.76	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-077	5874030	1960733	34° 21' 31.510" N	120° 16' 43.064" W	24.11	6.72	0.00	Unidentified Contact (Probable Sediment Mound)	Excluded- Outside of Cable Survey Corridor
T-078	5881479	1958279	34° 21' 8.897" N	120° 15' 13.574" W	8.12	0.00	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-079	5884908	1957209	34° 20' 59.072" N	120° 14' 32.397" W	12.67	8.94	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-080	5874319	1956559	34° 20' 50.290" N	120° 16' 38.486" W	27.96	9.88	0.00	Unidentified Sediment Variation	Inspected as part of ROV Anomaly Survey
T-082	5874069	1956462	34° 20' 49.271" N	120° 16' 41.444" W	37.68	29.32	0.00	Unidentified Contact next to Structure	Inspected as part of ROV Anomaly Survey
T-083	5881950	1956774	34° 20' 54.118" N	120° 15' 7.551" W	20.22	6.61	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-084	5883026	1956520	34° 20' 51.846" N	120° 14' 54.662" W	7.60	3.94	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-085	5870620	1957423	34° 20' 58.001" N	120° 17' 22.831" W	22.01	11.85	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-086	5872682	1956786	34° 20' 52.173" N	120° 16' 58.065" W	16.75	5.98	1.58	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-087	5883030	1956860	34° 20' 55.212" N	120° 14' 54.701" W	16.20	4.70	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-088	5871452	1956814	34° 20' 52.165" N	120° 17' 12.740" W	115.40	43.82	0.00	Unidentified Contact with Sediment Variation	Excluded- Outside of Cable Survey Corridor
T-089	5878893	1956699	34° 20' 52.701" N	120° 15' 43.989" W	11.84	6.00	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-090	5871235	1956744	34° 20' 51.427" N	120° 17' 15.303" W	194.52	88.60	0.00	Unidentified Sediment Variation	Excluded- Outside of Cable Survey Corridor
T-091	5871058	1956764	34° 20' 51.587" N	120° 17' 17.428" W	27.92	18.45	0.00	Unidentified Sediment Variation	Excluded- Outside of Cable Survey Corridor
T-092	5872372	1957055	34° 20' 54.755" N	120° 17' 1.837" W	57.50	19.21	0.00	Sediment Variation (Possible Geologic)	Excluded- Outside of Cable Survey Corridor
T-093	5871508	1956617	34° 20' 50.237" N	120° 17' 12.018" W	0.00	0.00	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-094	5876638	1955924	34° 20' 44.532" N	120° 16' 10.664" W	15.31	4.97	0.00	Unidentified Contact	Inspected as part of ROV Anomaly Survey
T-095	5875689	1955606	34° 20' 41.174" N	120° 16' 21.890" W	158.47	57.30	0.00	Unidentified Contact (Possible Geologic)	Excluded- Outside of Cable Survey Corridor
T-096	5875174	1955616	34° 20' 41.158" N	120° 16' 28.033" W	39.85	9.57	0.00	Unidentified Contact	Excluded- Outside of Cable Survey Corridor
T-097	5871182	1956958	34° 20' 53.532" N	120° 17' 15.996" W	131.32	48.25	0.00	Unidentified Sediment Variation (Possible Geologic)	Excluded- Outside of Cable Survey Corridor
T-098	5870951	1956948	34° 20' 53.386" N	120° 17' 18.745" W	95.45	59.47	0.00	Unidentified Contact with Sediment Variation	Excluded- Outside of Cable Survey Corridor
T-099	5871855	1956540	34° 20' 49.549" N	120° 17' 7.861" W	107.85	50.53	0.00	Unidentified Contact with Sediment Variation	Excluded- Outside of Cable Survey Corridor
T-100	5877016	1954547	34° 20' 30.992" N	120° 16' 5.785" W	59.22	14.60	0.00	Unidentified Contact (Possible Hondo Tie-off can anchor)	Excluded- Outside of Cable Survey Corridor
T-101	5946452	1995243	34° 27' 28.202" N	120° 02' 27.720" W	25.58	10.09	0.78	Unidentified Linear Object	Excluded- Outside of Cable Survey Corridor (Inspected by divers as part of Marine Biological Survey)

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-102	5945510	1995136	34° 27' 26.952" N	120° 02' 38.938" W	6.79	3.01	0.00	Unidentified Target	Inspected as part of Marine Biological Survey (Divers)
T-103	5945201	1994621	34° 27' 21.802" N	120° 02' 42.509" W	8.79	2.79	2.49	Unidentified Target	Inspected as part of Marine Biological Survey (Divers)
T-104	5944888	1994545	34° 27' 20.990" N	120° 02' 46.223" W	9.34	2.43	0.00	Unidentified Target	Excluded- Outside of Cable Survey Corridor (Inspected by divers as part of Marine Biological Survey)
T-105	5945649	1994225	34° 27' 17.976" N	120° 02' 37.068" W	0.00	0.00	0.00	Unidentified Target	Inspected as part of Marine Biological Survey (Towed camera)
T-106	5945773	1994283	34° 27' 18.567" N	120° 02' 35.603" W	20.21	4.58	0.84	Unidentified Rectangular Object	Inspected as part of Marine Biological Survey (Towed camera)
T-107	5945720	1994229	34° 27' 18.028" N	120° 02' 36.218" W	8.95	4.60	1.88	Unidentified Rectangular Object	Inspected as part of Marine Biological Survey (Towed camera)
T-108	5945675	1994197	34° 27' 17.700" N	120° 02' 36.743" W	10.98	5.90	0.00	Unidentified Rectangular Object	Inspected as part of Marine Biological Survey (Towed camera)
T-109	5945812	1993763	34° 27' 13.440" N	120° 02' 35.011" W	8.02	3.02	2.53	Unidentified Target	Inspected as part of Marine Biological Survey (Towed camera)
T-110	5945831	1993697	34° 27' 12.784" N	120° 02' 34.766" W	7.53	2.09	0.49	Unidentified Target	Inspected as part of Marine Biological Survey (Towed camera)
T-111	5945854	1994379	34° 27' 19.541" N	120° 02' 34.658" W	139.40	1.27	1.20	Unidentified Linear Target	Inspected as part of Marine Biological Survey (Towed camera)
T-112	5924027	1969933	34° 23' 13.299" N	120° 06' 49.115" W	68.90	10.83	0	Unidentified Target	Inspected as part of ROV Anomaly Survey
T-113	5934121	1982258	34° 25' 17.275" N	120° 04 51.740" W	10.04	3.53	1.29	Unidentified Target	Inspected as part of ROV Anomaly Survey

Table 7-1. Side Scan Sonar Target Table (Continued)

ExxonMobil OPSRB - November 2011

SSS Target No.	NAD83 Zone 5 Feet		NAD83		Length (feet)	Width (feet)	Height (feet)	Remarks	Disposition of Target (per ExxonMobil)
	Easting	Northing	Latitude	Longitude					
T-114	5873580	1957324	34° 20' 57.695" N	120° 16' 47.509" W	9.82	7.38	0.00	Anode Sled S-4	Excluded- Heritage Anode Sled (Shown as target on drawings)
T-115	5873479	1957225	34° 20' 56.690" N	120° 16' 48.682" W	28.23	8.59	0.00	Anode Sled S-3	Excluded- Heritage Anode Sled (Shown as target on drawings)
T-116	5873380	1957319	34° 20' 57.599" N	120° 16' 49.891" W	9.89	6.26	0.00	Anode Sled S-2	Excluded- Heritage Anode Sled (Shown as target on drawings)
T-117	5873260	1957187	34° 20' 56.264" N	120° 16' 51.287" W	14.71	5.49	0.00	Anode Sled S-1	Excluded- Heritage Anode Sled (Shown as target on drawings)
T-118	5873084	1958113	34° 21' 05.383" N	120° 16' 53.637" W	8.18	6.15	0.00	Anode Sled N-1	Excluded- Heritage Anode Sled (Shown as target on drawings)
T-119	5873224	1958124	34° 21' 05.525" N	120° 16' 51.961" W	16.65	9.43	0.00	Anode Sled N-2	Excluded- Heritage Anode Sled (Shown as target on drawings)
T-120	5873503	1958166	34° 21' 06.003" N	120° 16' 48.654" W	7.55	7.55	0.00	Anode Sled N-4	Excluded- Heritage Anode Sled (Shown as target on drawings)

Table 7-2. Magnetic Anomaly Table

ExxonMobil OPSRB, November 2011

Mag No.	Gamma	Duration (Meters)	NAD83 Zone 5 US Survey Feet		NAD83		Notes
			Easting	Northing	Latitude	Longitude	
M-01	2.1	35	5934138	1982263	34° 25' 17.326" N	120° 4' 51.546" W	Associated with T-113
M-02	17.6	27	5929569	1977093	34° 24' 25.258" N	120° 5' 44.787" W	In area of scattered rock
M-03	22	332	5929185	1977951	34° 24' 33.663" N	120° 5' 49.578" W	Not Associated with a Side Scan Sonar Target
M-04	5.1	138	5927830	1972566	34° 23' 40.128" N	120° 6' 04.406" W	Not Associated with a Side Scan Sonar Target
M-05	17.2	278	5928339	1976217	34° 24' 16.339" N	120° 5' 59.248" W	Not Associated with a Side Scan Sonar Target
M-06	12.7	518	5929248	1977856	34° 24' 32.741" N	120° 5' 48.801" W	Not Associated with a Side Scan Sonar Target
M-07	11.7	730	5929476	1978045	34° 24' 34.656" N	120° 5' 46.133" W	Not Associated with a Side Scan Sonar Target
M-08	94.5	71	5945347	1994327	34° 27' 18.923" N	120° 2' 40.697" W	Not Associated with a Side Scan Sonar Target
M-09	30.9	40	5944863	1993881	34° 27' 14.415" N	120° 2' 46.363" W	Not Associated with a Side Scan Sonar Target
M-10	39.1	63	5945008	1994098	34° 27' 16.588" N	120° 2' 44.681" W	Not Associated with a Side Scan Sonar Target
M-11	140.1	52	5930936	1979339	34° 24' 47.752" N	120° 5' 29.025" W	Not Associated with a Side Scan Sonar Target
M-12	6.5	53	5940599	1988639	34° 26' 21.702" N	120° 3' 35.988" W	Not Associated with a Side Scan Sonar Target
M-13	19.4	54	5945793	1993705	34° 27' 12.860" N	120° 2' 35.223" W	Possibly associated with nearby T-110 (range from target - 10m)
M-14	12.2	75	5941171	1988767	34° 26' 23.086" N	120° 3' 29.189" W	Not Associated with a Side Scan Sonar Target
M-15	5.8	54	5930137	1978304	34° 24' 37.357" N	120° 5' 38.313" W	Not Associated with a Side Scan Sonar Target

Table 7-2. Magnetic Anomaly Table (Continued)

ExxonMobil OPSRB, November 2011

Mag No.	Gamma	Duration (Meters)	NAD83 Zone 5 US Survey Feet		NAD83		Notes
			Easting	Northing	Latitude	Longitude	
M-16	12.5	87	5929550	1977427	34° 24' 28.560" N	120° 5' 45.089" W	Not Associated with a Side Scan Sonar Target
M-17	14.9	71	5930359	1973214	34° 23' 47.063" N	120° 5' 34.398" W	Not Associated with a Side Scan Sonar Target
M-18	5.4	60	5930475	1973109	34° 23' 46.044" N	120° 5' 32.979" W	Not Associated with a Side Scan Sonar Target
M-19	7.5	87	5930629	1975506	34° 24' 09.784" N	120° 5' 31.743" W	Not Associated with a Side Scan Sonar Target
M-20	8.6	101	5930473	1974907	34° 24' 03.829" N	120° 5' 33.461" W	Not Associated with a Side Scan Sonar Target
M-21	14.8	90	5944111	1991700	34° 26' 52.693" N	120° 2' 54.813" W	Possibly associated with nearby T-021 (range from target - 30m)

Table 7-3. Pipeline/Power Cable Verification Survey - Magnetic Anomaly

ExxonMobil OPSRB, November 2011							
Mag No.	Gamma	Duration (Meters)	NAD83 Zone 5 US Survey Feet		NAD83		Notes
			Easting	Northing	Latitude	Longitude	
M-22	357.7	86.3	5945848	1994798	34° 27' 23.681" N	120° 02' 34.823" W	Buried Pipeline
M-23	111.4	35.7	5945698	1994625	34° 27' 21.934" N	120° 02' 36.573" W	Buried Pipeline
M-24	897.5	93.5	5945873	1994635	34° 27' 22.068" N	120° 02' 34.491" W	Buried Pipeline
M-25	11.3	117.7	5929469	1977747	34° 24' 31.704" N	120° 05' 46.141" W	Buried Cable
M-26	51.1	80.1	5929534	1977992	34° 24' 34.146" N	120° 05' 45.426" W	Buried Cable
M-27	217.1	26.2	5945782	1995333	34° 27' 28.962" N	120° 02' 35.742" W	Buried Pipeline
M-28	127.2	10.1	5945708	1995319	34° 27' 28.808" N	120° 02' 36.622" W	Buried Cable
M-29	1124	28.4	5945788	1995304	34° 27' 28.670" N	120° 02' 35.666" W	Buried Pipeline
M-30	151	8.1	5945582	1996127	34° 27' 36.775" N	120° 02' 38.331" W	Buried Pipeline
M-31	1316	30.5	5945829	1994850	34° 27' 24.194" N	120° 02' 35.062" W	Buried Pipeline
M-32	181.4	16.2	5945565	1996127	34° 27' 36.767" N	120° 02' 38.532" W	Buried Pipeline
M-33	210.9	11	5945603	1996129	34° 27' 36.794" N	120° 02' 38.070" W	Buried Cable
M-34	177.9	16.7	5945670	1996132	34° 27' 36.842" N	120° 02' 37.279" W	Buried Pipeline
M-35	327.1	24	5945174	1993635	34° 27' 12.038" N	120° 02' 42.587" W	Buried Pipeline
M-36	194.5	34.5	5945839	1994316	34° 27' 18.914" N	120° 02' 34.814" W	Buried Pipeline
M-37	292.9	48.7	5945681	1994307	34° 27' 18.791" N	120° 02' 36.703" W	Buried Pipeline
M-38	225.6	23.4	5945704	1995894	34° 27' 34.492" N	120° 02' 36.807" W	Buried Pipeline
M-39	39.1	17.1	5945165	1993438	34° 27' 10.094" N	120° 02' 42.649" W	Buried Cable
M-40	134.3	17.6	5945737	1995801	34° 27' 33.574" N	120° 02' 36.390" W	Buried Pipeline
M-41	813.8	32.4	5945291	1993775	34° 27' 13.455" N	120° 02' 41.223" W	Buried Pipeline
M-42	175.5	31.7	5945284	1993975	34° 27' 15.424" N	120° 02' 41.361" W	Buried Pipeline
M-43	548.2	34.2	5945422	1994073	34° 27' 16.425" N	120° 02' 39.740" W	Buried Pipeline

Table 7-3. Pipeline/Cable Verification Survey - Magnetic Anomaly (Continued)

ExxonMobil OPSRB, November 2011							
Mag No.	Gamma	Duration (Meters)	NAD83 Zone 5 US Survey Feet		NAD83		Notes
			Easting	Northing	Latitude	Longitude	
M-44	353.8	30.3	5945538	1994047	34° 27' 16.193" N	120° 02' 38.348" W	Buried Pipeline
M-45	1506.3	19.5	5945646	1994128	34° 27' 17.008" N	120° 02' 37.071" W	Buried Pipeline
M-46	746.9	32.5	5945635	1994259	34° 27' 18.307" N	120° 02' 37.238" W	Buried Pipeline
M-47	271.6	32.2	5945535	1994168	34° 27' 17.383" N	120° 02' 38.409" W	Buried Pipeline

Table 7-4. Pipeline/Power Cable Crossings

ExxonMobil OPSRB, November 2011							
ID	NAD83 Zone 5 US Survey Feet		NAD83		Proposed Cable Route	Pipeline/ Cable	Station (Feet)
	Easting	Northing	Latitude	Longitude			
1	5945756	1994236	34° 27' 18.103" N	120° 02' 35.789" W	A2	POPCO 12" Gas, Buried	49552
2	5909843	1963468	34° 22' 06.377" N	120° 09' 36.671" W	F2	Power Cable C-1, Buried	4205
3	5945827	1994303	34° 27' 18.780" N	120° 02' 34.957" W	F2	POPCO 12" Gas, Buried	54119
4	5907380	1966054	34° 22' 31.428" N	120° 10' 06.713" W	F2	Power Cable C	295
5	5907380	1966054	34° 22' 31.428" N	120° 10' 06.713" W	F-2-Alt	Power Cable C	295
6	5905561	1963551	34° 22' 06.284" N	120° 10' 27.763" W	G2	Power Cable C-1, Buried	3572
7	5907369	1966054	34° 22' 31.425" N	120° 10' 06.844" W	G2	Power Cable C	342
8	5907369	1966054	34° 22' 31.425" N	1 20° 10' 06.844" W	G-2-Alt	Power Cable C	297

7.2 BATHYMETRY

The singlebeam data collected during the survey was processed and used in conjunction with NOAA and MBARI data sets to generate contours that are present on alignment sheets found in the Charts section of this report. Water depths within the two surveyed areas range from 20 feet deep approximately located near the terminus to nearly 1400 feet along the proposed cable routes south of Platform Harmony and 1,200 feet at Platform Heritage. Bathymetric contours reduced to MLLW are shown on the accompanying alignment charts at 10-foot intervals.

7.2.1 Route G-2

The proposed OPSRB cable routes, as surveyed, traverse the continental shelf, slope, and a portion of the basin floor near Platform Heritage. At Platform Heritage, approximate station 370+00 of the G-2 proposed cable route, the water depth is 1,085 feet. From Heritage eastward toward Platform Harmony the seafloor gently (50 feet in 9,000 linear feet) drops away to the deepest portion of the route; a depth of 1390 feet at Station 40+00 of the proposed cable route. Between Stations 266+00 and 248+00, the G2 cable route crosses a submarine channel. The western most channel bank is the steepest and depths drop 9 feet in 500 linear feet at the steepest point. From the deepest point of the G2 route, Station 40+00, the seabed remains relatively level to Station 20+00 where it begins a noticeable rise of the continental slope.

7.2.2 Route F-2

The F-2 proposed route is between Platform Harmony and the terminus. The steepest section of the route occurs near Station 305+00 where a rise of 50 feet in 500 linear feet can be seen just below the shelf break. The shelf break occurs near Station 320+00 in approximately 300 feet of water. From the shelf break shoreward, the seafloor rises very gently, 50 feet in 8000 linear feet, as the proposed route traverses the continental shelf from Station 320+00 to the survey limits at the terminus. At the shoreward limits of the survey the water depth is charted as 20 feet. It should be noted however, that these reported slope measurements are more correctly termed apparent slopes and were made along the proposed route and are not necessarily the true slope as measured normal to slope contours.

7.2.3 Route A-2

The A-2 proposed route is between Platform Harmony and the terminus. The water depths along this proposed route rise from approximately 1,200 feet at Harmony to 800 feet at Hondo as it crosses the upper continental slope and 20 feet at the terminus. The steepest section of route occurs near Station 262+00 where a rise of 50 feet in 500 linear feet can be seen just below the shelf break. The shelf break occurs near Station 272+00 in approximately 300 feet of water. From the shelf break shoreward, the seafloor rises very gently, 50 feet in 8,000 linear feet, as the proposed route traverses the continental shelf from Station 272+00 to the survey limits at the terminus. At the shoreward limits of the survey the water depth is charted as 20 feet. It should be noted however, these reported slope measurements are more

correctly termed apparent slopes, and were made along the proposed route and are not necessarily the true slope as measured normal to slope contours.

7.3 SHALLOW SUBSEAFOOR SEDIMENTS

The subbottom profiler used during the 2011 Fugro survey penetrated the top 20 msec. (50 feet). The character and thickness of subsurface strata changes considerably from the landfall site, across the shelf, over the shelfbreak, and onto the continental slope of the Santa Barbara Basin. The following text summarizes these changes by referencing subbottom profiler (SBP) images, whose locations are indicated on Figure 7-1.

The sandy seabed characterizes the upper shelf near the landfall location. Isolated bedrock (likely the Monterey Fm) is exposed where this cover layer thins near shore, but it thickens to approximately 10 feet within a few hundred feet from shore (the base of this layer is shown as Horizon A on Figure 7-2). The subbottom profiler signal did not penetrate much below this layer, indicating that a base Holocene coarse lag deposit may be present. For a distance of approximately 500 feet, the base of the inferred coarse lag deposit (top of the bedrock) could not be detected in the subbottom profiles along both Routes A2 and F2. As the route descends the inner shelf, the surface layer thins from a maximum thickness of about 20 feet (Figure 7-2). Sinuous echoes in the data indicate nearby pipelines paralleling the proposed replacement cable routes.

Holocene deposits fine seaward. The base of the Holocene sediments is defined by an angular unconformity with the underlying bedrock, which appears as a series of south-dipping reflectors in the mid-shelf region (Figure 7-3). These rocks are likely the Pliocene Sisquoc (marine) and Pico (terrestrial) Formations (Fm). These units are likely exposed in local outcrops near the shelfbreak (Figure 7-3).

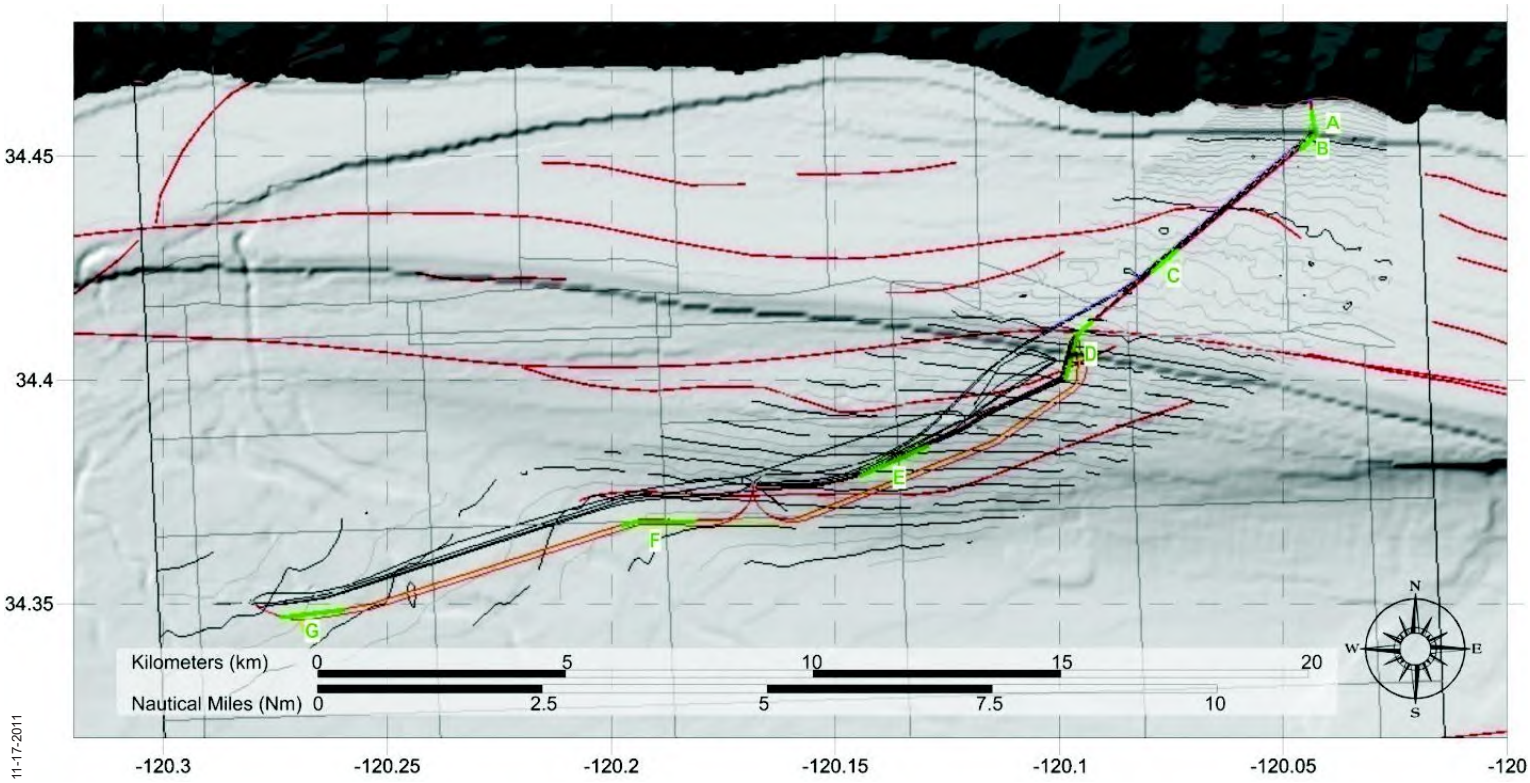
The Red Mountain/North Channel Slope fault trends through the vicinity of the shelfbreak. It offsets the Monterey Fm near 34.4118°N, 120.0941°W some 6,000 feet below the surface (Fisher, 2005; Figure 5-1b). However, this position is also that of its surface trace, assuming a nominal 25 degree fault incline value, the fault should intersect the surface approximately 2.5 miles to the south. In any case, there is no evidence of the Red Mountain/North Channel Slope fault in the subbottom records (Figure 7-3).

The last dipping bedrock layer observed along both the A2 and F2 routes occurs at the shelfbreak. Immediately seaward of the shelfbreak, subseabed reflections are not returned to the subbottom profiler. The upper slope seabed dips sub-parallel to the dip of the bedrock on the shelf. Approximately 800 feet south of the shelfbreak, a stratified package of presumably sand grading south to clay becomes visible below the seafloor (Figure 7-3). The reflectors in this package diverge seaward, and may rest conformably on the underlying bedrock. These upper slope sediments are likely sandy near the shelfbreak and grade to clay farther downslope. The measureable sediment thickness increases to at least 100-feet thick on the lower slope (Figure 7-4). In several places, high amplitude hazy reflections seen at depth are interpreted as gassy sediment (Figure 7-4), though some increases in amplitude may be

attributed to an increase in grain size (sand) as indicated by high amplitude closely-spaced reflectors (Figure 7-4).

As the route proceeds onto the mid-slope area, the surface sediment is interpreted to become more clayey, and the subsurface package more isotropic (Figure 7-4). The surficial sediments down to a depth of at least 20 feet beneath the seabed are characterized as moderate amplitude, parallel continuous reflectors interpreted as hemipelagic silt and/or clay. As the base of the slope is reached, the moderate amplitudes of the surficial hemipelagic deposits grade to low amplitudes indicating a decrease in grain size and/or undifferentiated sediment properties. The thickness of the hemipelagic pinches out in some places where buried slump and/or turbidite deposits outcrop at the seabed.

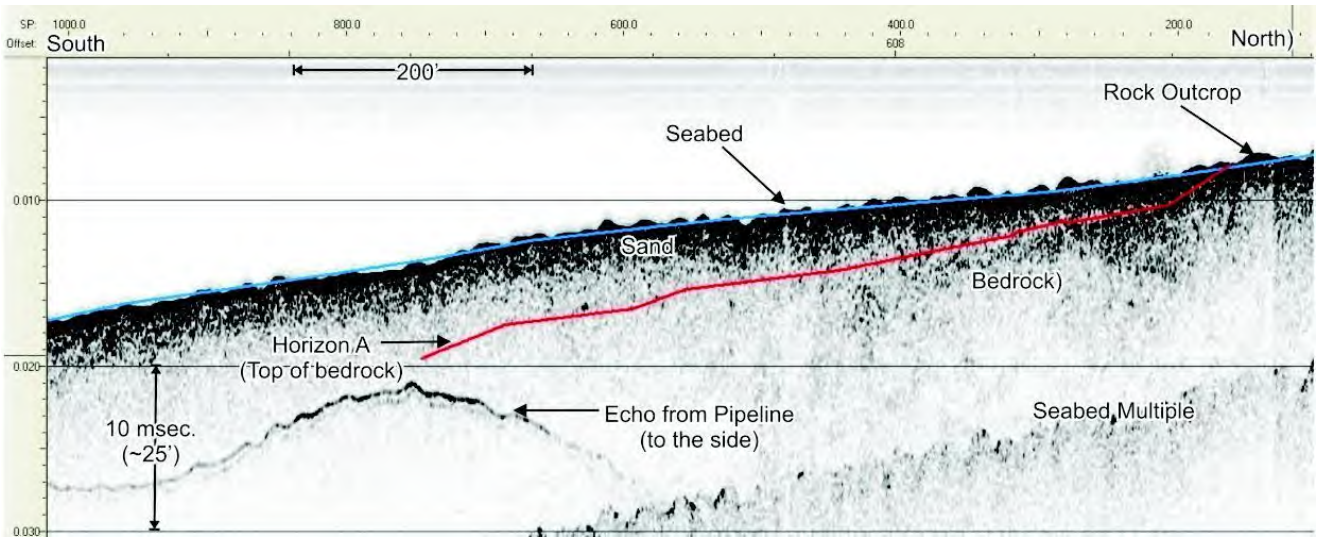
Along the G2 and G2-Alt routes, laterally discontinuous and sometimes stacked layers characterized high amplitudes and often very closely-spaced reflectors are evident. These units are interpreted as turbidite deposits and buried slump deposits. In several places, the routes cross slope channel deposits. One such channel is shown in cross section on Figure 7-5; this channel intersects the G2 route near 34.3471°N, 120.2641°W. A slight mounding either side of this channel is interpreted as channel levee deposits (presumably silty or sandy material). In this location, a thin hemipelagic sediment drape blankets the seabed.



This image shows the locations of the Subbottom Profiler data examples discussed below (green line). The red lines show the locations of reported faults; the orange lines, the proposed routes; and black lines, existing cables and pipelines. Local bathymetry is contoured at a 50-ft interval below the shelfbreak (near D) and at a 10-ft interval above.

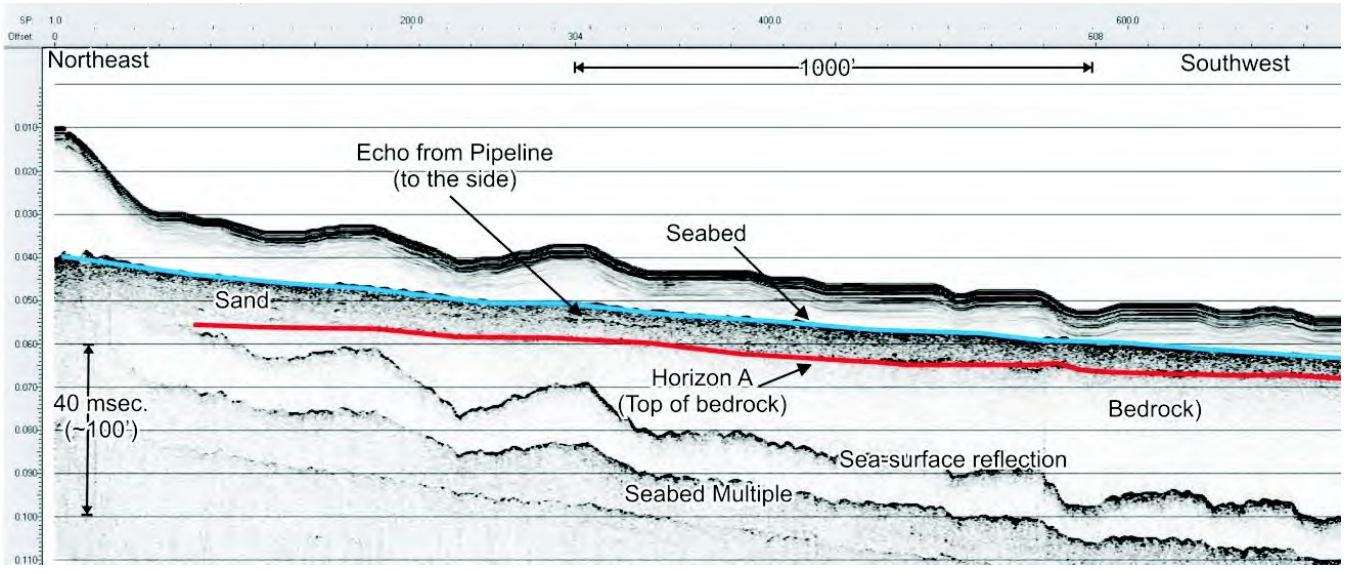
SUBBOTTOM PROFILER EXAMPLE LOCATION MAP
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 7-1



A - INSHORE SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Line 107. The blue line indicates the seafloor and the red line traces Horizon A, which is the contact between the bedrock and the overlying sand sediment. Pipeline side-echoes are labeled.

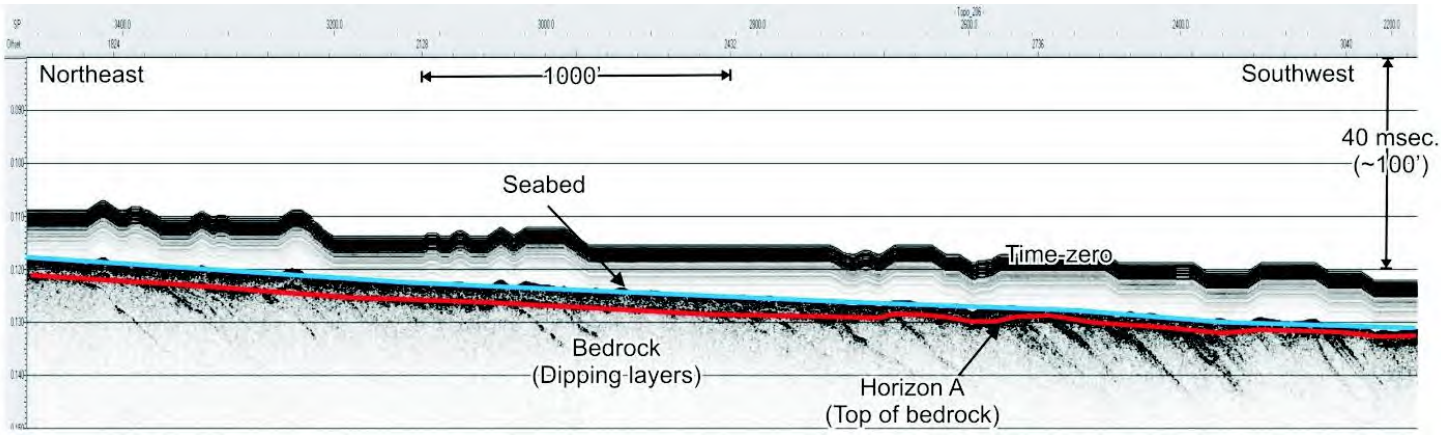


B - INNER SHELF SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Line 207. The blue line indicates the seafloor and the red line traces Horizon A, which is the contact between the bedrock and the overlying sandy sediment.

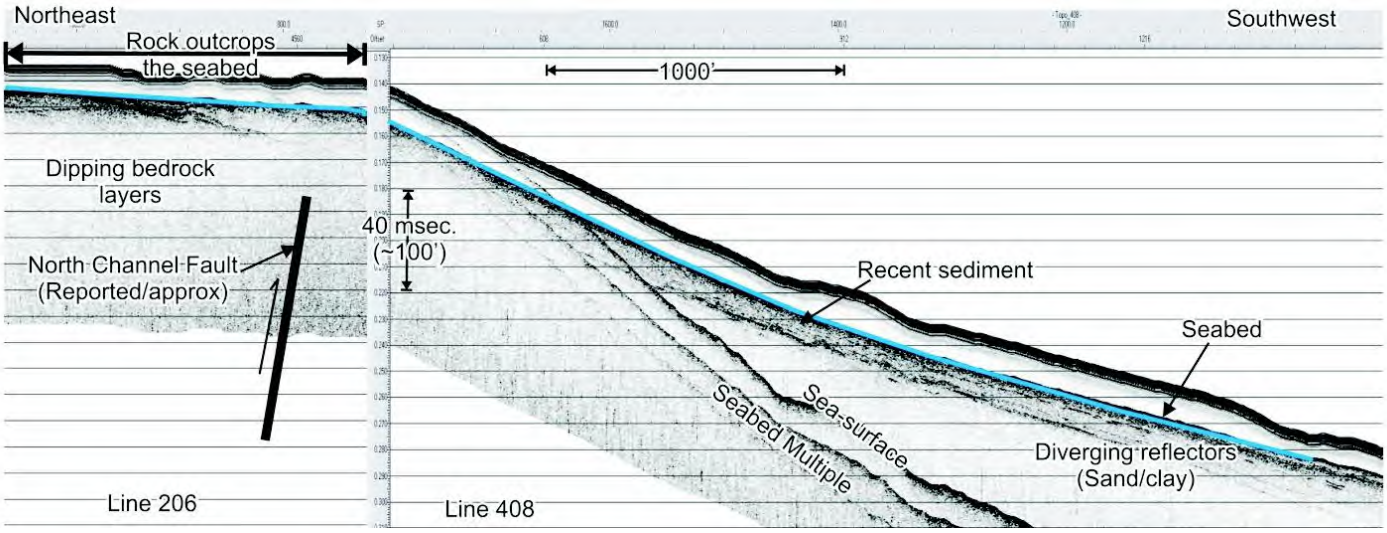
SUBBOTTOM PROFILER EXAMPLES A AND B
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 7-2



C - MIDSHELF SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Line 206. The blue line indicates the seafloor and the red line traces Horizon A, which is the contact between the bedrock and the overlying sediment. The bedrock appears as dipping reflectors in the subsurface, which probably constitute parts of the Pliocene Sisquoc and Pico Formations.

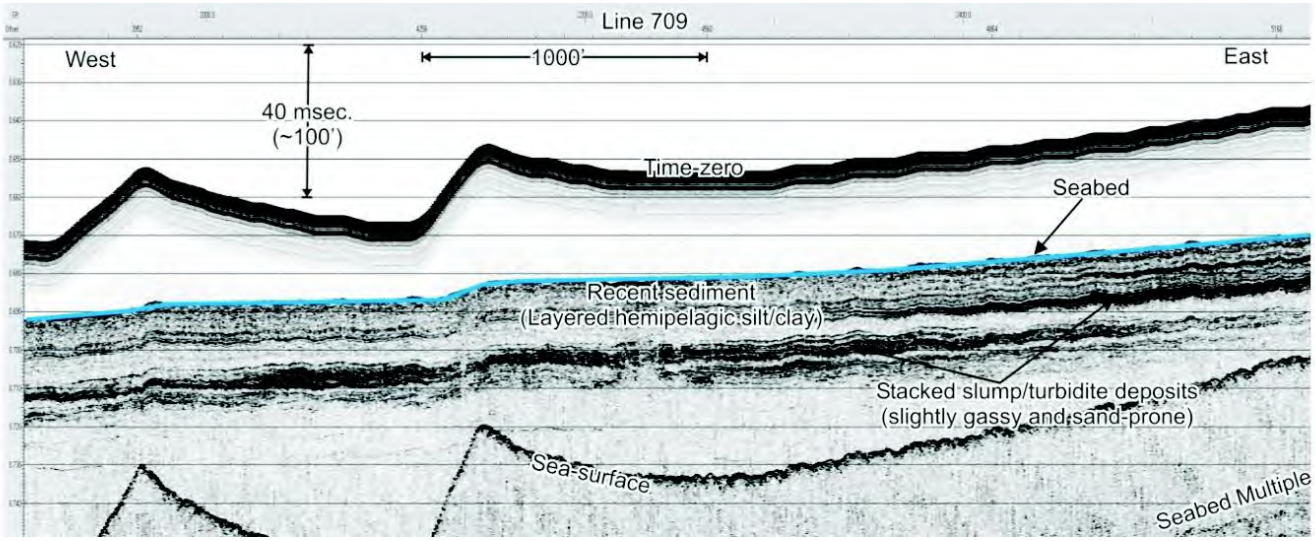


D - SHELF BREAK SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Lines 206 and 408. The blue line indicates the seafloor. The dipping reflectors indicate bedrock strata above the shelfbreak and a thickening package of turbidite sequences on the upper slope.

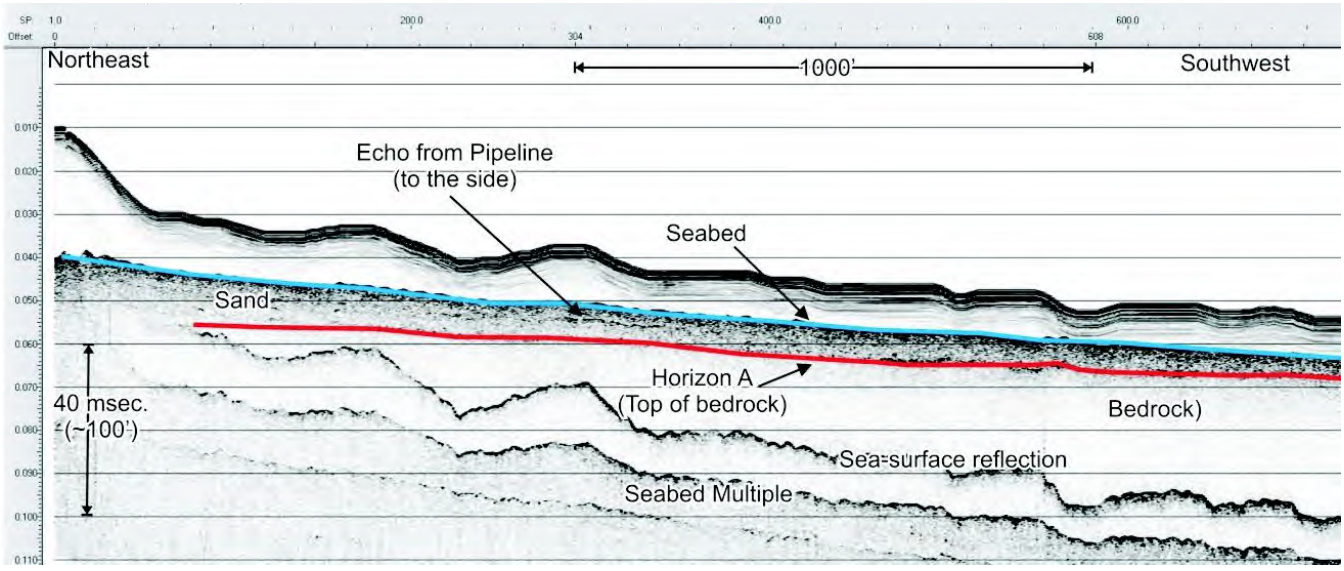
SUBBOTTOM PROFILER EXAMPLES C AND D
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 7-3



E - UPPER SLOPE SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Line 709. The blue line indicates the seafloor. The turbidite package appears to be approximately 100 ft thick in this area, but the dark (i.e. gassy or sandy) layers prevent deeper penetration. The package may be much thicker.

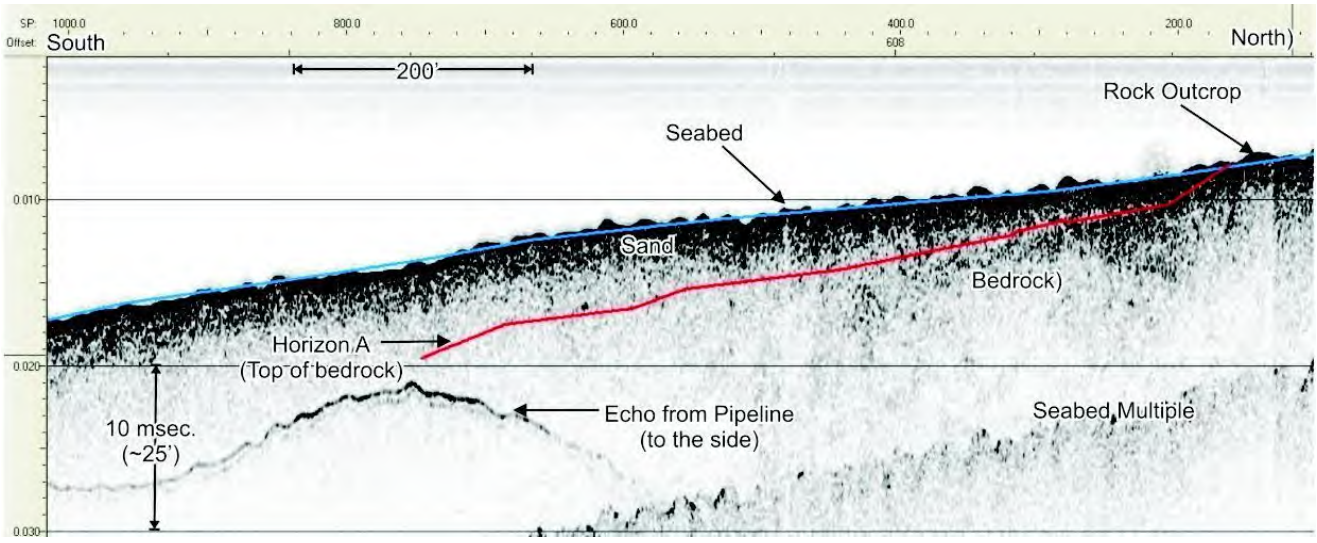


F - MID-SLOPE SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Line 518. The blue line indicates the seafloor. The hemipelagic subsurface here is largely isotropic, but dark patches indicate gassy pockets within it.

SUBBOTTOM PROFILER EXAMPLES E AND F
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 7-4



G - LOWER SLOPE SUBBOTTOM PROFILER DATA EXAMPLE

This image shows a segment of the subbottom profiler example taken from Line 3007. The blue line indicates the seafloor. The concave feature is a cross section of a seachannel. Dark layers indicate sand levee deposits within the silt and clay hemipelagic layers. Lumpy, irregular segments of this layer reflect buried slump deposits.

SUBBOTTOM PROFILER EXAMPLE G
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 7-5

SECTION 8
GEOLOGIC HAZARDS

8.0 GEOLOGIC HAZARDS

8.1 MASS MOVEMENT

Historic submarine landslides and channel features within the Santa Barbara Channel correlate closely with the development of geologic structures under the channel's northern margin (Figures 4-4 and 8-1).

The Goleta Slide comprises three slide features that coalesced as the west, central and east sections of a single complex that reflects at least four episodes of slope failures within Late Quaternary sediment (Figure 4-4).

The Gaviota Slide is a mudflow that lies 8 km west of the Goleta Slide complex that may have failed as recently as 300 years ago. Its headwall scarp occurs near 1,247 feet (380 meters) depth, from which the slide descends to a depth of some 1,640 feet (500 meters), covering an area of 4 km^2. This slide is located to the south of the proposed cable route within the project area and poses a risk to the proposed OPSRB cable based on its proximity, location, and activity.

Submarine slope gullies and channels extend from the northwest margin of the Santa Barbara Channel into its depocenter (Figure 2-2). The proposed cable route crosses these predominate features between Platform Harmony and Heritage. The slope channels provide possible conduits for turbidity currents. Active mass movement in the slope channels represent a geologic hazard to the proposed cables and other existing facilities.

8.2 SURFACE FAULT RUPTURE

Ground surface displacement, or rupture, caused by an earthquake is a design consideration for offshore cables that cross faults. The State of California has mapped known faults in inhabited areas onshore as part of the Alquist-Priolo Earthquake Fault Zoning Act (www.consrv.ca.gov/CGS/rghm/ap/). Faults of concern include those that are known to be active or potentially active and are capable of surface rupture.

The Red Mountain/North Channel Slope fault is the only documented fault located within the project survey area (Figures 5-1a and 5-1b). No evidence of Holocene seafloor displacement was interpreted in the subbottom profiler data (Figures 7-2 through 7-5). Consequently, the risk of surface fault rupture on faults crossing the proposed cable route is considered to be low.

8.3 SEISMICITY AND STRONG GROUND MOTIONS

Local active faults could subject the proposed OPSRB cable to strong ground motions. There are numerous other known active faults in the region that are also capable of producing strong ground motions within the project area.

In 2008, the USGS released an update of the United States National Seismic Hazard Maps previously released in 2002 (Petersen *et al*., 2008). This update utilized Next Generation Attenuation (NGA) Relations developed from new ground motion records to replace previous ground-motion prediction equations for crustal faults (Petersen *et al*., 2008). These NGA equations allow for direct calculations of ground motions for a shear wave velocity of 760 m/s in the upper 100 feet (30 meters) of crust. This update also incorporated revised fault data from the Uniform California Earthquake Rupture Forecast Version 2 (UCERF2, 2008) for Southern California, which includes fault data from the Community Fault Model (Plesch *et al*., 2007). These new data sources were used to produce updated seismic hazard maps for California and Nevada (Petersen *et al*., 2008).

Figures 8-2 and 8-3 contain portions of two of these updated seismic hazard maps, in which different parameters are shown. A probabilistic ground motion map for peak ground acceleration (PGA) as a percent of gravity with a 2 percent probability of exceedance in 50 years (2,475 year return period) is presented in Figure 8-1. At the SYU, the PGA value is approximately 0.77g to 1.0g at the 2,475 year return period. A probabilistic ground motion map of 1-Hertz spectral acceleration (SA) for 2 percent probability of exceedance in 50 years in standard gravity (g) is presented in Figure 8-2. At the SYU, the SA value is approximately 0.77g to 1.0g at the 2,475 year return period.

Seismicity and strong ground motions clearly pose a significant hazard to the project. It is our understanding from ExxonMobil that the OPSRB project will be constructed to accommodate and withstand strong seismic shaking without suffering significant damage.

8.4 HARD ROCK AREAS/IRREGULAR TOPOGRAPHY

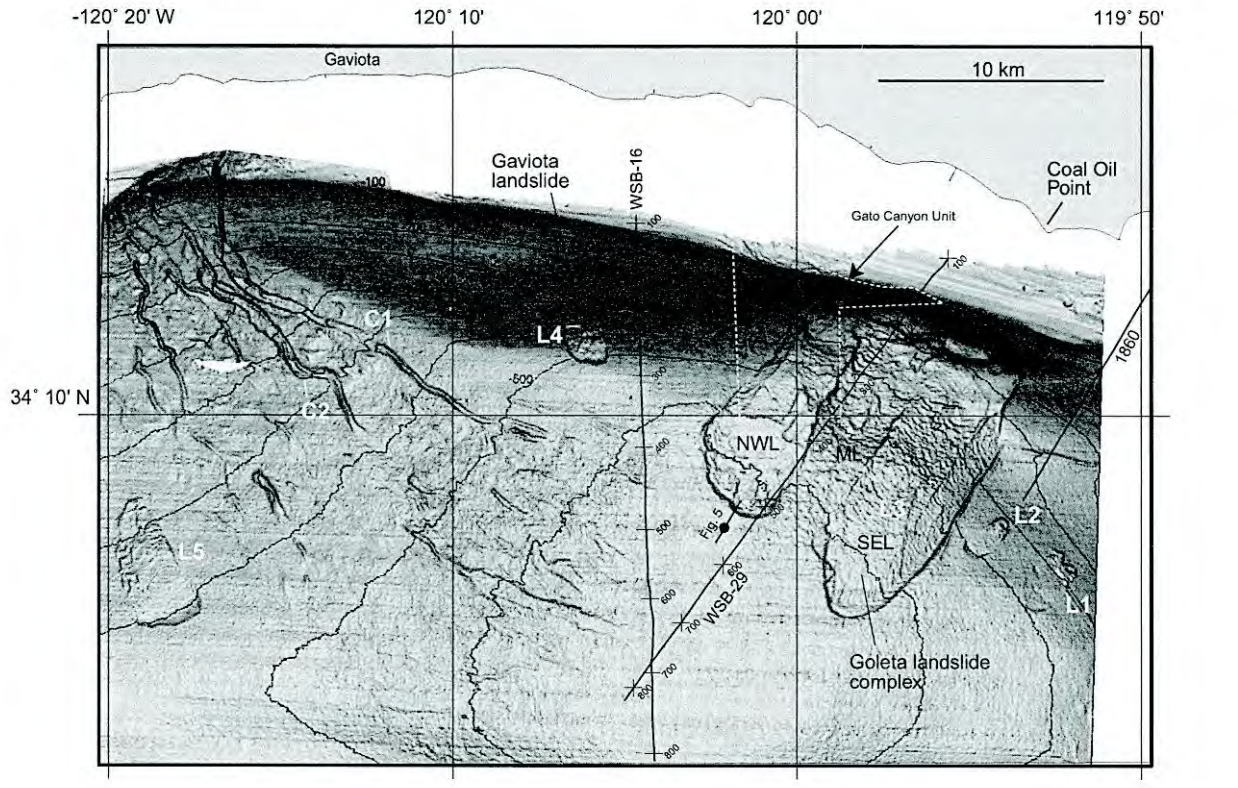
Fugro mapped some areas of hard rock and irregular topography within the project survey extents. An area characterized by scattered hard rock was mapped using the side scan dataset and is shown on the alignment sheets. These mapped areas of outcropping and scattered rock fall within 650 feet of the proposed OPSRB cable alignments. These targets are described in Tables 7-1 and 7-2.

The majority of the seafloor within the project area is characterized by thin Holocene sediment cover consisting of loose sands and silty sands as described in Sections 6.2 and 7.3 above. Anthropogenic features such as existing pipelines and cable routes are shown in red and green on Figures 1-2a and 1-2b. There are very few areas interpreted to consist of hard rock in the vicinity of Platforms Hondo, Harmony, and Heritage.

8.5 HYDROCARBON SEEPS AND ASPHALT VOLCANOES IN THE SANTA YNEZ UNIT

There are natural hydrocarbon seeps and asphalt volcanoes on the continental shelf along the northern margin and within the Santa Barbara Channel (Figures 4-6a and 4-6b); two small mounds have been mapped between Platform Hondo and Harmony. Asphalt volcanoes are common along the MCT, and seven undersea mounds were discovered approximately 10 to 20 km to the ESE of Isla Calafia in 2007 (Keller *et al*, 2007; Figure 4-6). These natural seeps are described in numerous professional papers and other references (e.g., Hornafius *et al*.,

1999; Clark *et al*., 2000; Lorenson *et al*., 2009; Judd and Hovland, 2009) as well as in Section 4.3.3 above. These features do not pose a hazard to the planned facilities.

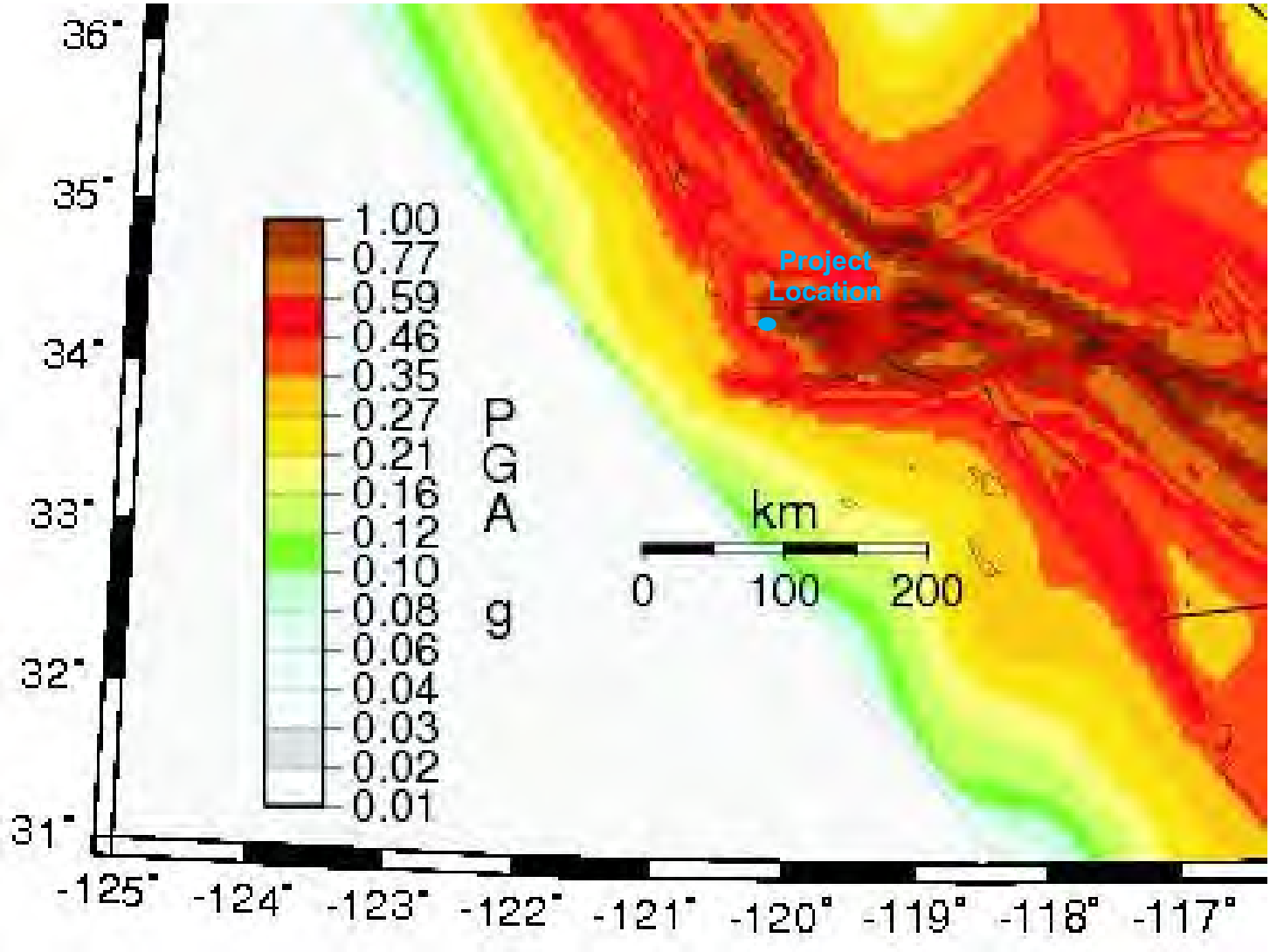


Multibeam bathymetric data collected by Monterey Bay Aquiarium Research Institute (MBARI). Seafloor data shown as shaded-relief of topographic slope. Black dot is ODP site 893. Landslides are denoted by the letter "L" with a number L3: us the Goleta landslide complex, and L4 is the Gaviota Mudslide. The Goleta landslide complex includes three main surficial lobes: NWL is northwest lobe; ML is middle lobe; SEL is southeast lobe. Seafloor channels are indicated with the letter "C" and a number.

SOURCE: Fisher et al., 2005

SANTA BARBARA CHANNEL LANDSLIDES
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 8-1

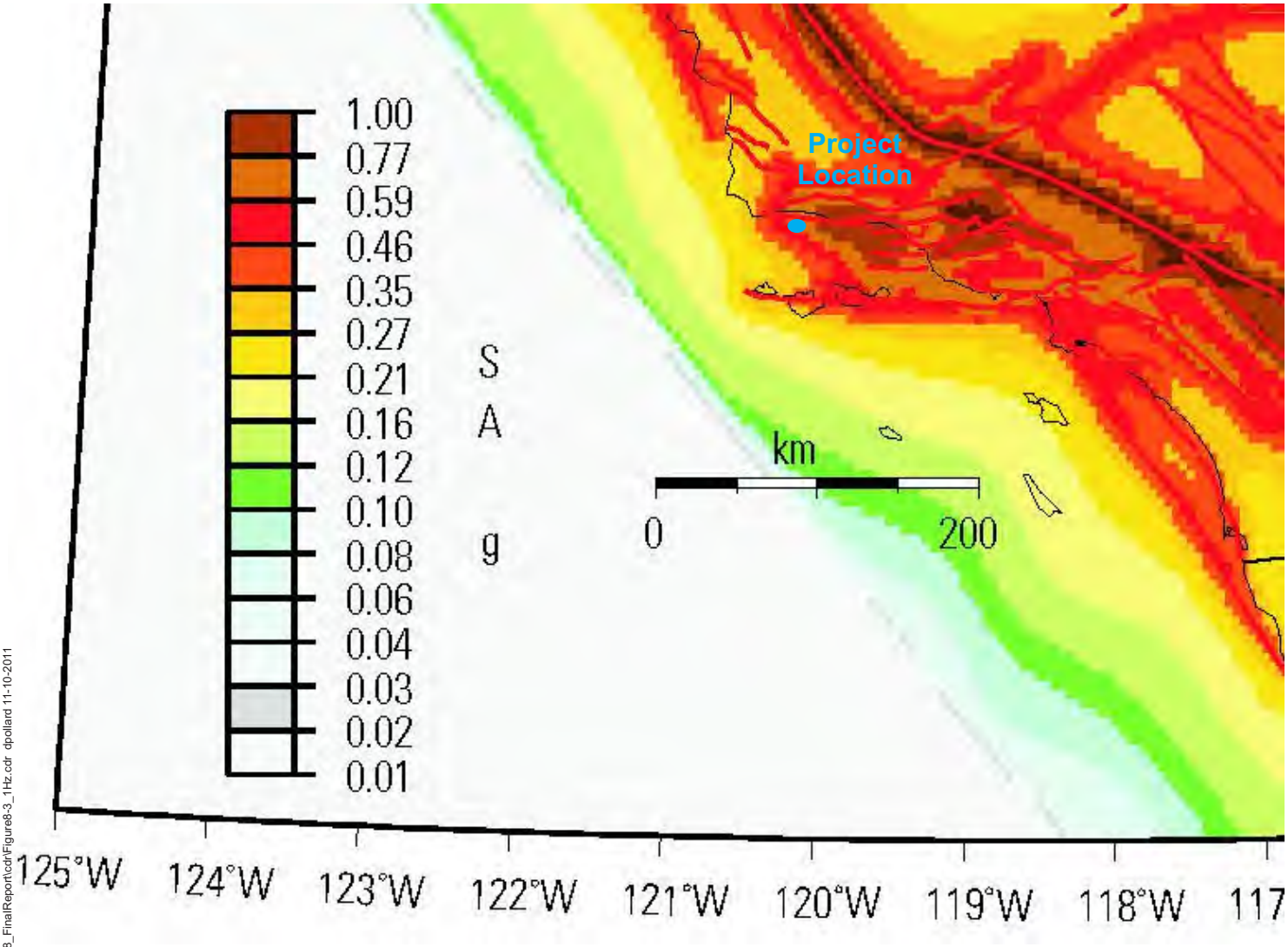


Probabilistic Ground Motion Map for Peak Ground Acceleration (PGA) with a return period of 2% in 50 years. Red lines are fault sources used in the model.

SOURCE: Petersen et al., 2008

PEAK GROUND ACCELERATION: 2% PROBABILITY OF EXCEEDANCE IN 50 YEARS
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 8-2



Probabilistic Ground Motion Map of 1-hertz spectral acceleration (SA) for 2% probability of exceedance in 50 years in standard gravity (g). Red lines are fault sources used in the model.

SOURCE: Petersen et al., 2008

1-HERTZ SPECTRAL ACCELERATION: 2% PROBABILITY OF EXCEEDANCE IN 50 YEARS
SYU Cable Reliability OPSRB
Santa Barbara Channel, California

FIGURE 8-3

SECTION 9
CONCLUSIONS

9.0 CONCLUSIONS

The SYU contains Platforms Hondo, Harmony, and Heritage located in three OCS lease blocks designated OCS-P-188, 190, and 182, respectively (Figure 1-1). This study summarizes geologic and geotechnical conditions described in previous and this survey's geoscience studies performed in the area, and identifies potential geohazards and constraints of relevance to the ExxonMobil SYU OPSRB project.

Single beam bathymetry, side scan sonar, and subbottom profiler (CHIRP) data were collected in September, 2011. MBARI and NOAA bathymetry datasets were also incorporated into this report. These new data were processed and interpreted. Charts and figures presented in this report document the results, and site conditions within the proposed OPSRB cable alignment corridors.

Various potential geohazards have been identified and are interpreted to be present between Platforms Hondo, Harmony, and Heritage and in the surrounding area. The most significant potential geohazards that have been identified by Fugro in the project survey area include:

- Mass Movement, and
- High seismicity and associated strong ground motions.

9.1 CONCLUDING REMARKS

This study summarizes geologic conditions described in previous and this survey's geoscience studies performed in the SYU area, and identifies potential geohazards and constraints of relevance to the OPSRB project. These geologic hazards and constraints can be mitigated by appropriate cable routing and engineering design. Based on review and analysis of available data as discussed and documented in this report, it is our opinion that the proposed OPSRB cable routes are geologically feasible.

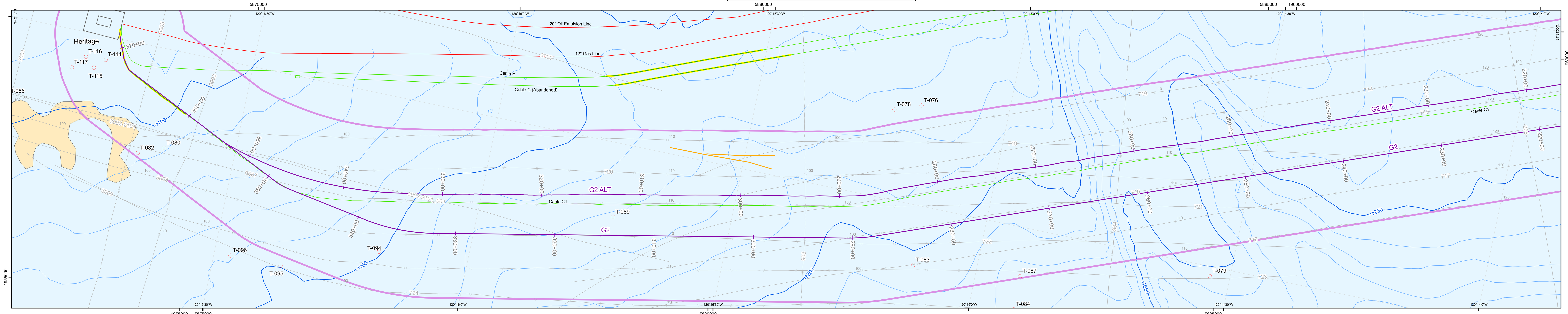
SECTION 10
LIMITATIONS

10.0 LIMITATIONS

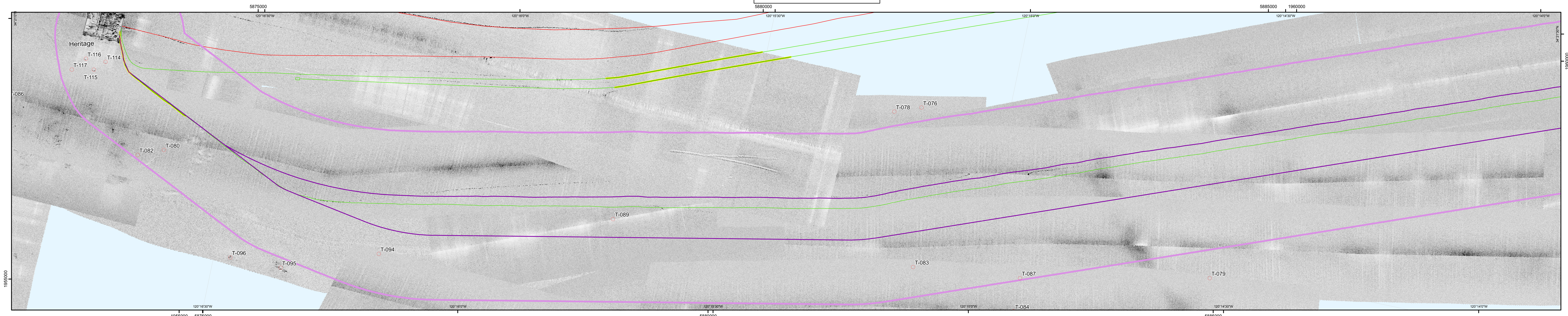
In performing the exploration and professional services described in this report, we have used that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geophysical survey and geologic professionals currently practicing in this or similar localities. No other warranty, expressed or implied, is made relative to the professional opinions included in this report.

CHARTS

BATHYMETRY AND SEAFLOOR FEATURES

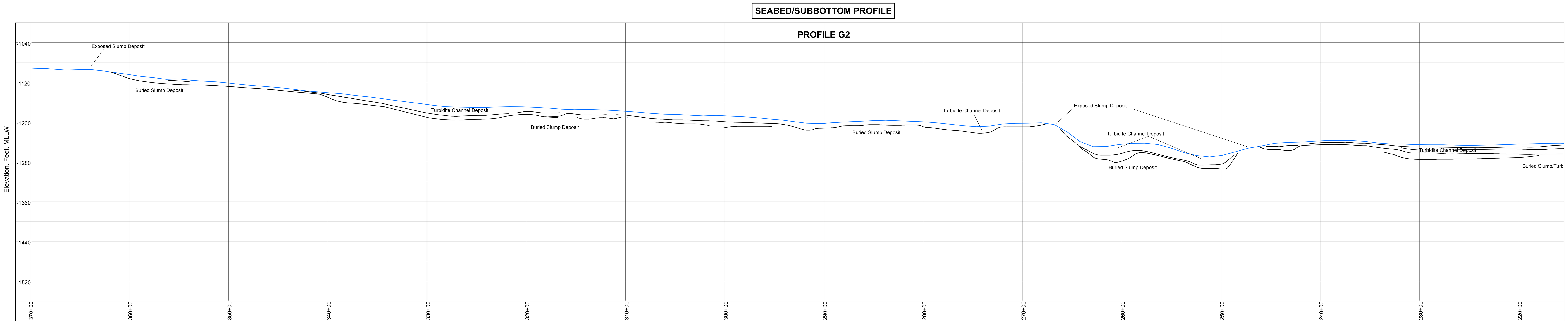


SIDE SCAN SONAR MOSAIC



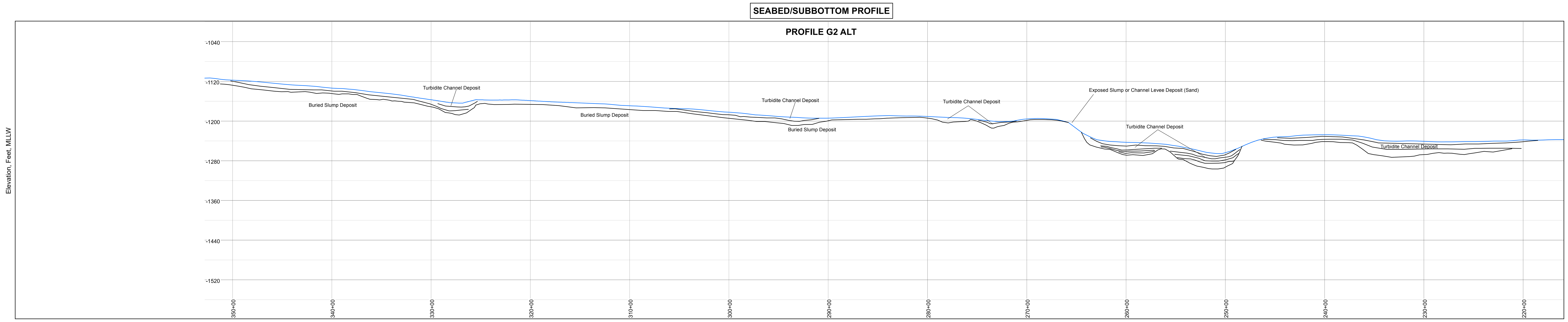
SEABED/SUBBOTTOM PROFILE

PROFILE G2



SEABED/SUBBOTTOM PROFILE

PROFILE G2 ALT



Legend

Bathymetry

Major Contours- contour interval = 50'

Minor Contours- contour interval = 10'

Geophysical Survey

—701— Trackline and Line Number

300 Shotpoint and Label

Sediment Isopach

Major Contours- contour interval = 10'

Minor Contours- contour interval = 2'

Infrastructure

230+00 Proposed Cable Route and Stationing

650' Buffer Zone

Existing Pipeline

Existing Buried Pipeline

Existing Power Cable

Existing Buried Power Cable

Mooring System

Three Mile Limit

Anchor

Buoy at Rest

Platforms

Seafloor Features

T-004 Side Scan Sonar Target with ID

M-01 Magnetometer Anamolies With ID

Abandoned SALM Unit

Drag Marks

Area of Escarpment

Area of Kelp

Area of Possible Seafloor Vegetation

Area of Scattered Rock

Area of Rock Outcropping

Map Extents (in Key Map)

Map Extents

Current Map Extent

Profiles

Seafloor

Interpreted Features

Horizon A

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This hydrographic survey was completed under the direction of an ACSM/THSOA, Certified Hydrographer

Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM: NAD83
PROJECTION: LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE: 5
UNITS: US SURVEY FEET

VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)

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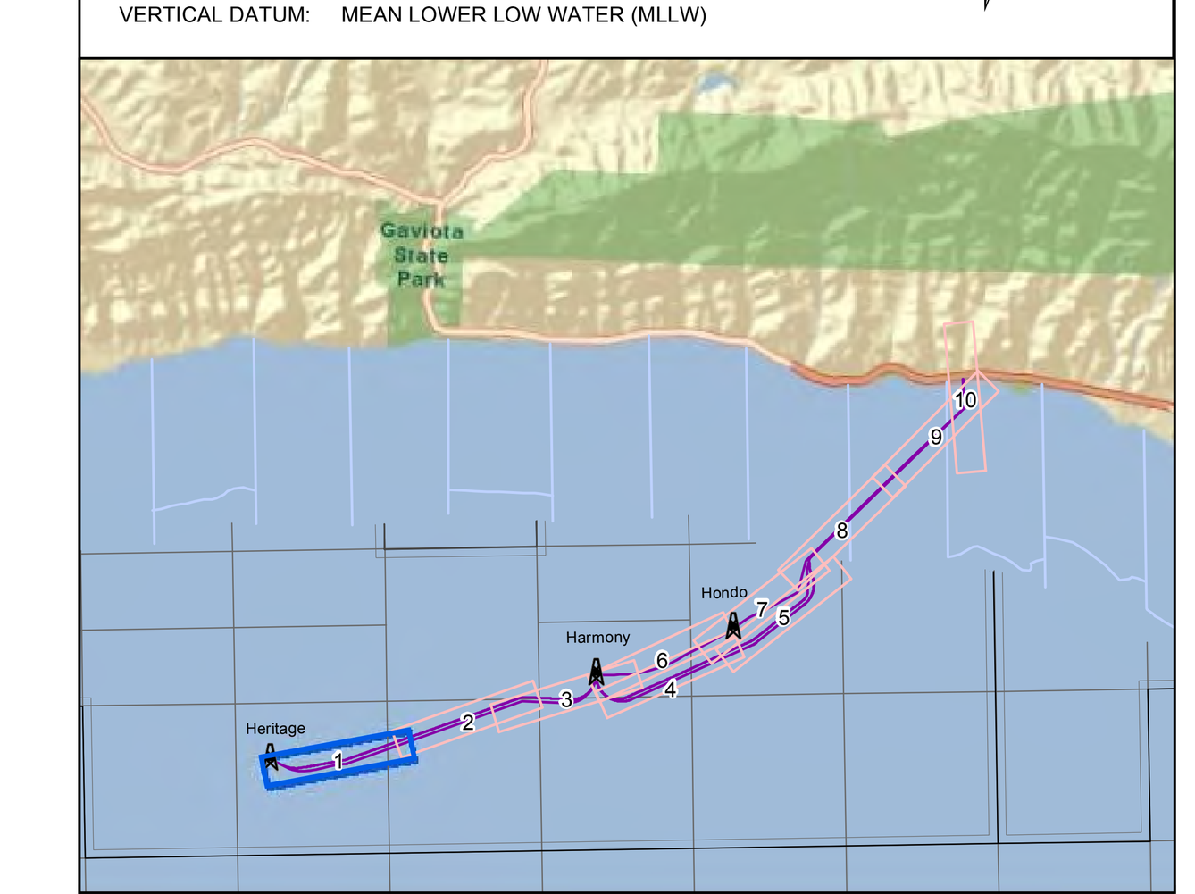

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November 2011
Santa Barbara Channel, California

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400 200 0 400 800 1,200 1,600 Feet

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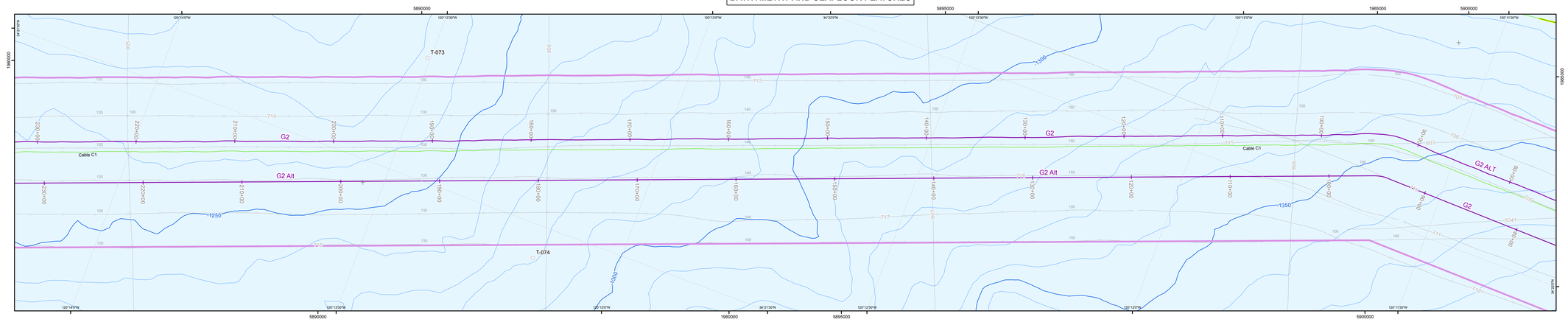
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

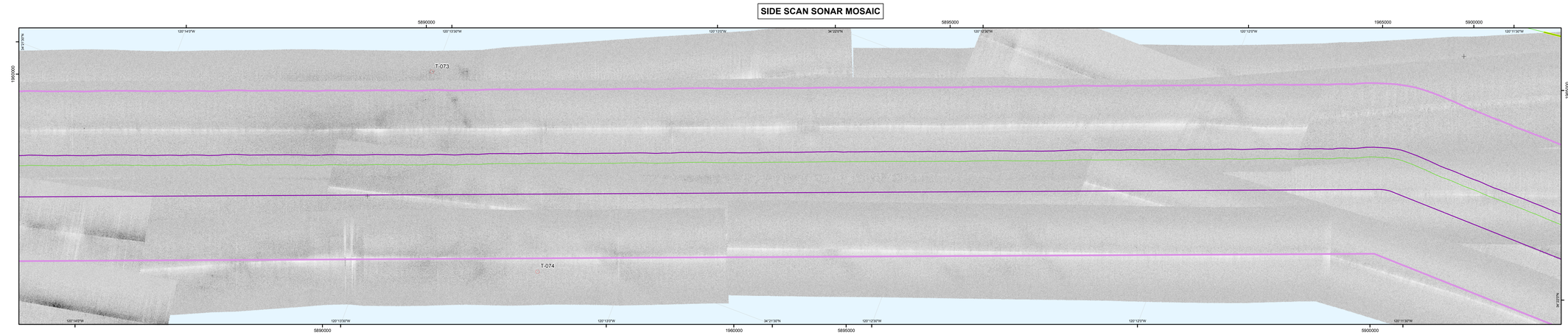
PROJECT NO.: 04.64110024-1A

PLATE NO.: 1 of 10

BATHYMETRY AND SEAFLOOR FEATURES

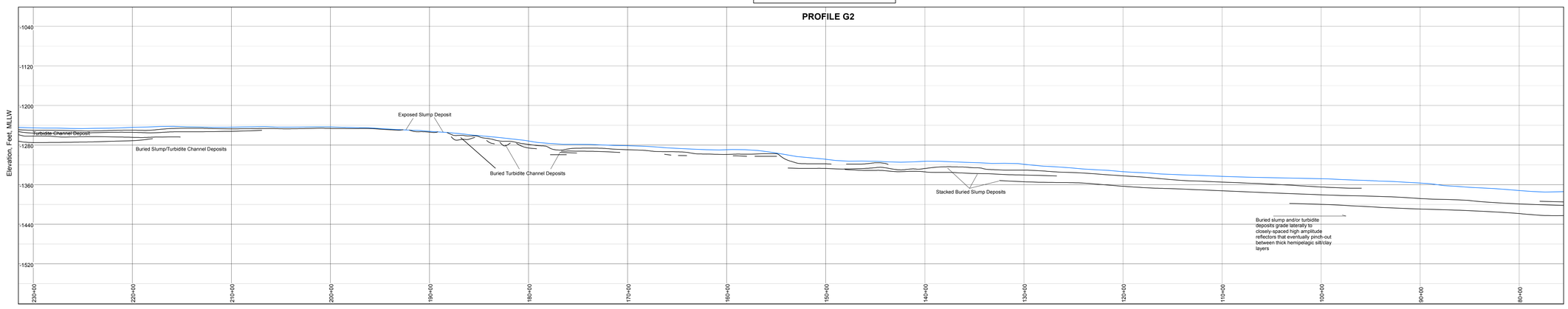


SIDE SCAN SONAR MOSAIC



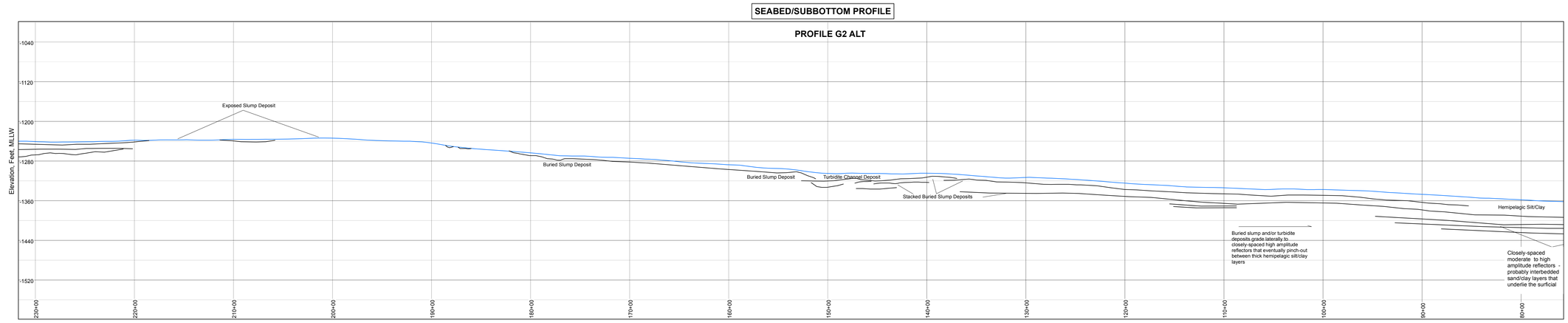
SEABED/SUBBOTTOM PROFILE

PROFILE G2



SEABED/SUBBOTTOM PROFILE

PROFILE G2 ALT



Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- 701 Trackline and Line Number
- 300 Shotpoint and Label

Sediment Isopach
- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure
- 230+00 Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features
- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
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- Interpreted Features
- Horizon A

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NOTES

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Eddie Stutts, C.H. (224)

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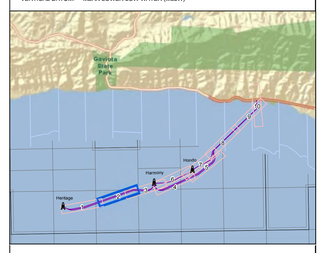
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)

N



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400 200 0 400 800 1,200 1,600 Feet

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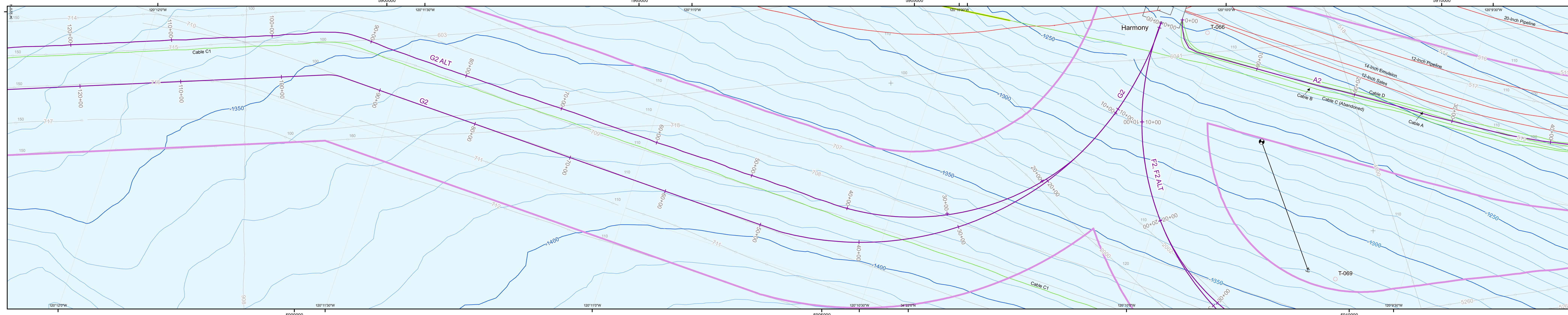
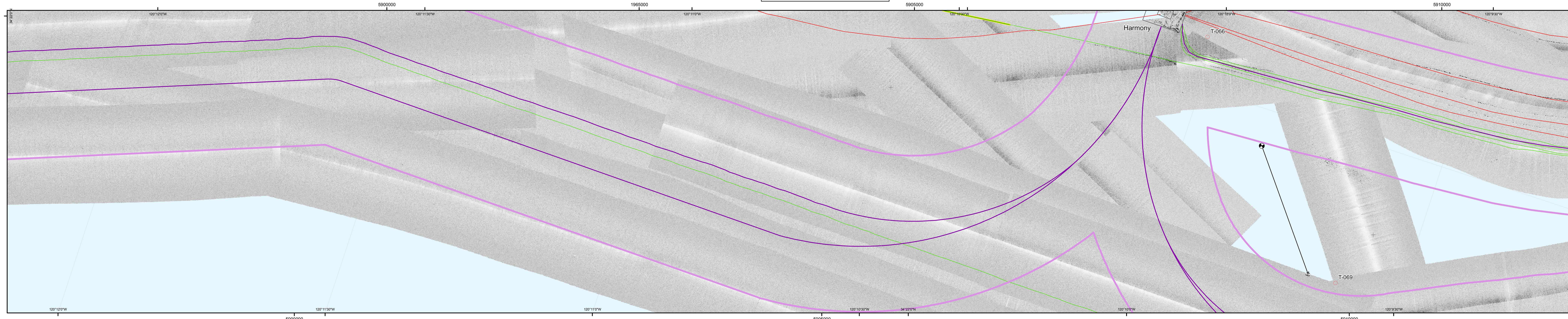
PROJECT NO.: 04.64110024-1B

PLATE NO.: **2 of 10**

BATHYMETRY AND SEAFLOOR FEATURES



SIDE SCAN SONAR MOSAIC



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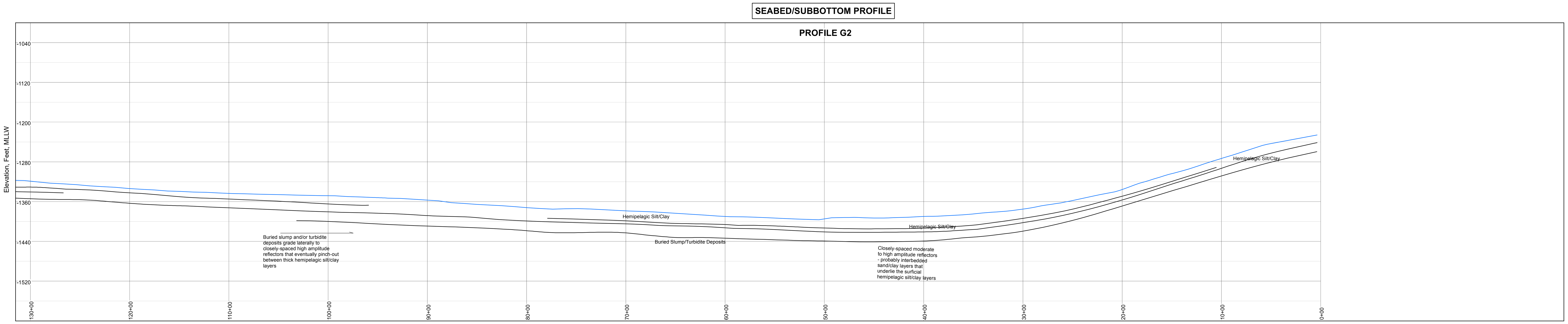

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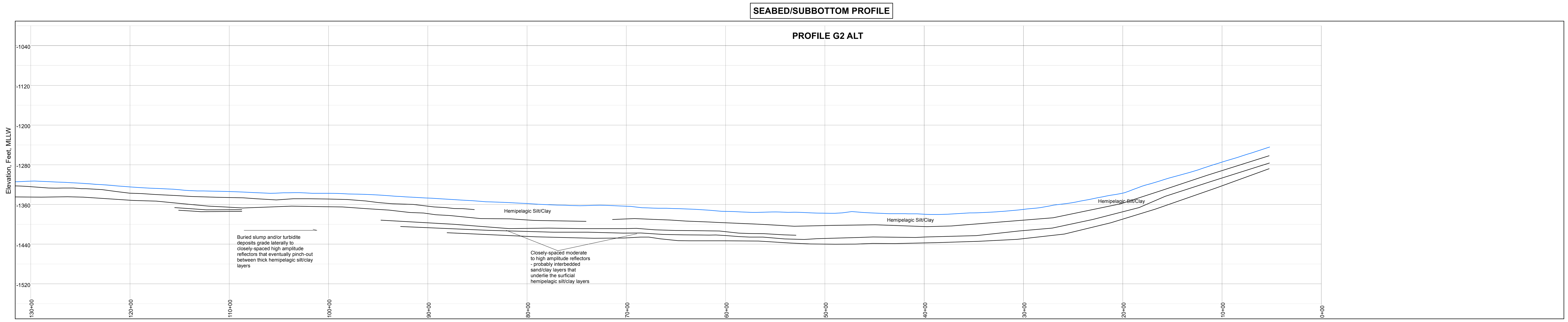

Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- Trackline and Line Number
- Shotpoint and Label

Sediment Isopach
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Infrastructure
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- 650' Buffer Zone
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- Anchor
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Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
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- Interpreted Features
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VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)

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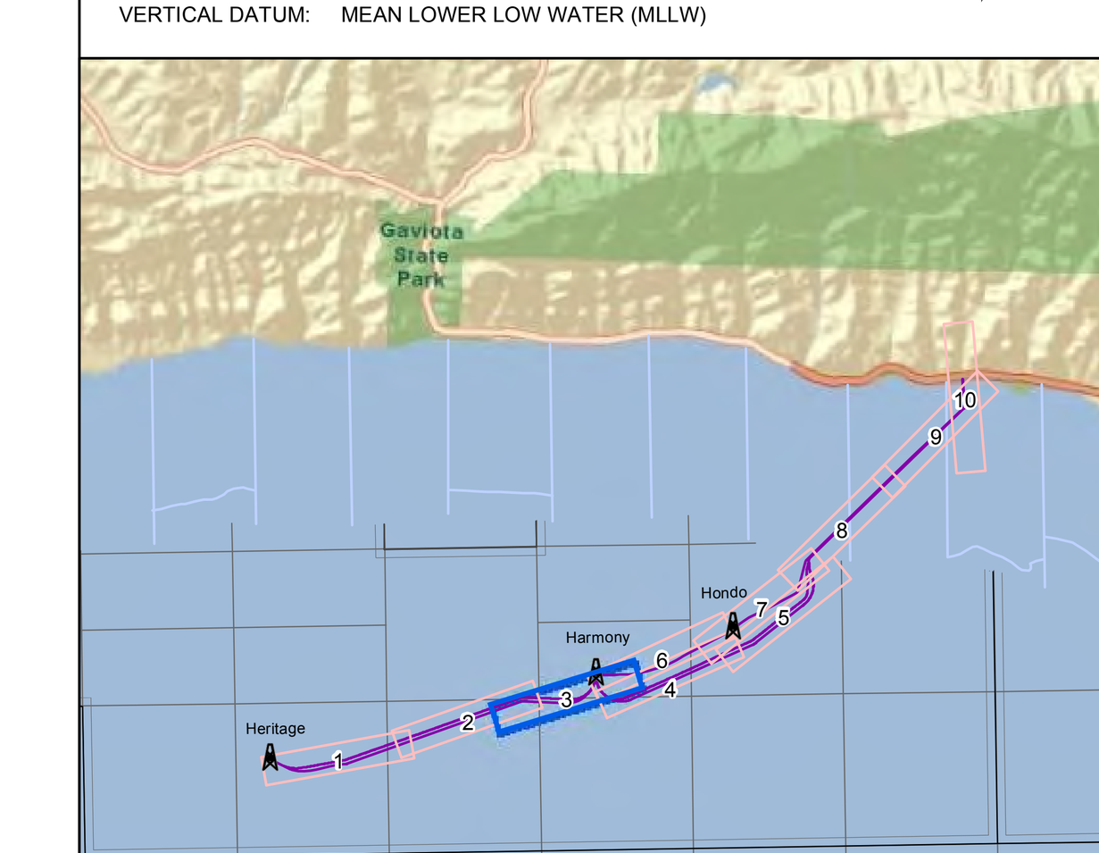

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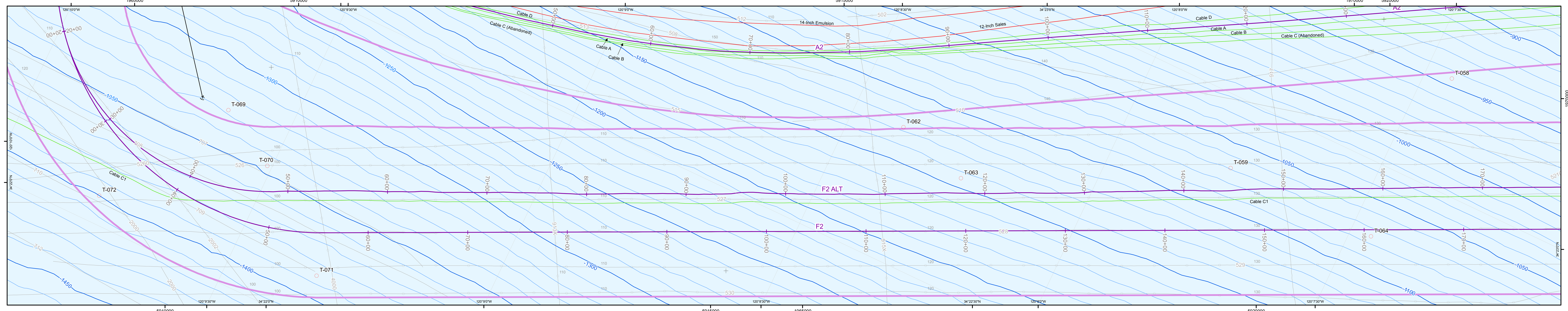
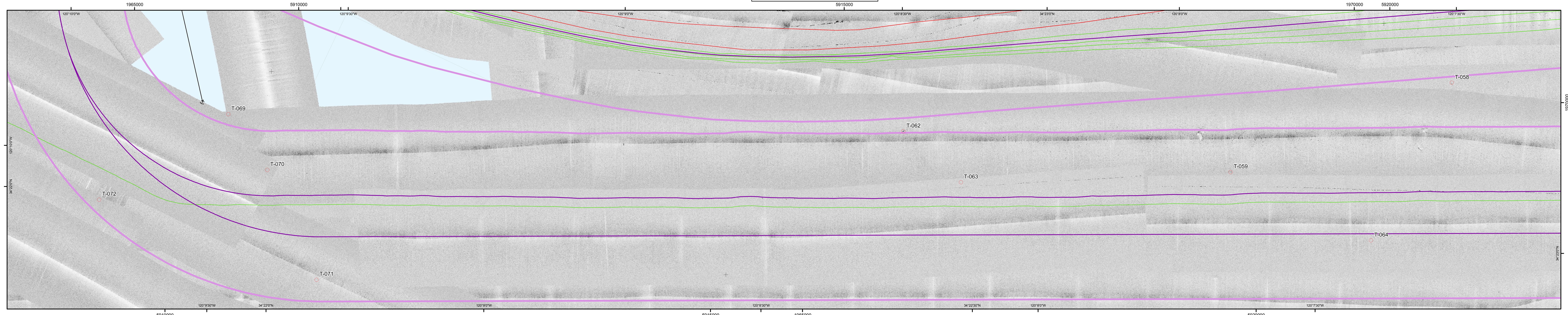
PROJECT NO.: 04.64110024-1C

PLATE NO.:

BATHYMETRY AND SEAFLOOR FEATURES



SIDE SCAN SONAR MOSAIC



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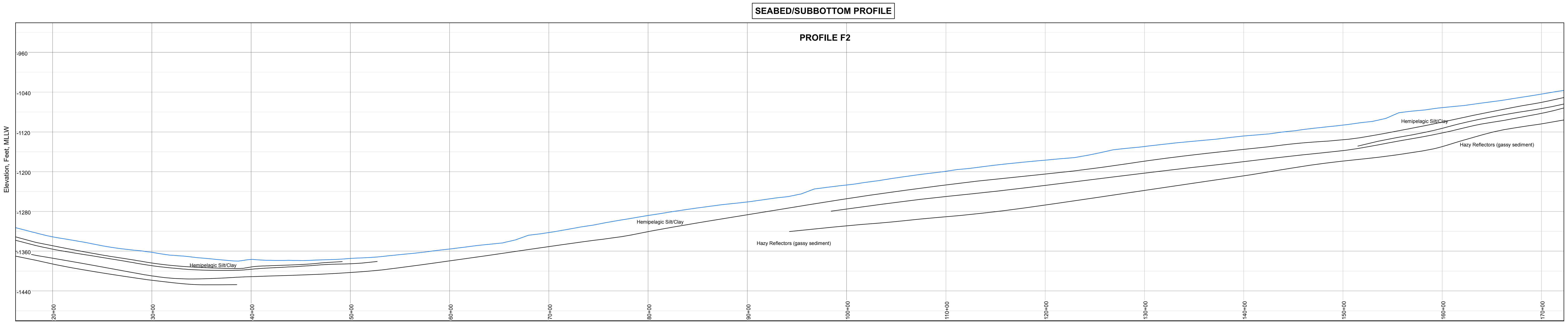

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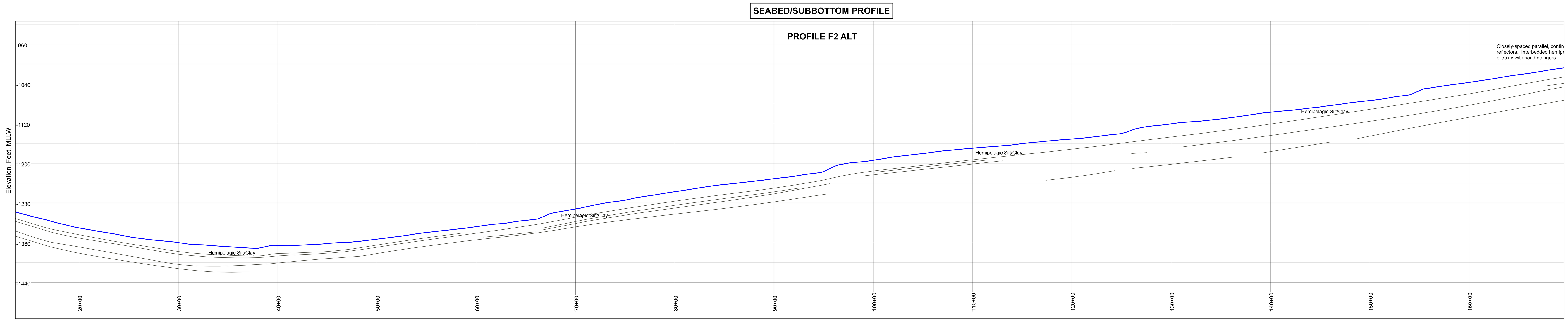

Legend

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Geophysical Survey

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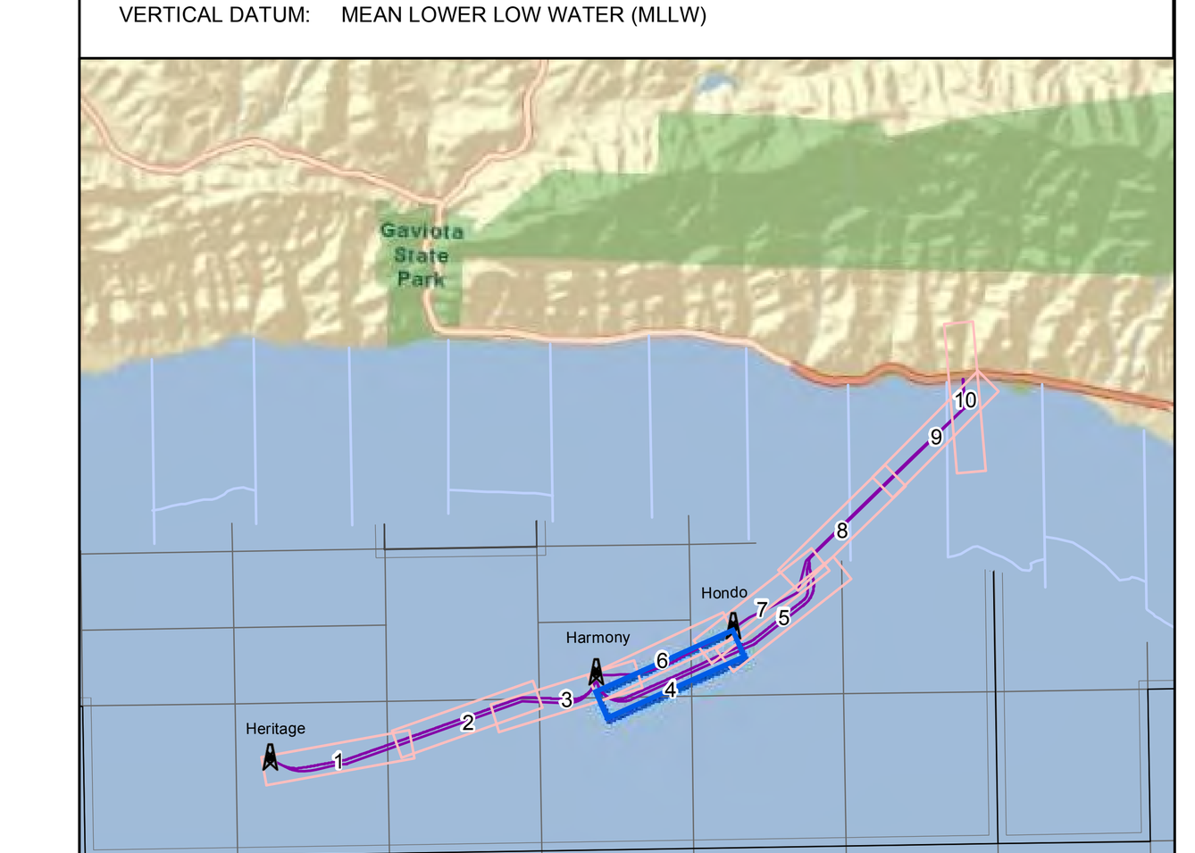
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)



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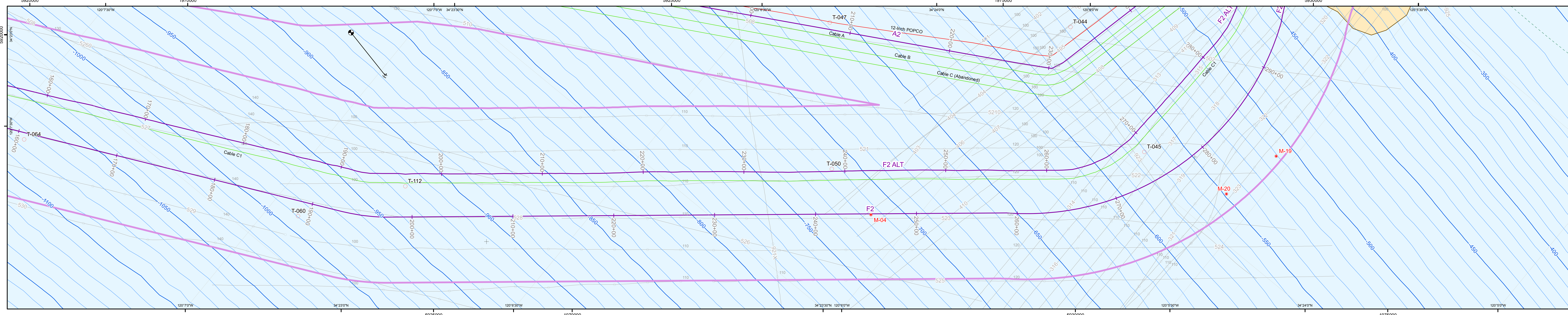
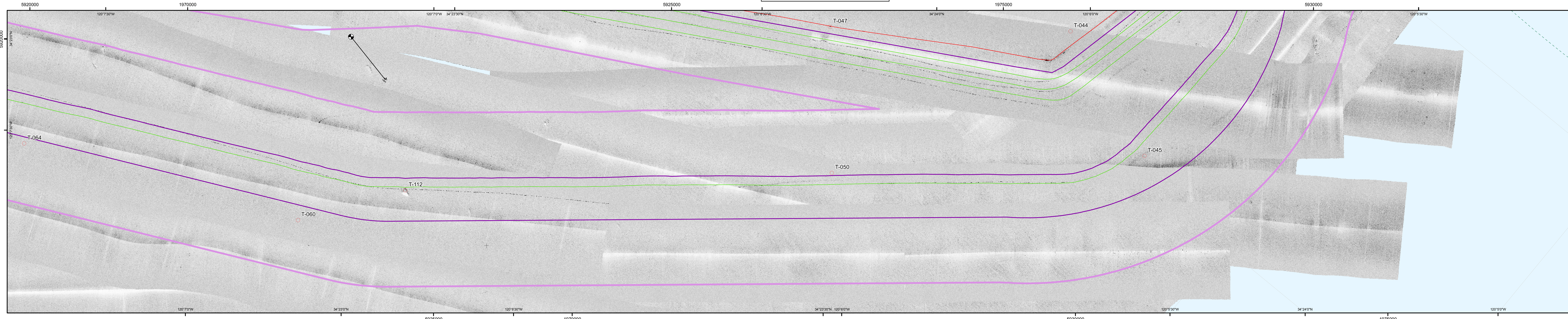
PROJECT NO.: 04.64110024-1D

PLATE NO.:

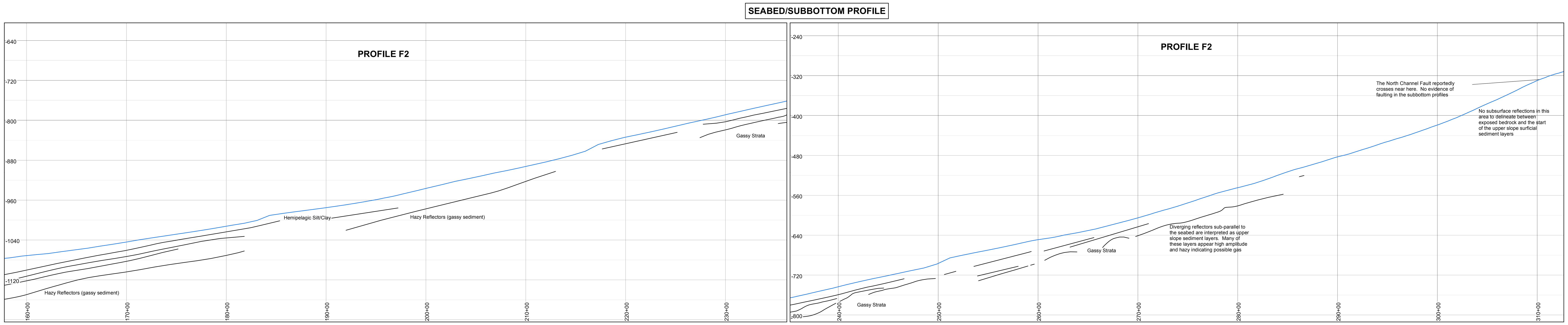
BATHYMETRY AND SEAFLOOR FEATURES



SIDE SCAN SONAR MOSAIC



SEABED/SUBBOTTOM PROFILE



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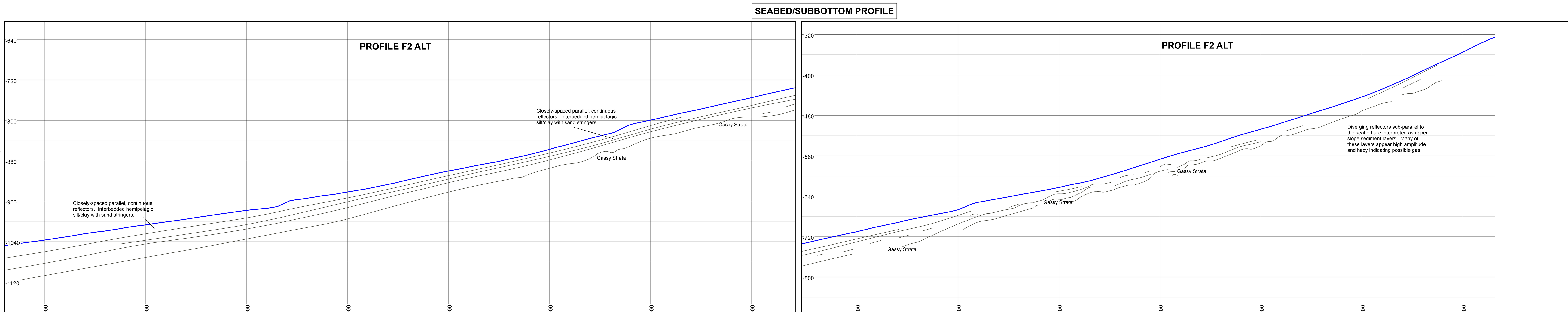

Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- Trackline and Line Number
- Shotpoint and Label

Sediment Isopach
- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure
- Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features
- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

NOTES

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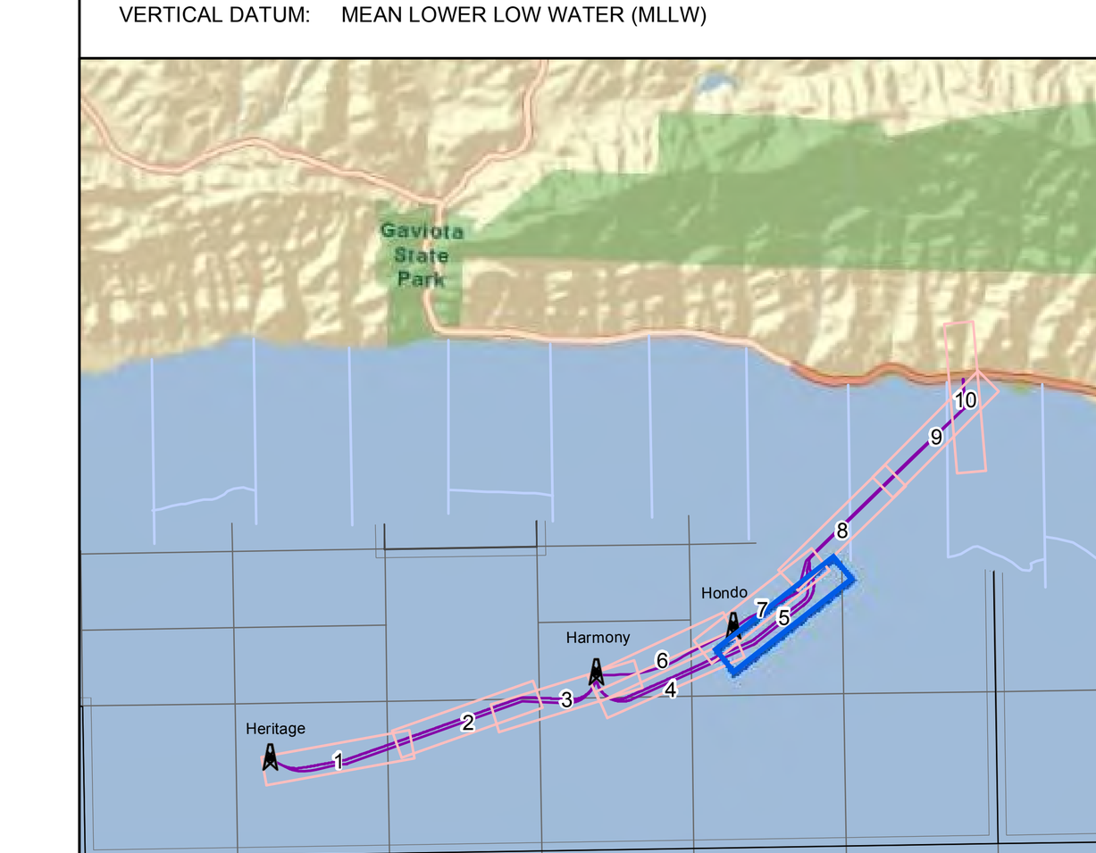
This hydrographic survey was completed under the direction of an ACSM/THSOA, Certified Hydrographer

Eddie Stutts, C.H. (224)

GEODETIC INFORMATION
DATUM: NAD83
PROJECTION: LAMBERT CONFORMAL CONIC, CALIFORNIA COORDINATE SYSTEM
ZONE: 5
UNITS: US SURVEY FEET
VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)



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ExxonMobil

EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

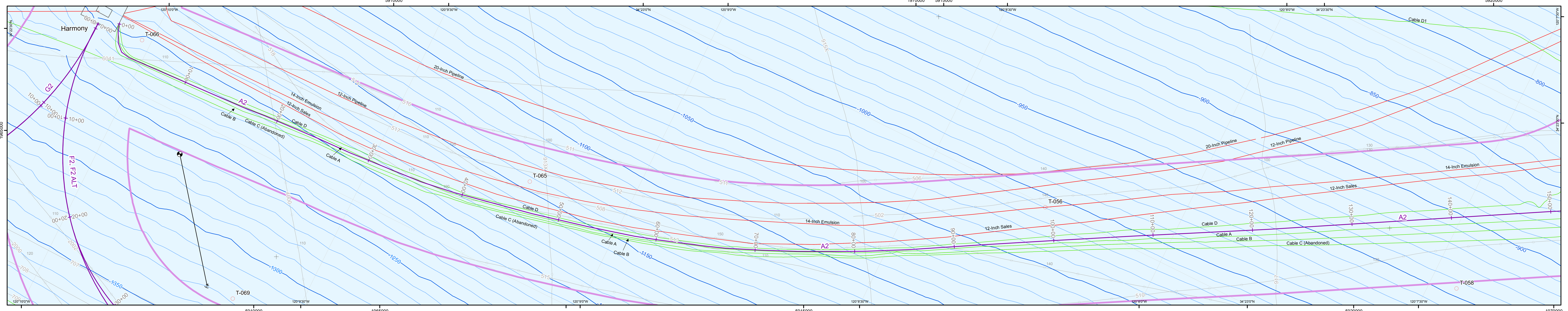
November 2011
Santa Barbara Channel, California

SCALE : 1 in = 400 ft

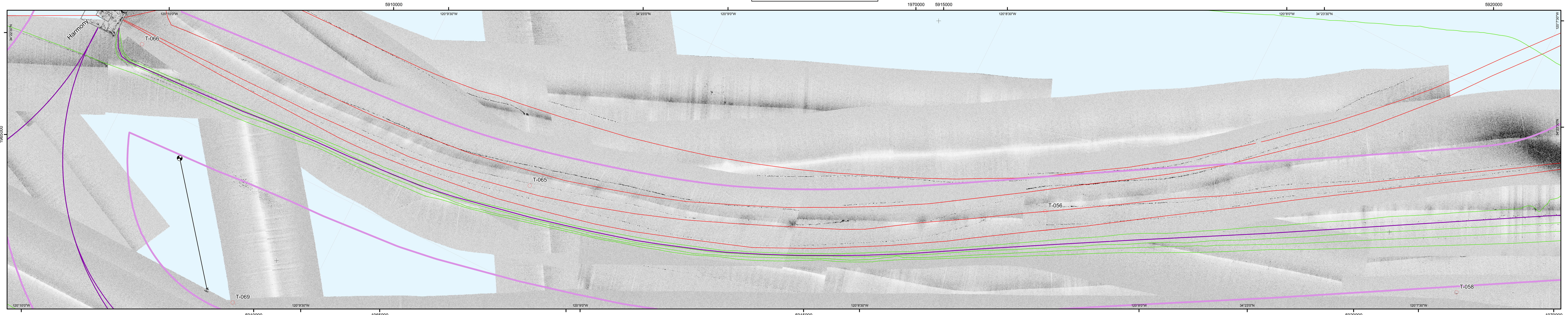
REV.	DATE:	DESCRIPTION	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

PROJECT NO.: 04.64110024-1E
PLATE NO.: 5 of 10

BATHYMETRY AND SEAFLOOR FEATURES

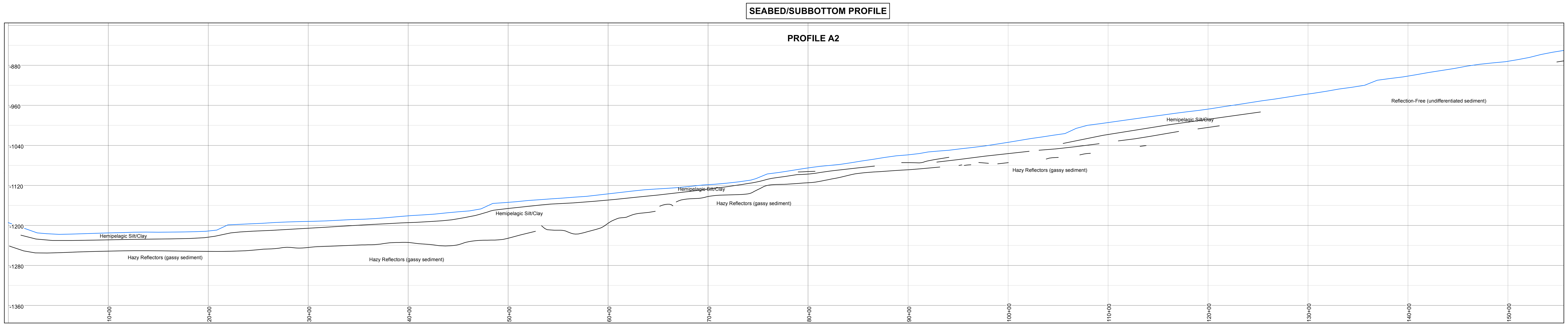


SIDE SCAN SONAR MOSAIC



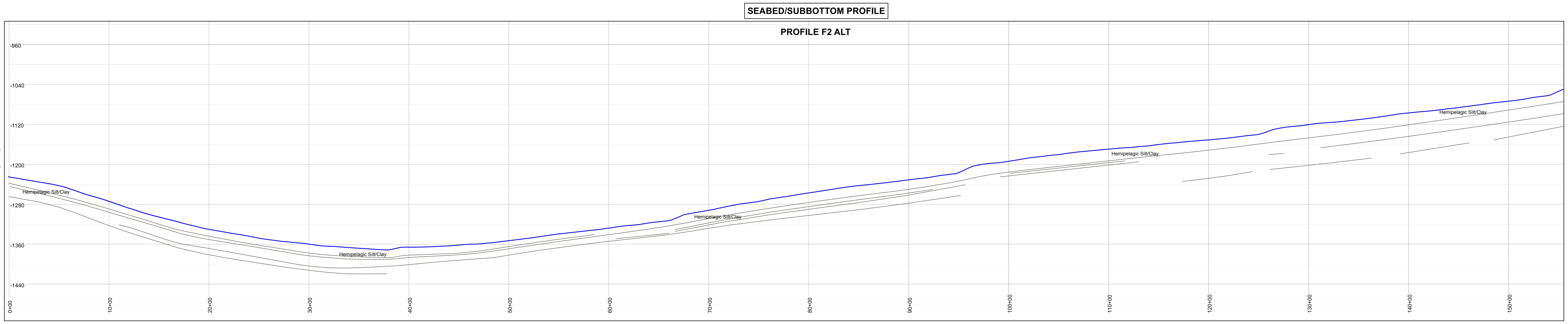
SEABED/SUBBOTTOM PROFILE

PROFILE A2



SEABED/SUBBOTTOM PROFILE

PROFILE F2 ALT



Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- 701 Trackline and Line Number
- 300 Shotpoint and Label

Sediment Isopach
- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure
- 230+00 Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features
- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
- Seafloor
- Interpreted Features
- Horizon A

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NOTES

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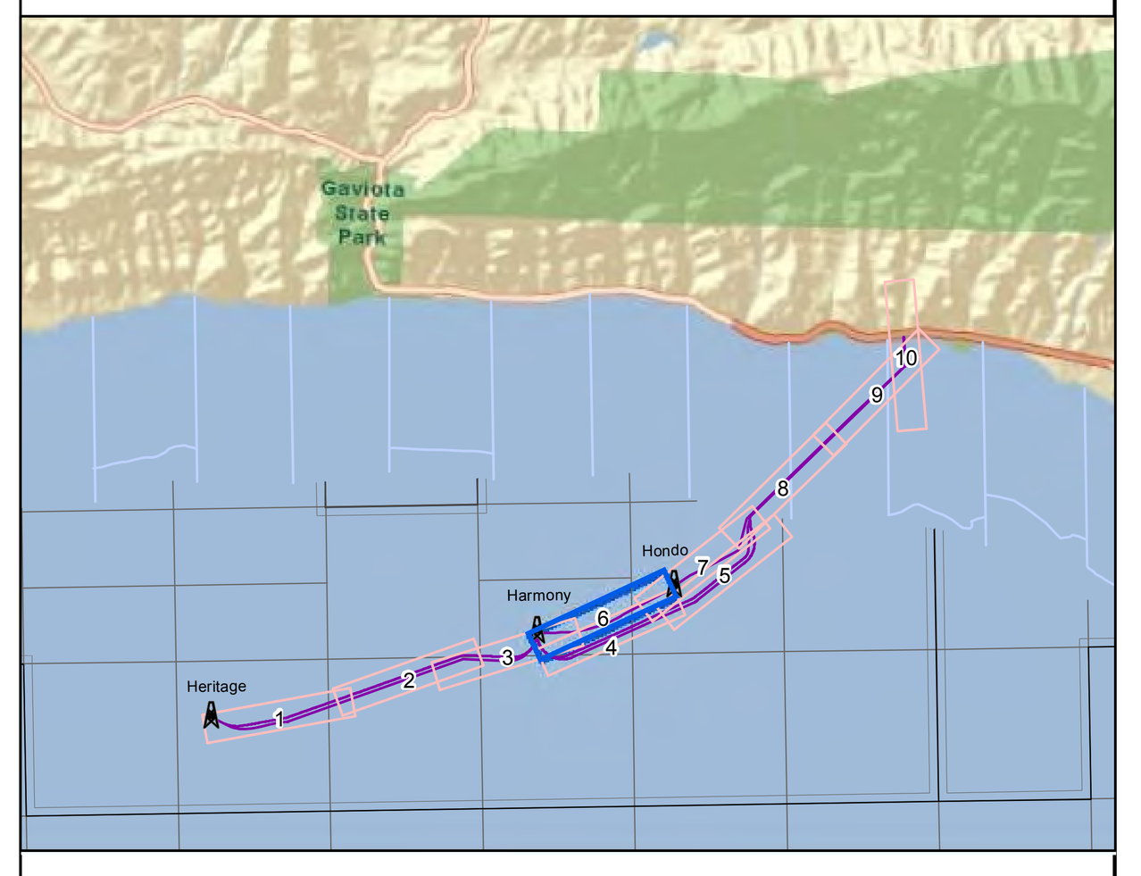
This hydrographic survey was completed under the direction of an ACSM/THSOA, Certified Hydrographer

Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)

N



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www.fugroconsultants.com

EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

November 2011
Santa Barbara Channel, California

SCALE : 1 in = 400 ft

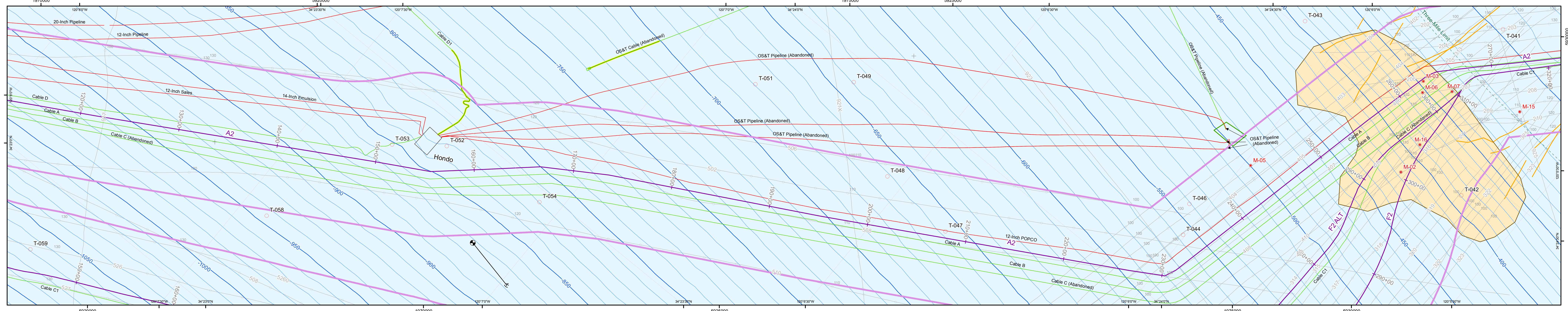
400 200 0 400 800 1,200 1,600 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

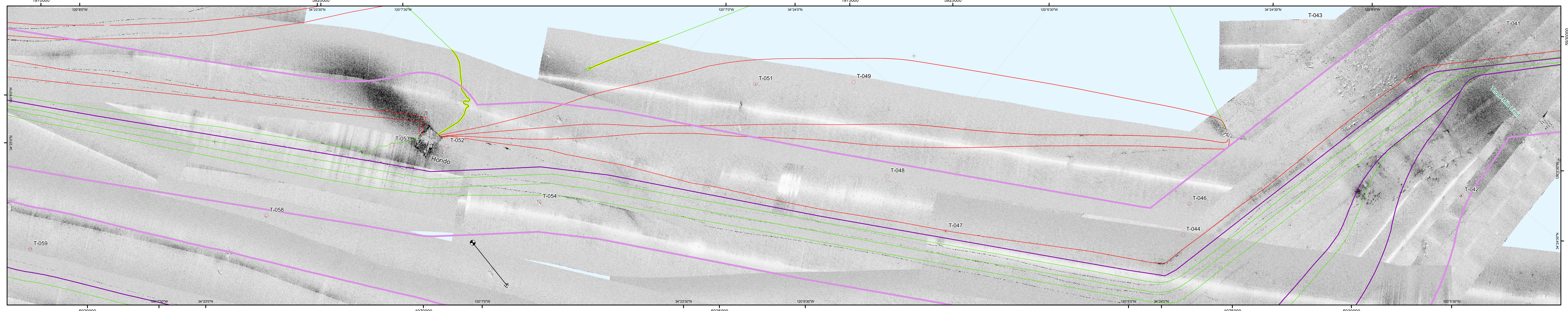
PROJECT NO.: 04.64110024-1F

PLATE NO.: 6 of 10

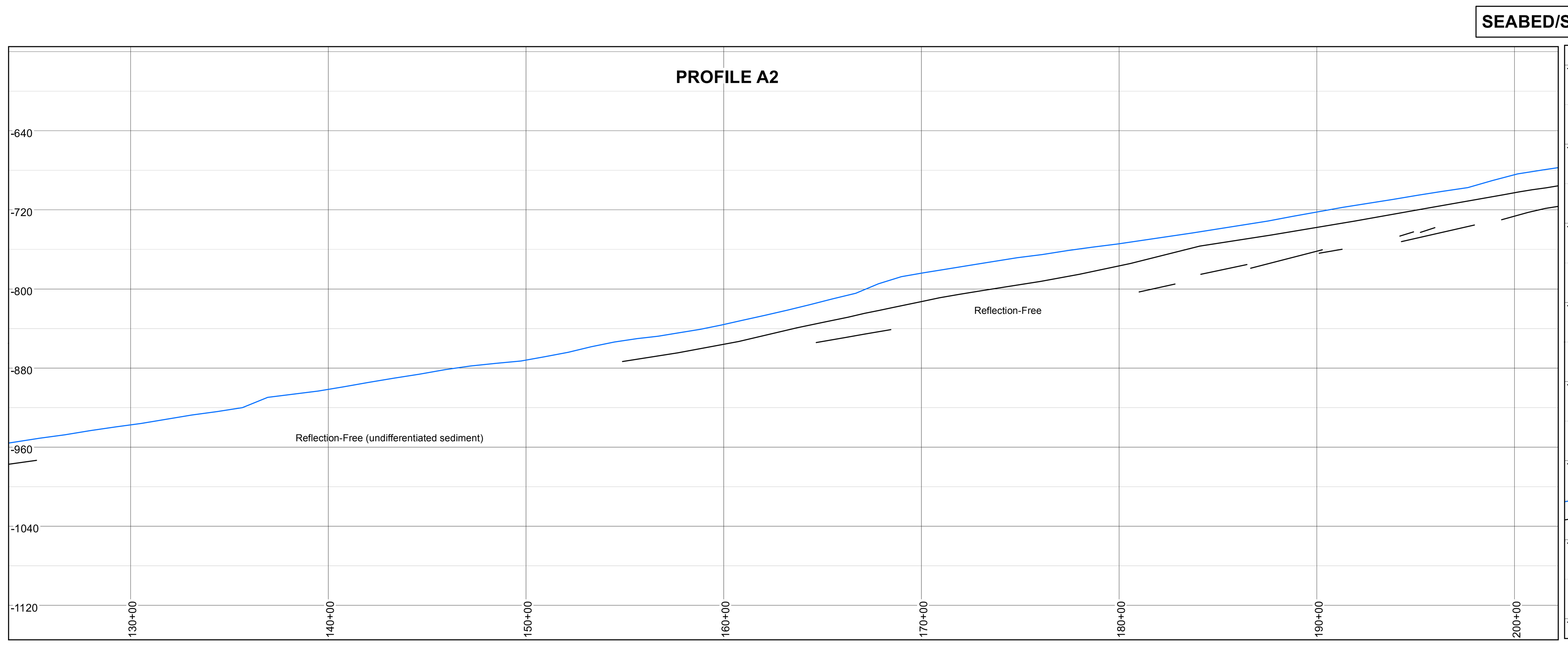
BATHYMETRY AND SEAFLOOR FEATURES

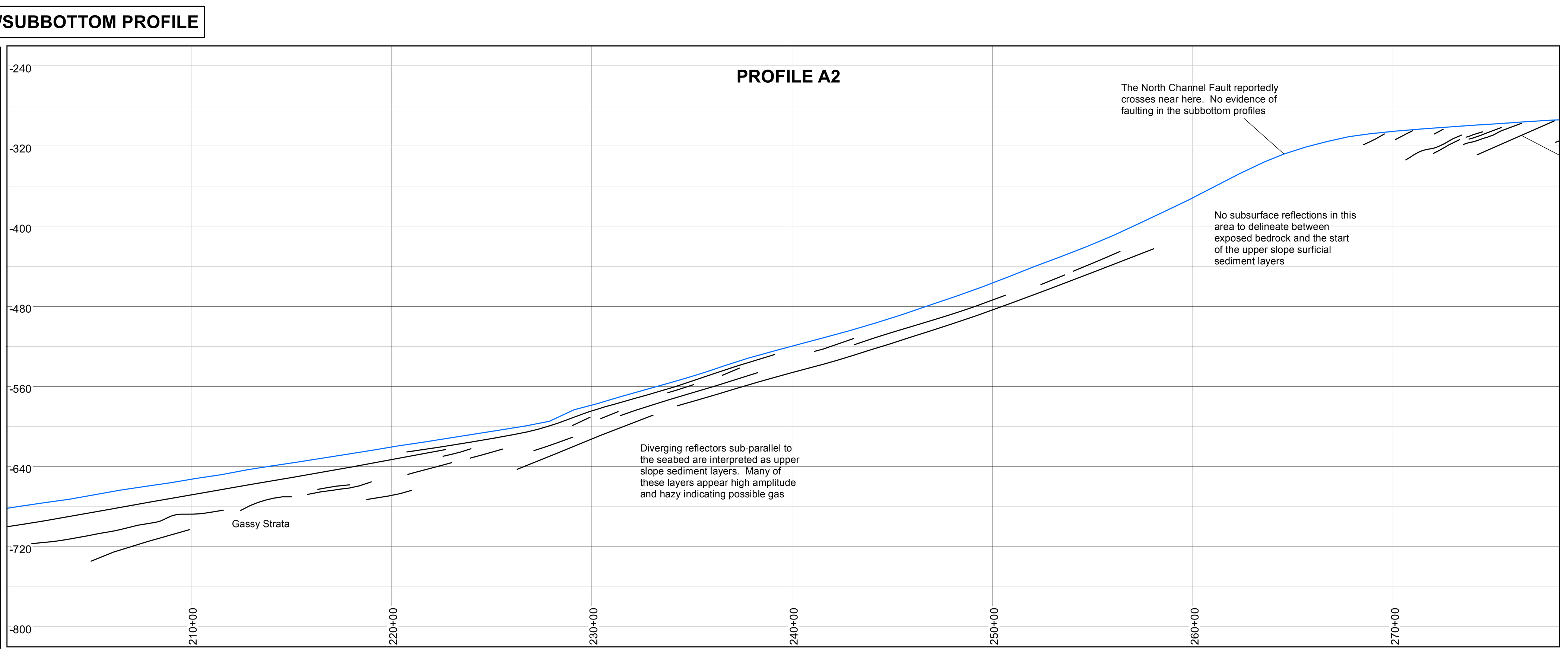


SIDE SCAN SONAR MOSAIC



SEABED/SUBBOTTOM PROFILE





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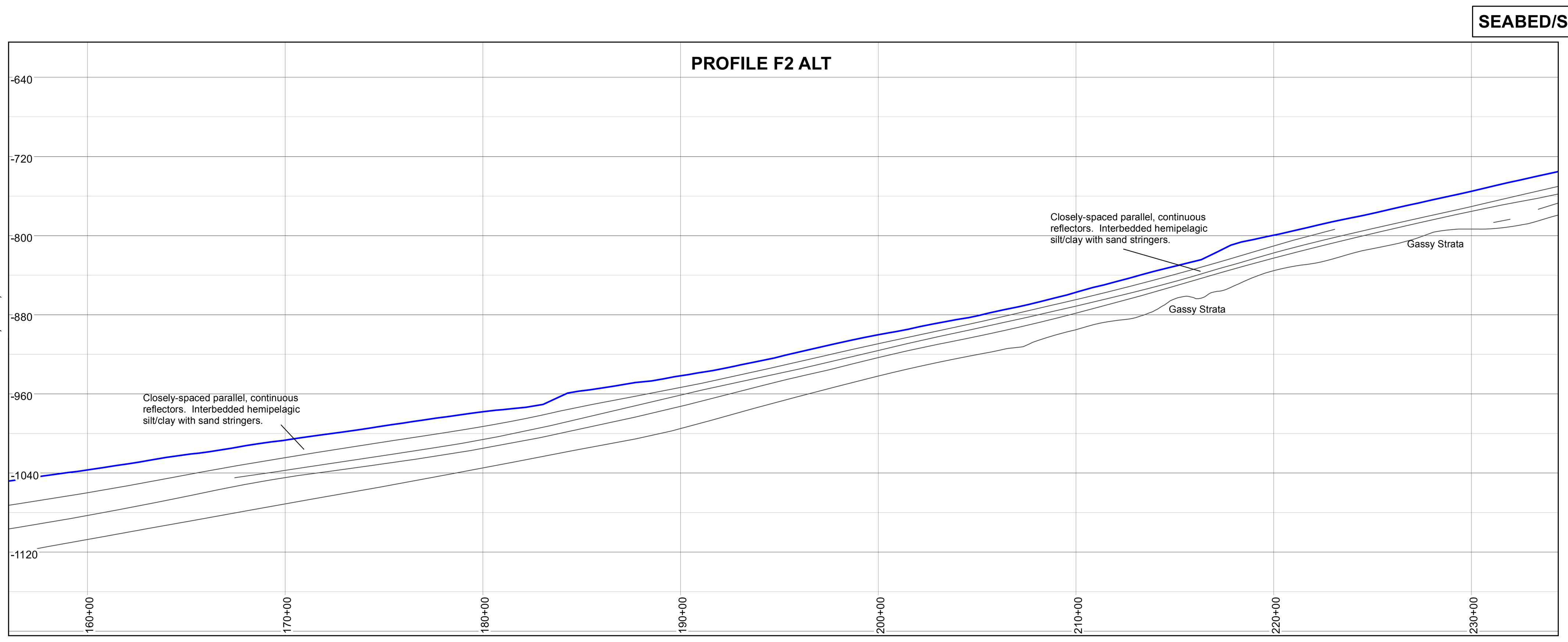

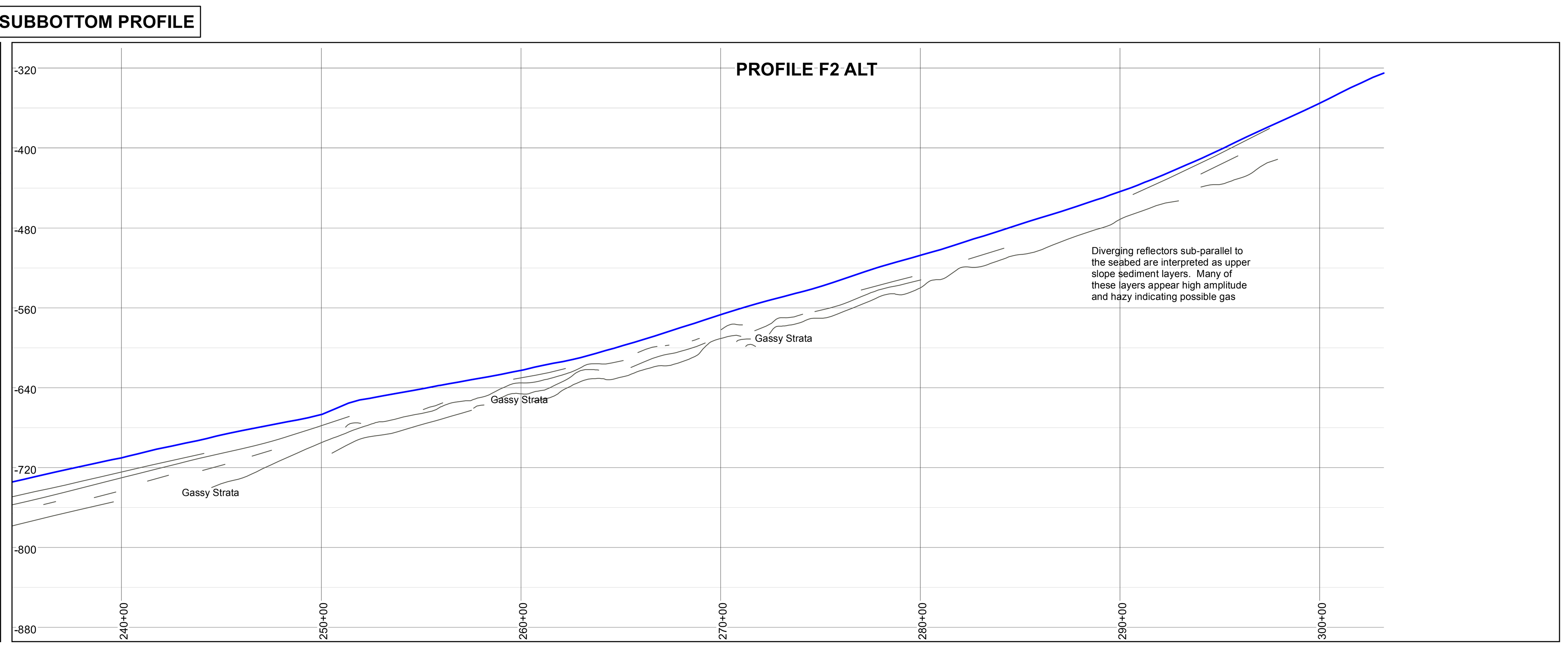

Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- Trackline and Line Number
- Shotpoint and Label

Sediment Isopach
- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure
- Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features
- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

NOTES

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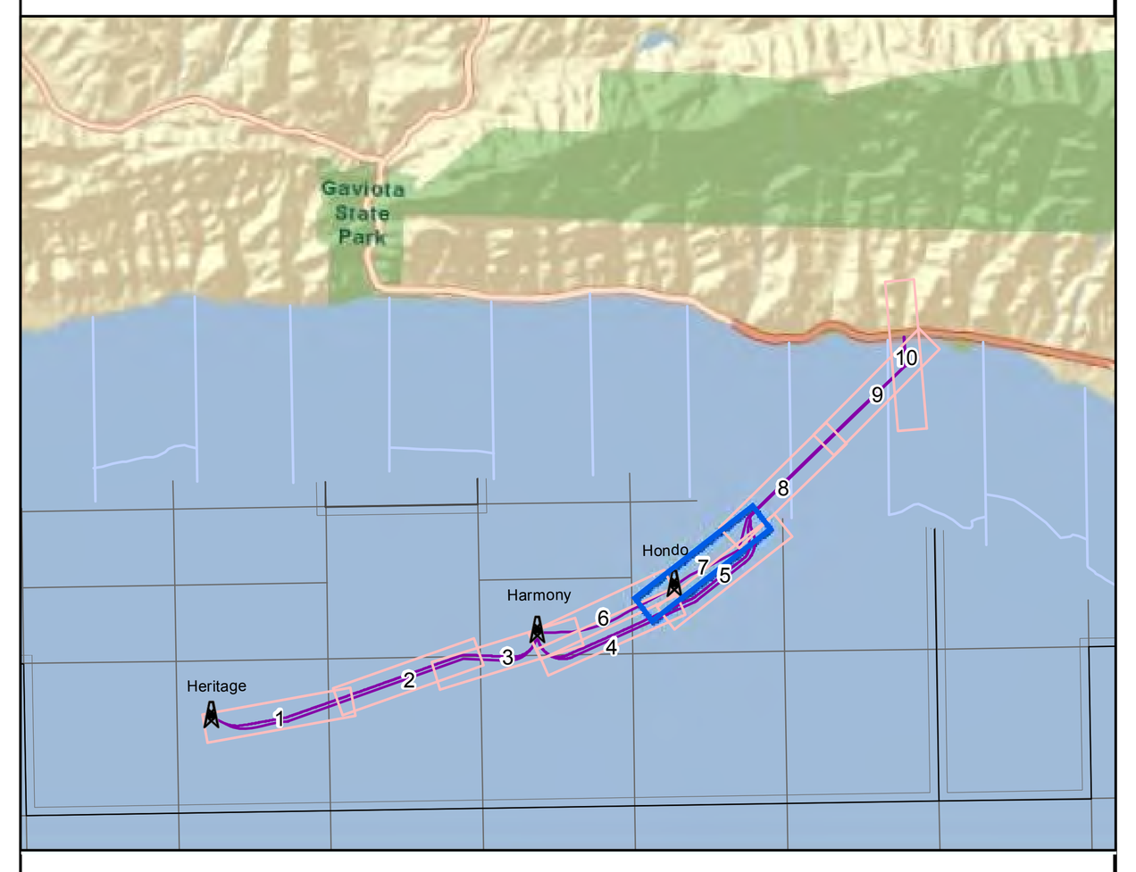
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)



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EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

November 2011
Santa Barbara Channel, California

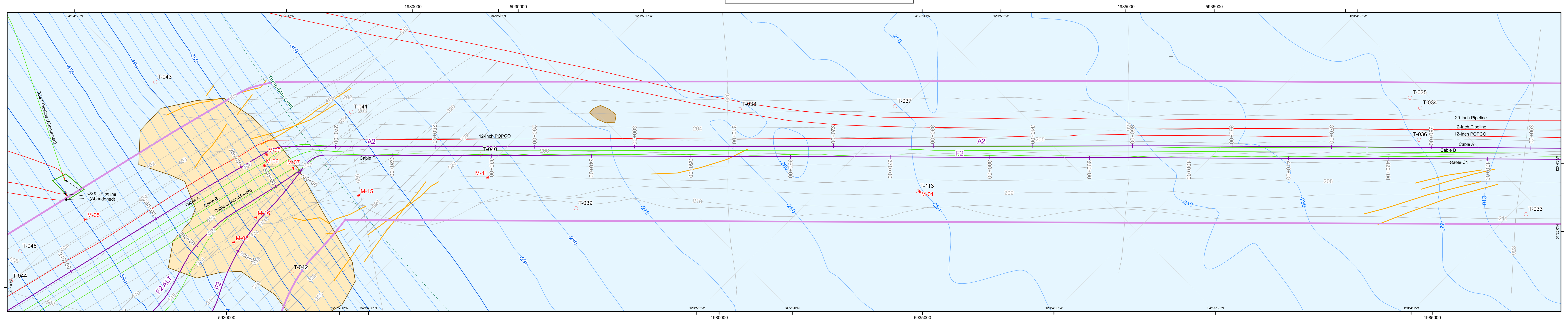
SCALE : 1 in = 400 ft

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

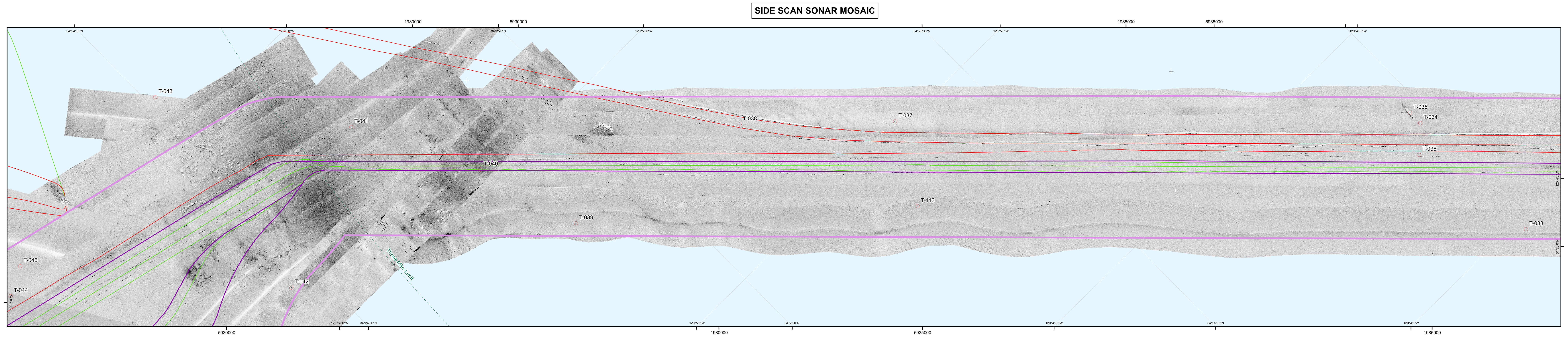
PROJECT NO.: 04.64110024-1G

PLATE NO.: 7 of 10

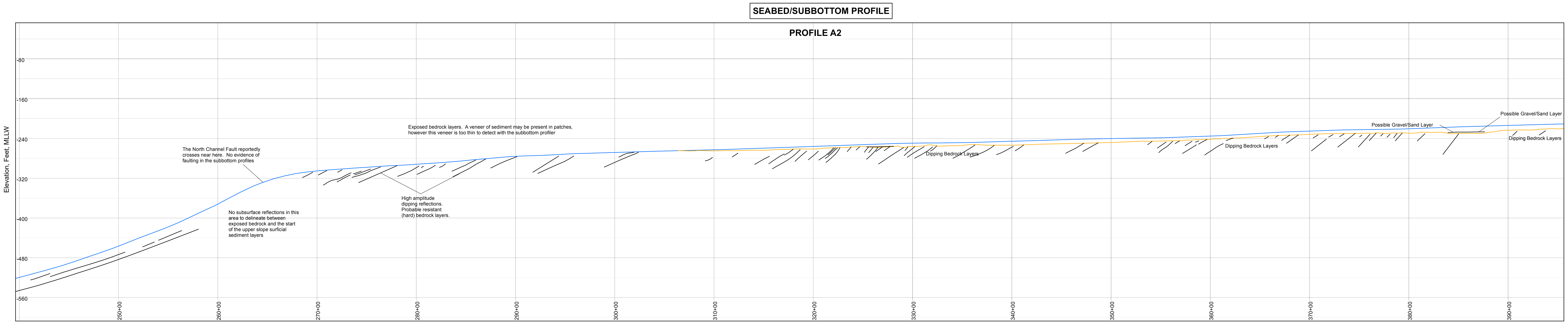
BATHYMETRY AND SEAFLOOR FEATURES



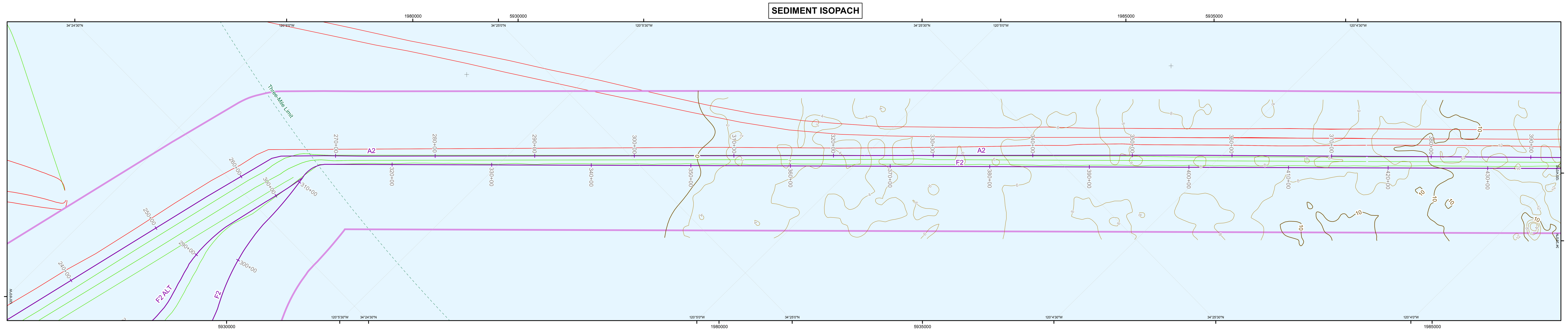
SIDE SCAN SONAR MOSAIC



SEABED/SUBBOTTOM PROFILE



SEDIMENT ISOPACH



Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- 701 — Trackline and Line Number
- 300 — Shotpoint and Label

Sediment Isopach
- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure
- 230+00 — Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features
- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

NOTES

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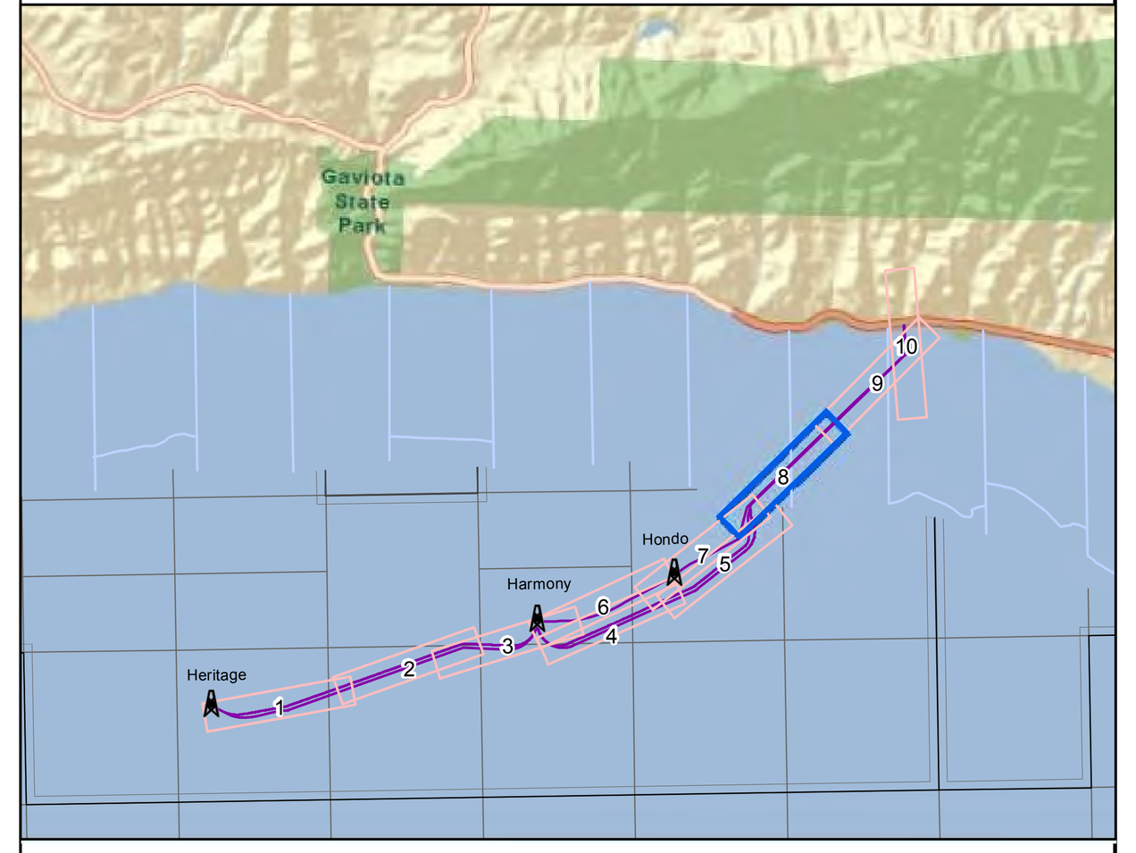
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)



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ExxonMobil

EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

November 2011
Santa Barbara Channel, California

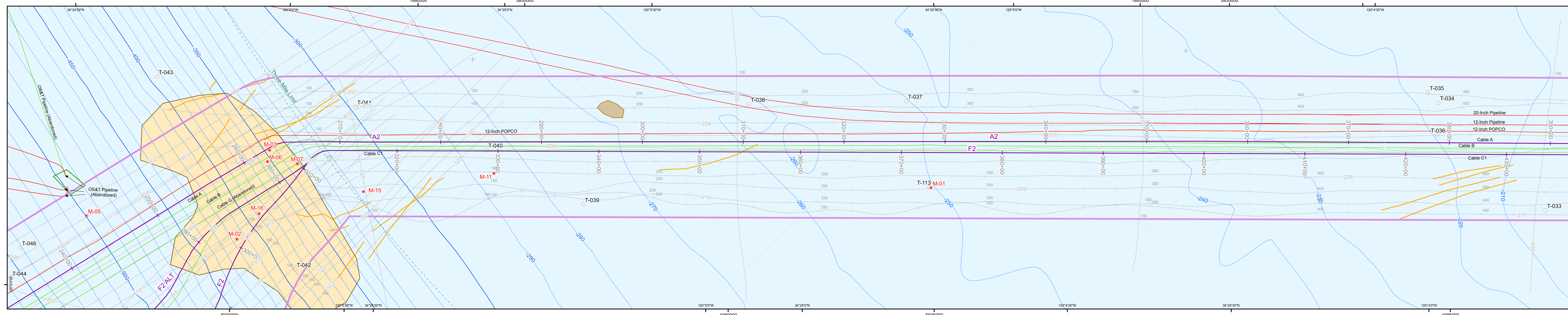
SCALE : 1 in = 400 ft

400 200 0 400 800 1,200 1,600 Feet

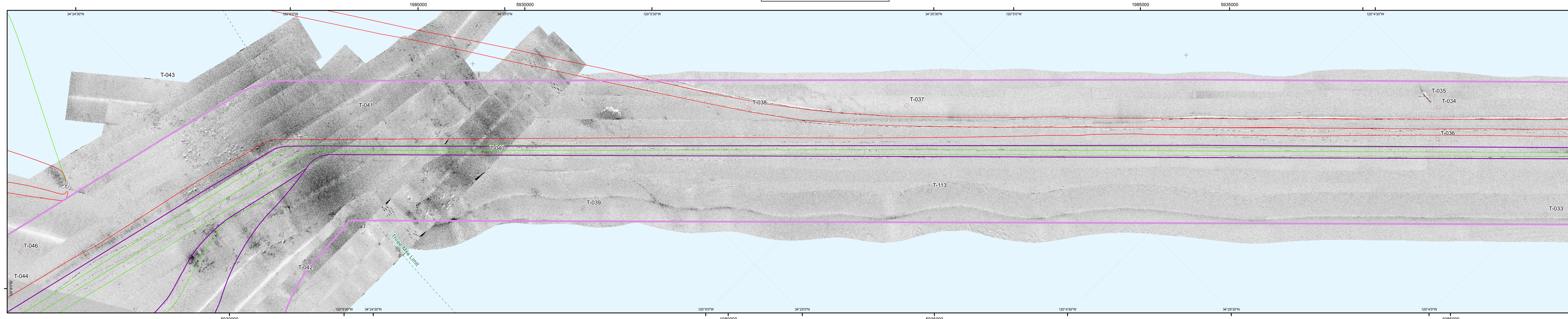
REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

PROJECT NO.: 04.64110024-1H(A) PLATE NO.: **8A of 10**

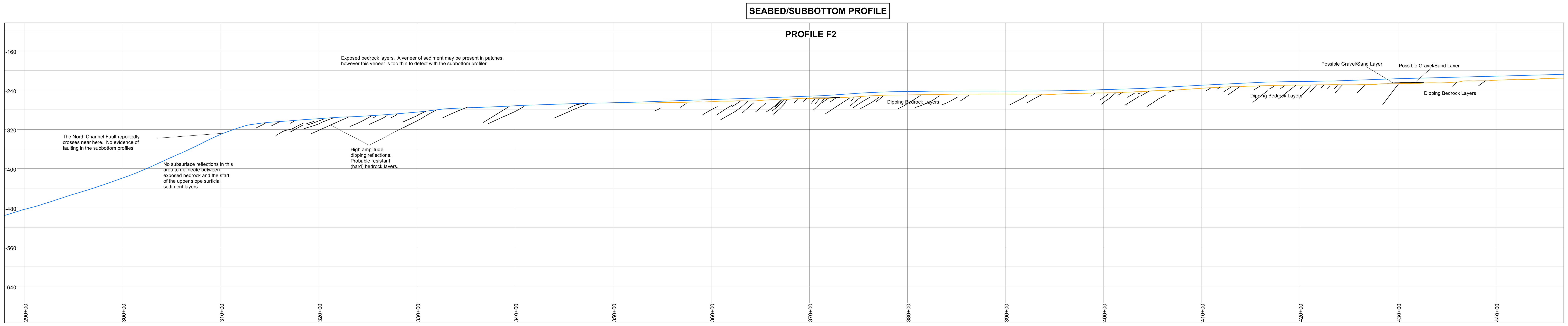
BATHYMETRY AND SEAFLOOR FEATURES



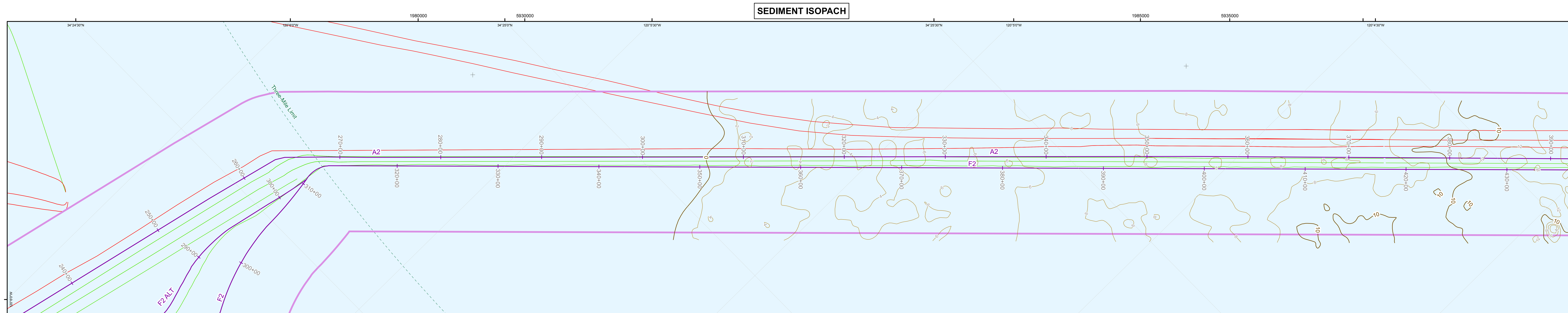
SIDE SCAN SONAR MOSAIC



SEABED/SUBBOTTOM PROFILE



SEDIMENT ISOPACH



Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey

- 701 — Trackline and Line Number
- 300 — Shotpoint and Label

Sediment Isopach

- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure

- 230+00 — Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features

- T-004 — Side Scan Sonar Target with ID
- M-01 — Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)

- Map Extents
- Current Map Extent

Profiles

- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

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Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

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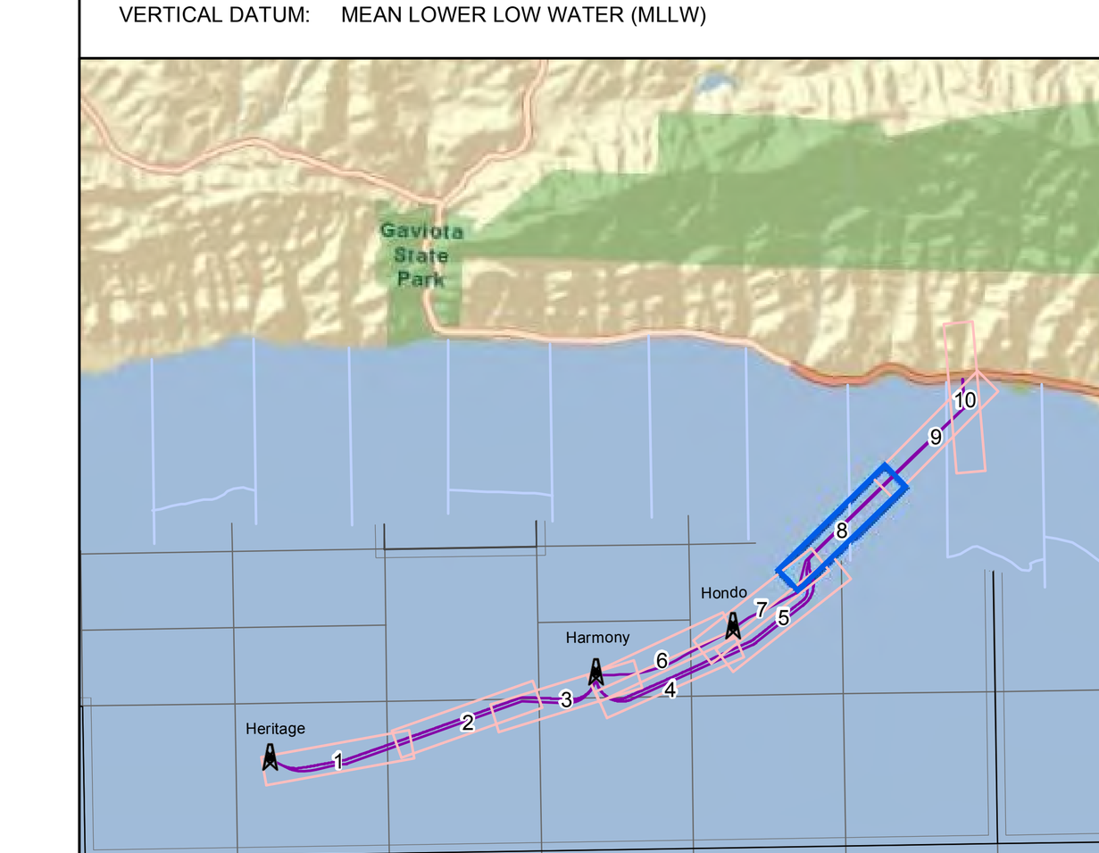
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)



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GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

November 2011
Santa Barbara Channel, California

SCALE : 1 in = 400 ft

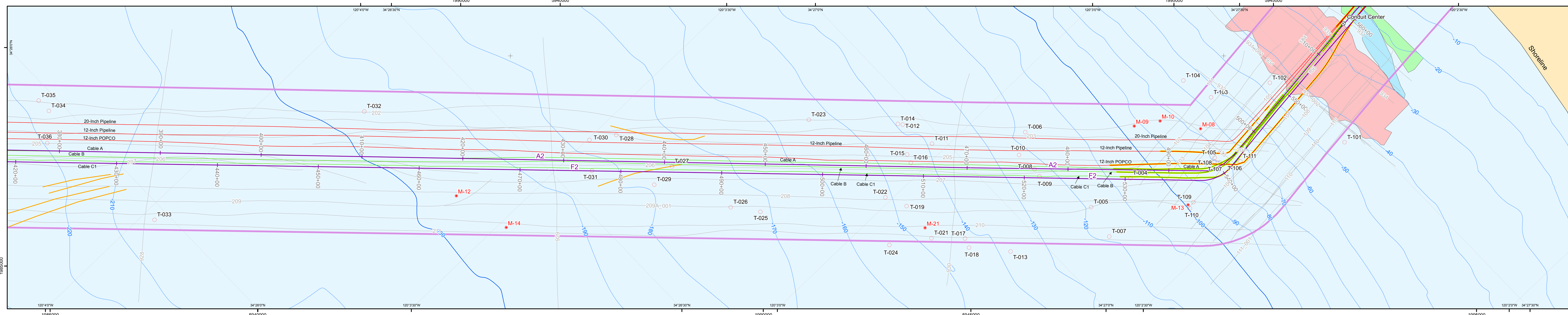
400 200 0 400 800 1,200 1,600 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

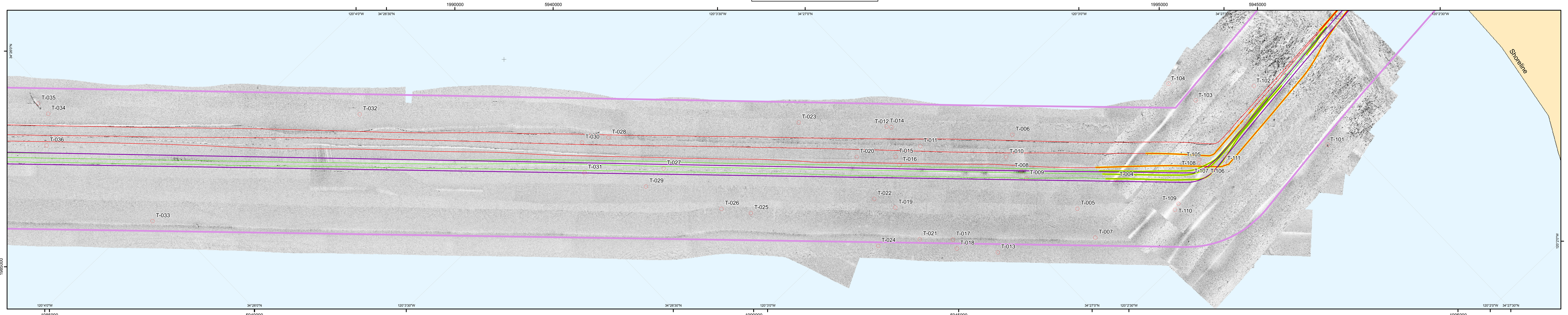
PROJECT NO.: 04.64110024-1H(B)

PLATE NO.: 8B of 10

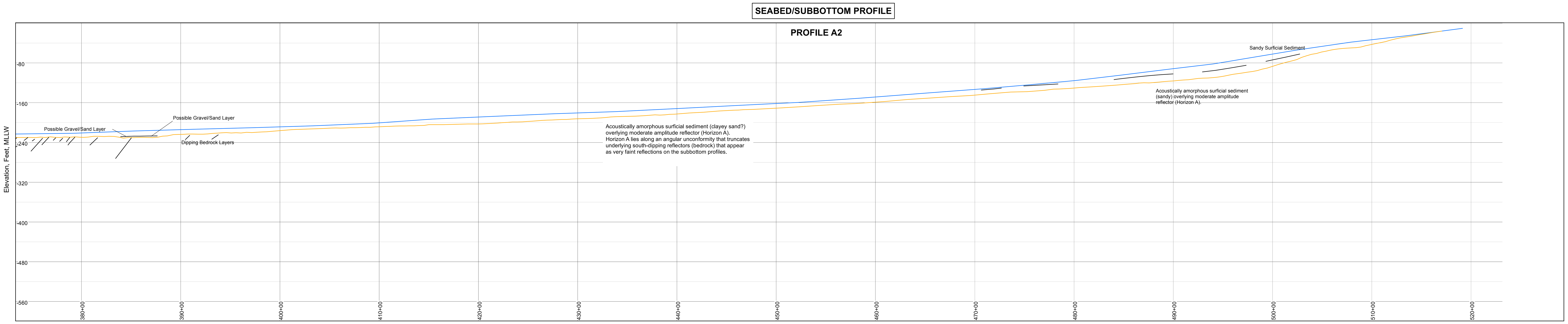
BATHYMETRY AND SEAFLOOR FEATURES



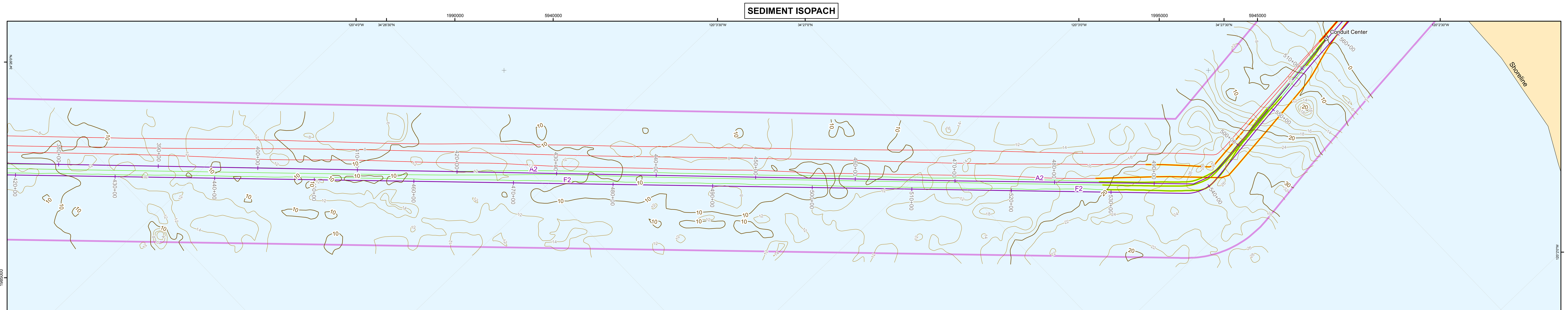
SIDE SCAN SONAR MOSAIC



SEABED/SUBBOTTOM PROFILE



SEDIMENT ISOPACH



Legend

Bathymetry
- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey
- 701 Trackline and Line Number
- 300 Shotpoint and Label

Sediment Isopach
- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure
- 230+00 Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features
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- M-01 Magnetometer Anamolies With ID
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- Area of Kelp
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Map Extents (in Key Map)
- Map Extents
- Current Map Extent

Profiles
- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

NOTES

1. DATA WERE COLLECTED ON SEPTEMBER 9-10, 2011 ABOARD THE M/V DANNY C AND ON SEPTEMBER 17-29, 2011 ABOARD THE M/V TOBY TIDE.

2. BATHYMETRIC CONTOURS ARE MAPPED AT 10 FOOT INTERVALS.

3. BATHYMETRIC CONTOURS SHOWN ARE FROM MBARI (1998) AND NOAA (2001) VERIFIED WITH SINGLE BEAM BATHYMETRY DATA ACQUIRED DURING THIS SURVEY.

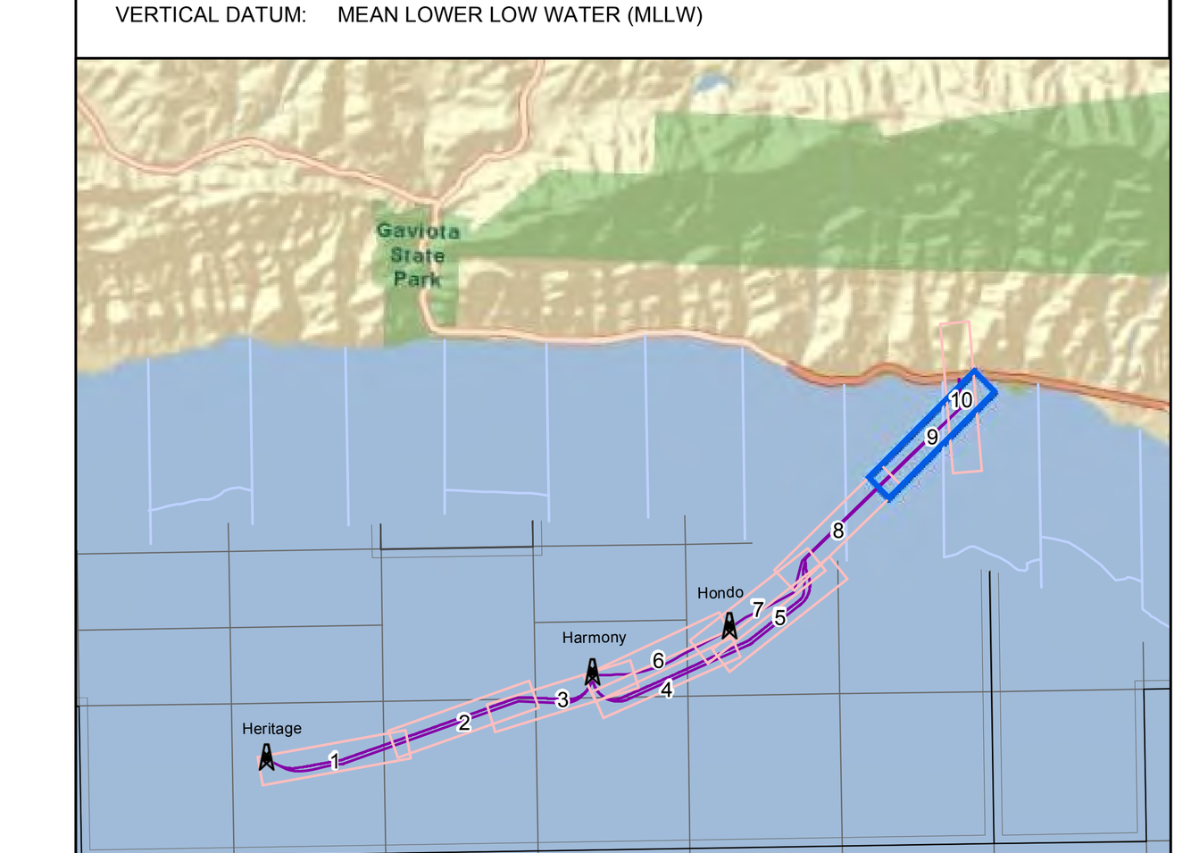
4. EXISTING FEATURES INCLUDING AS-BUILT PIPELINES, CABLE LOCATIONS AND SEAFLOOR FEATURES ARE COMPILED FROM AS-BUILT HISTORICAL SURVEY DATA.

This hydrographic survey was completed under the direction of an ACSM/THSOA, Certified Hydrographer

Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)



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EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

November 2011
Santa Barbara Channel, California

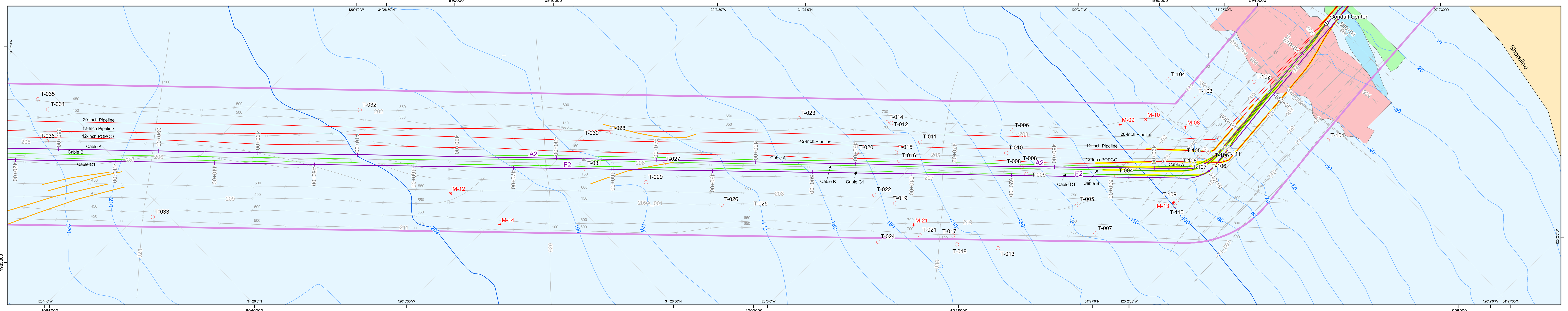
SCALE : 1 in = 400 ft

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

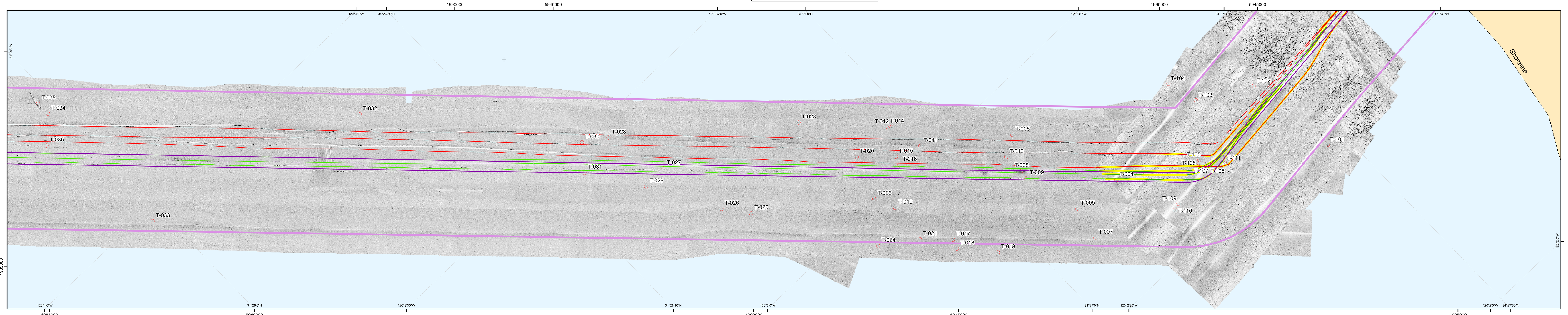
PROJECT NO.: 04.64110024-1I(A)

PLATE NO.: 9A of 10

BATHYMETRY AND SEAFLOOR FEATURES

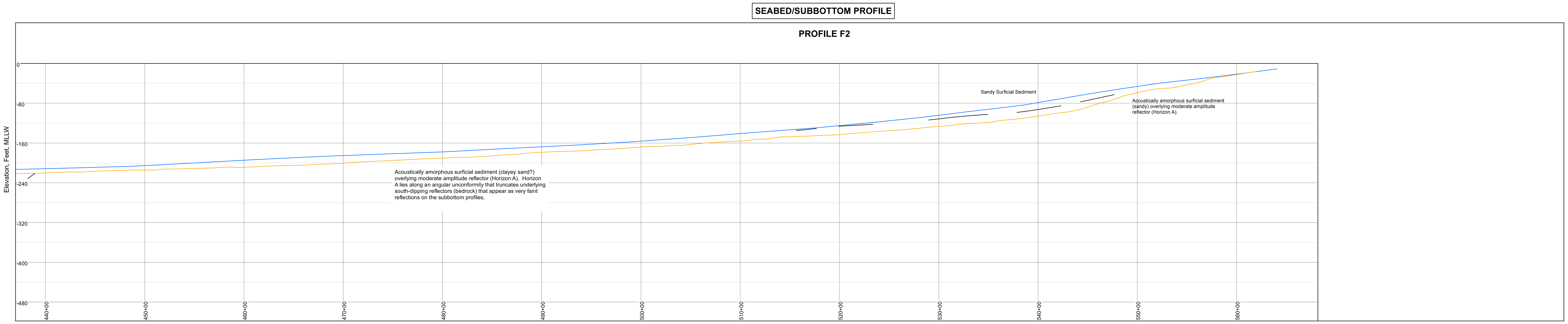


SIDE SCAN SONAR MOSAIC

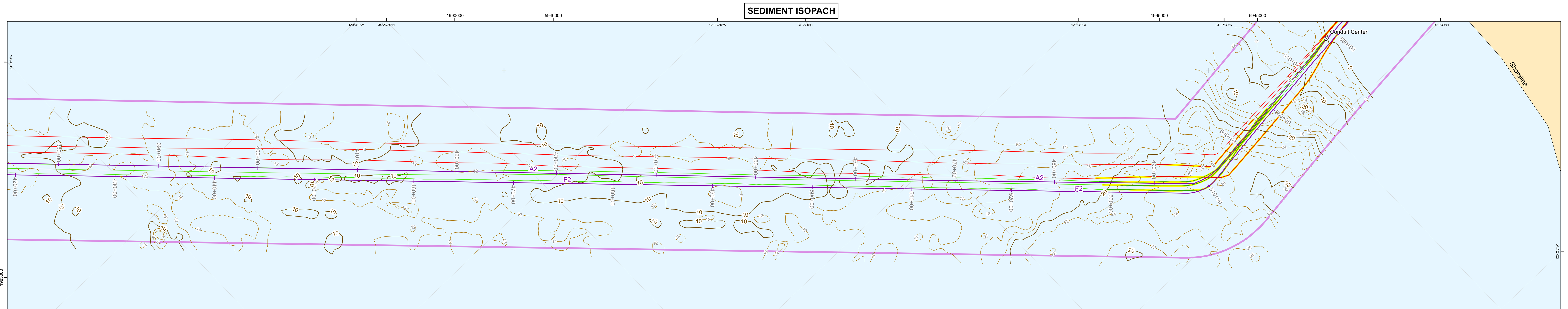


SEABED/SUBBOTTOM PROFILE

PROFILE F2



SEDIMENT ISOPACH



Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey

- 701 Trackline and Line Number
- 300 Shotpoint and Label

Sediment Isopach

- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure

- 230+00 Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features

- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)

- Map Extents
- Current Map Extent

Profiles

- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

NOTES

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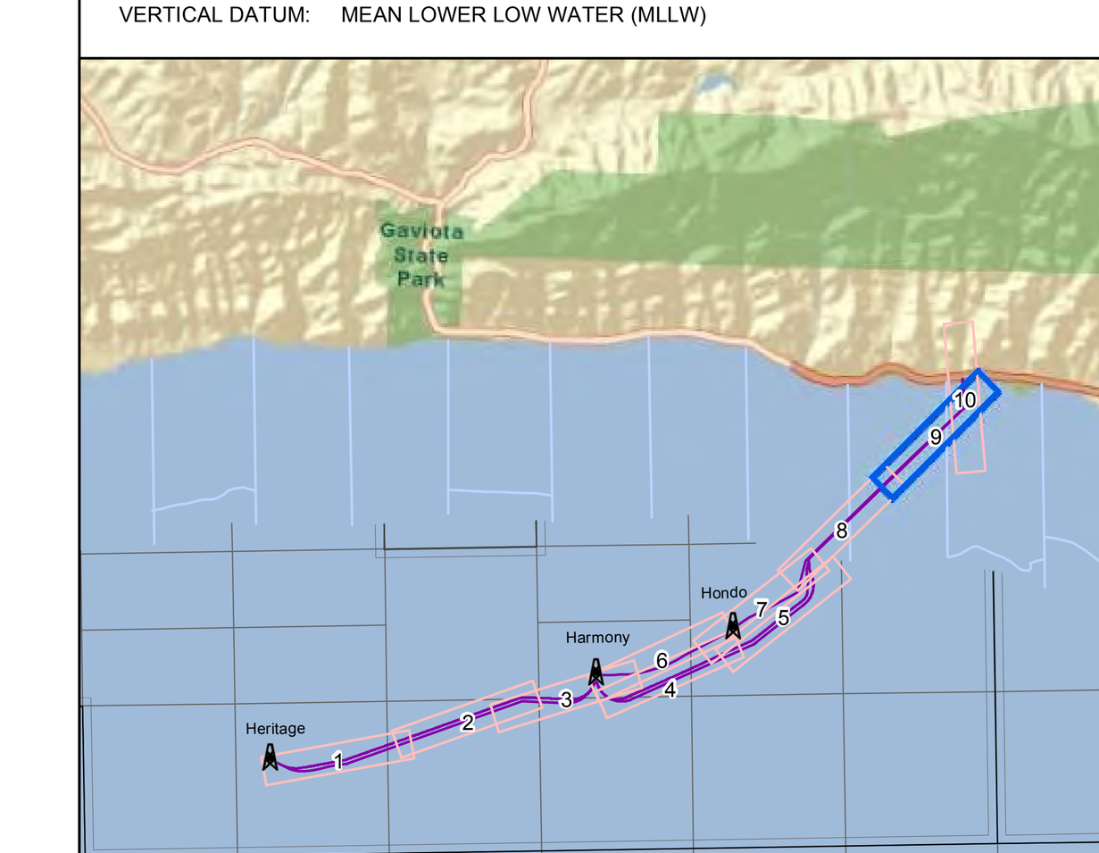
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	US SURVEY FEET
VERTICAL DATUM:	MEAN LOWER LOW WATER (MLLW)



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EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

November 2011
Santa Barbara Channel, California

SCALE : 1 in = 400 ft

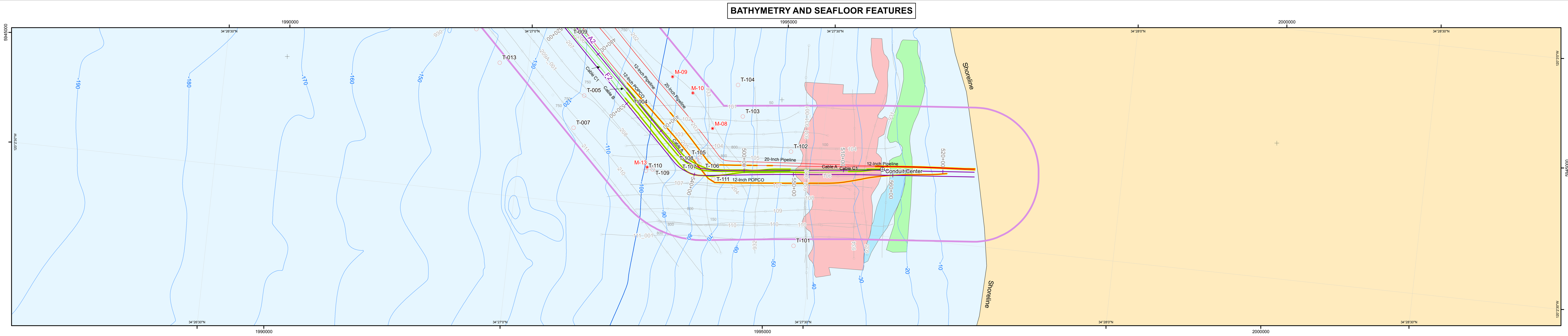
400 200 0 400 800 1,200 1,600 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

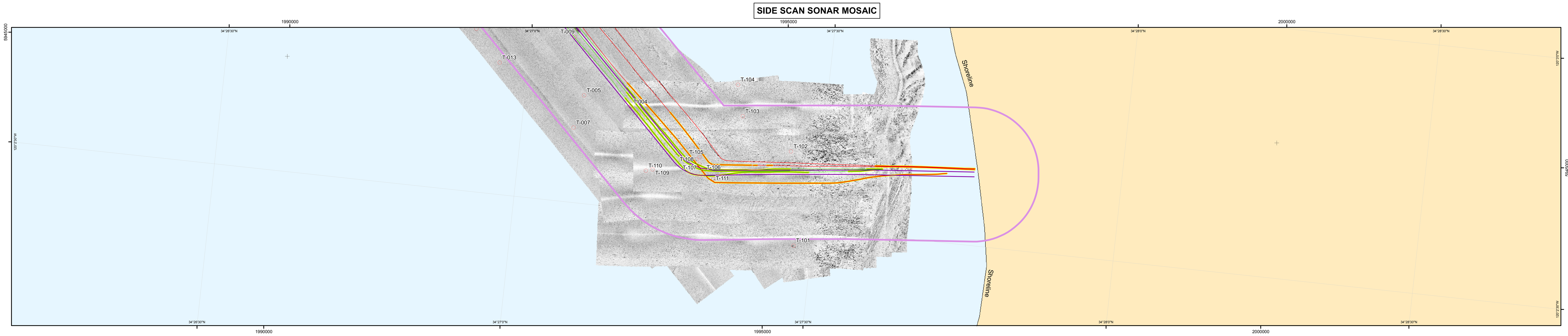
PROJECT NO.: 04.64110024-1I(B)

PLATE NO.: 9B of 10

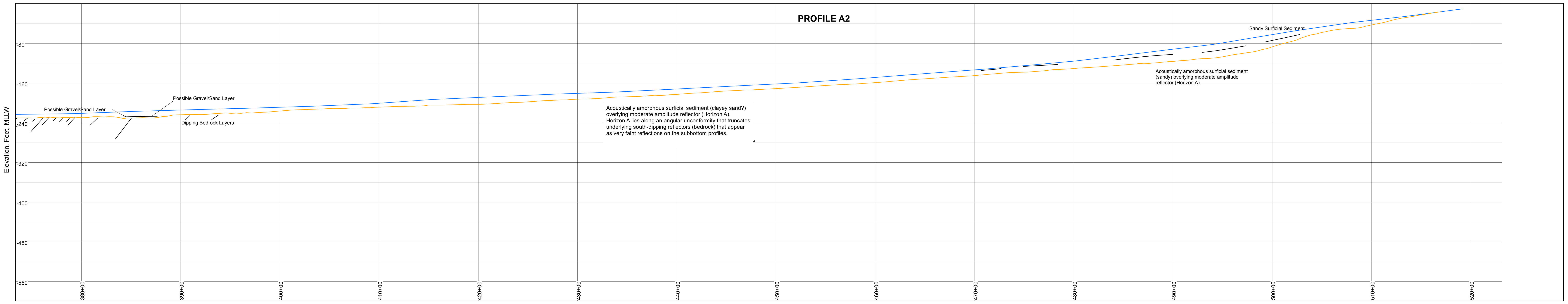
BATHYMETRY AND SEAFLOOR FEATURES



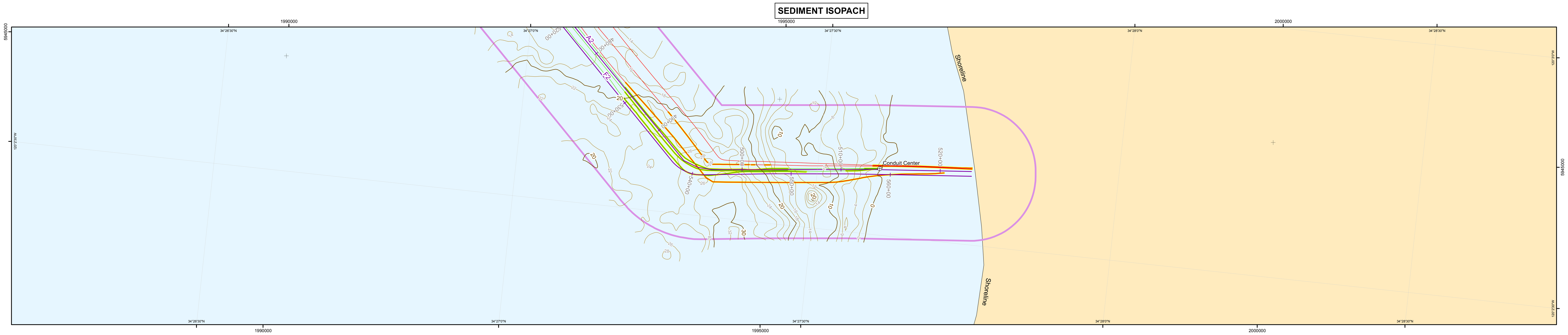
SIDE SCAN SONAR MOSAIC



SEABED/SUBBOTTOM PROFILE



SEDIMENT ISOPACH



Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Geophysical Survey

- 701 Trackline and Line Number
- 300 Shotpoint and Label

Sediment Isopach

- Major Contours- contour interval = 10'
- Minor Contours- contour interval = 2'

Infrastructure

- 230+00 Proposed Cable Route and Stationing
- 650' Buffer Zone
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Mooring System
- Three Mile Limit
- Anchor
- Buoy at Rest
- Platforms

Seafloor Features

- T-004 Side Scan Sonar Target with ID
- M-01 Magnetometer Anamolies With ID
- Abandoned SALM Unit
- Drag Marks
- Area of Escarpment
- Area of Kelp
- Area of Possible Seafloor Vegetation
- Area of Scattered Rock
- Area of Rock Outcropping

Map Extents (in Key Map)

- Map Extents
- Current Map Extent

Profiles

- Seafloor
- Interpreted Features
- Horizon A

Note: All legend items will not appear on all maps.

NOTES

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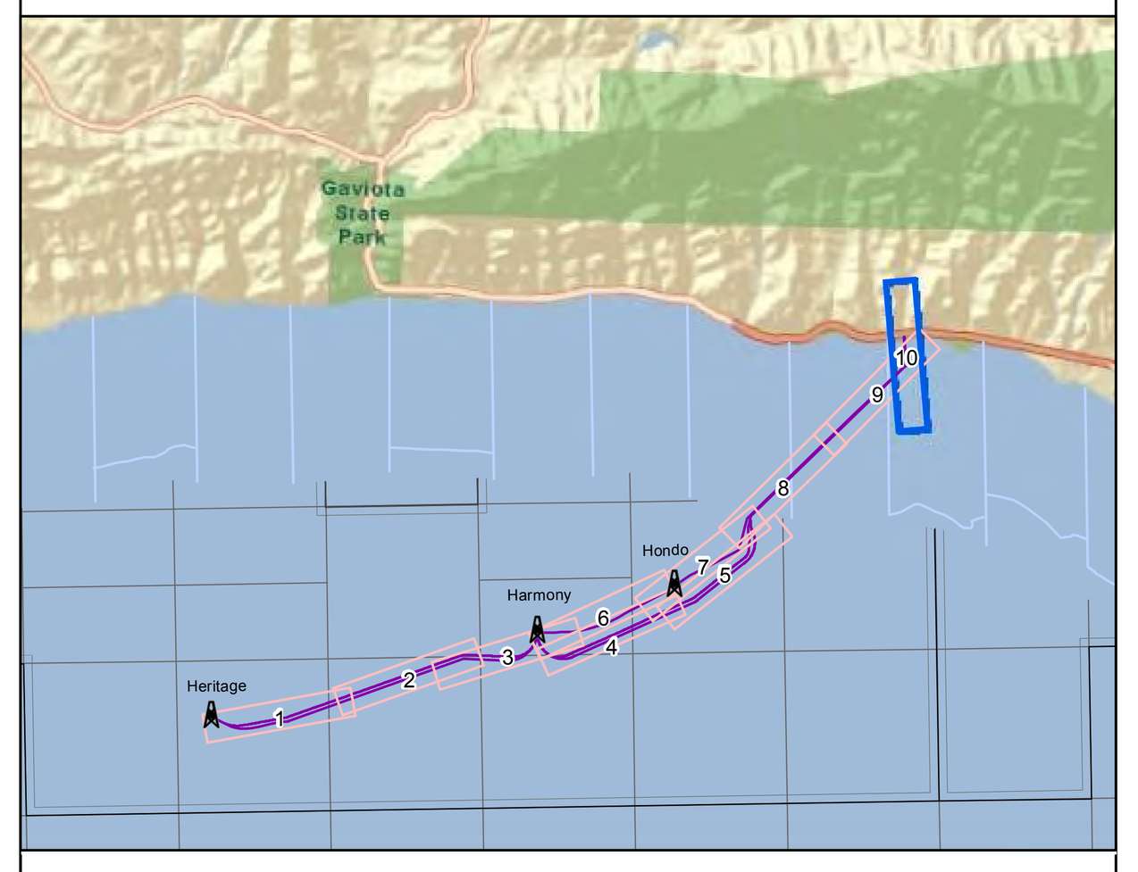
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM: NAD83
PROJECTION: LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE: 5
UNITS: US SURVEY FEET

VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW)



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EXXONMOBIL

GEOPHYSICAL/ARCHAEOLOGICAL GEOHAZARDS SURVEY OF PROPOSED CABLE ROUTES

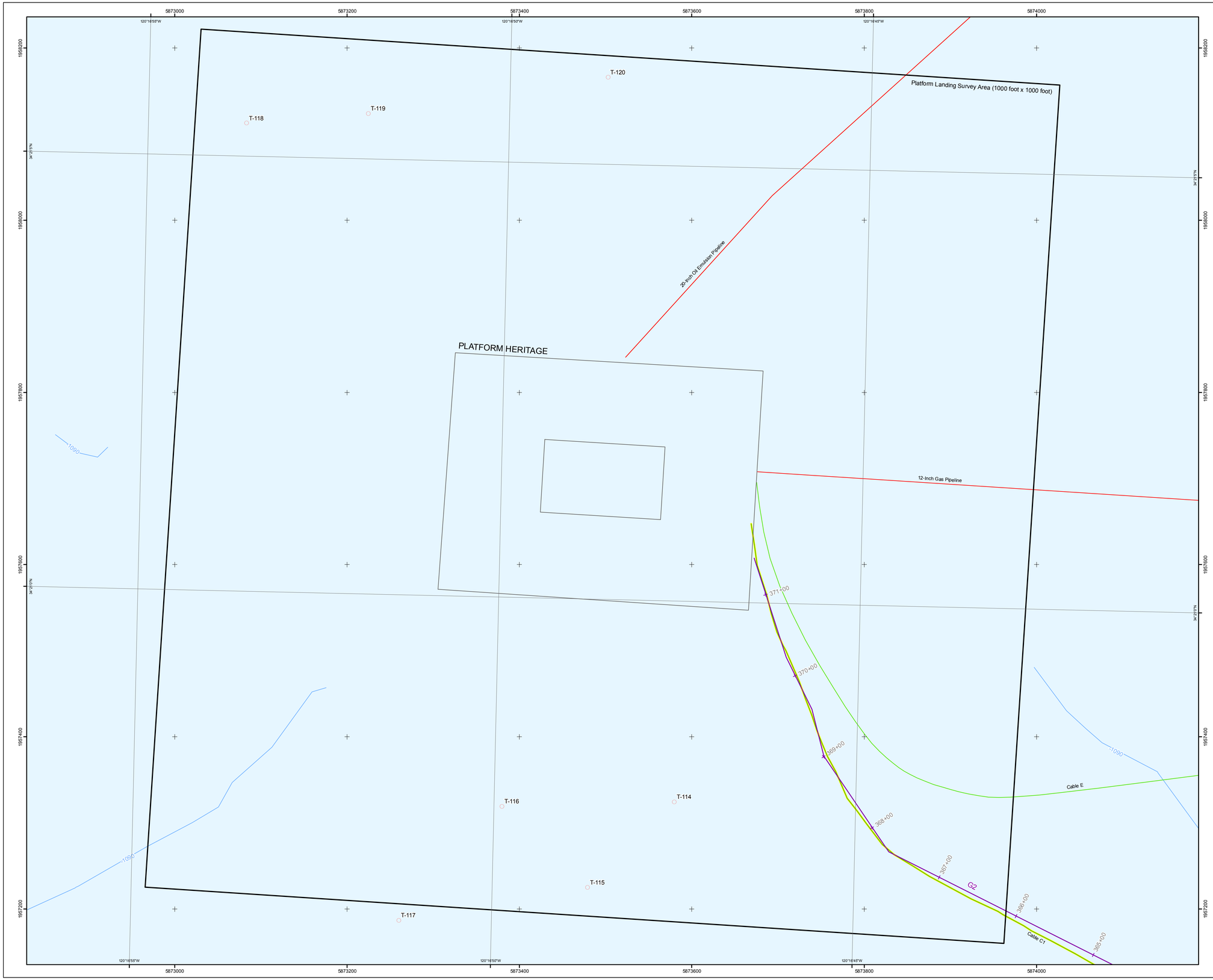
November 2011
Santa Barbara Channel, California

SCALE : 1 in = 400 ft

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Alignment Charts	CBD	CP/AT	ES
2	Dec 2011	Revision Made per ExxonMobil Review	CBD	CP/AT	ES

PROJECT NO.: 04.64110024-1J

PLATE NO.: 10 of 10



Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Seafloor Features

- T-004 Side Scan Sonar Target with ID

Infrastructure

- 230+00 Proposed Cable Route and Stationing
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Platforms

Map Extents (in Key Map)

- Current Map Extent

Note: All legend items will not appear on all maps.

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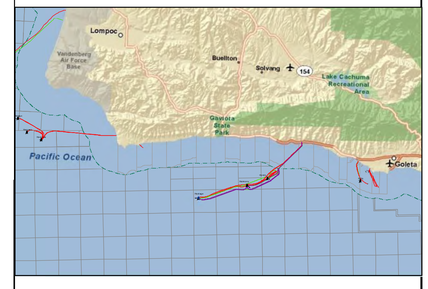
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	U.S. SURVEY FEET

N



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ExxonMobil

EXXONMOBIL

PLATFORM LANDING SURVEY BATHYMETRY AND SEAFLOOR FEATURES

November 2011
Santa Barbara Channel, California

SCALE : 1 inch = 50 feet

50 25 0 50 100 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Platform Landing Survey - Heritage	CLP	CLP	DES
2	Dec 2011	Revision Made per ExxonMobil Review	CLP	CLP	DES

04.64110024-2A CHART NO.: **1A of 2**

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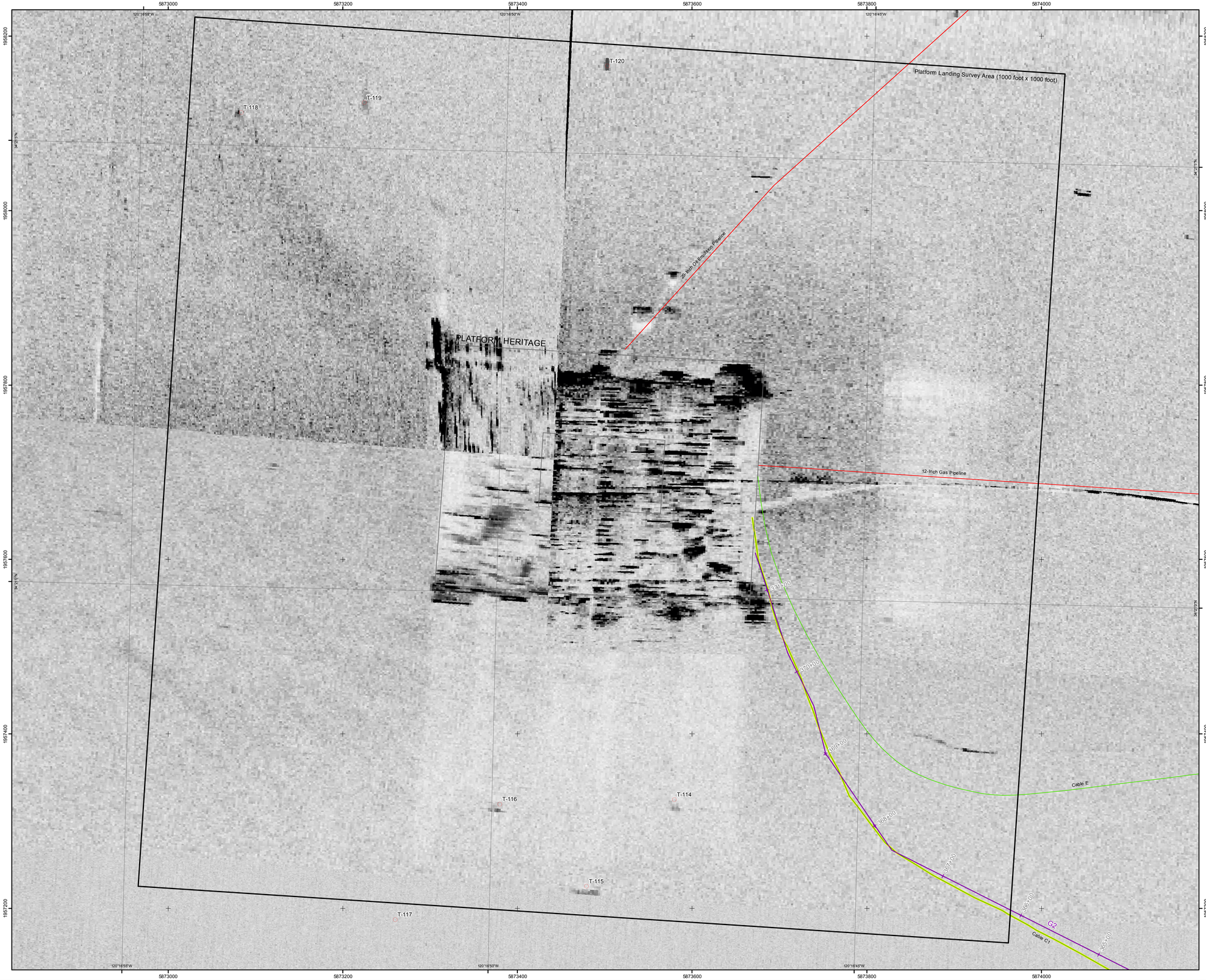

Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Seafloor Features

- T-004 Side Scan Sonar Target with ID

Infrastructure

- 230+00 Proposed Cable Route and Stationing
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Platforms

Map Extents (in Key Map)

- Current Map Extent

Note: All legend items will not appear on all maps.

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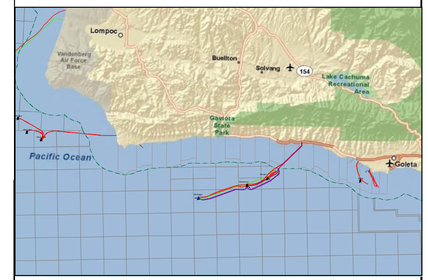
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	U.S. SURVEY FEET

N



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ExxonMobil

EXXONMOBIL

PLATFORM LANDING SURVEY SIDE SCAN SONAR MOSAIC

November 2011
Santa Barbara Channel, California

SCALE : 1 inch = 50 feet

50 25 0 50 100 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Platform Landing Survey - Heritage	CLP	CLP	DES
2	Dec 2011	Revision Made per ExxonMobil Review	CLP	CLP	DES

04.64110024-2B

CHART NO.: **1B of 2**

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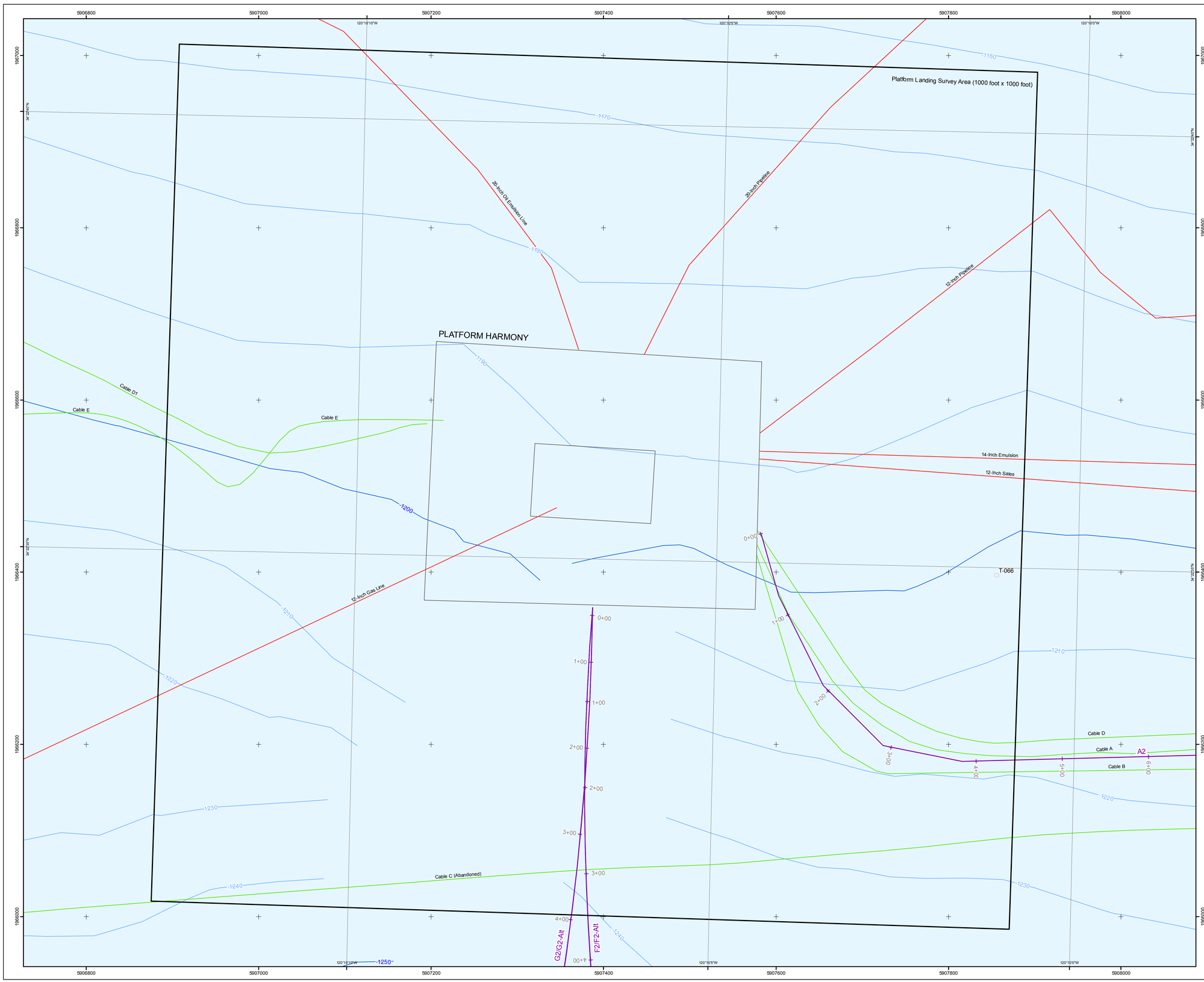

Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Seafloor Features

- T-004 Side Scan Sonar Target with ID

Infrastructure

- 2+00 Proposed Cable Route and Stationing
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Platforms

Map Extents (in Key Map)

- Current Map Extent

Note: All legend items will not appear on all maps.

NOTES

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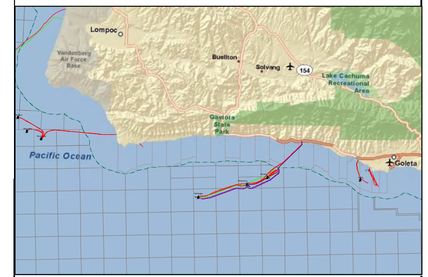
Eddie Stutts, C.H. (224)

GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	U.S. SURVEY FEET

N



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ExxonMobil

EXXONMOBIL

PLATFORM LANDING SURVEY BATHYMETRY AND SEAFLOOR FEATURES

November 2011
Santa Barbara Channel, California

SCALE : 1 inch = 50 feet

50 25 0 50 100 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Platform Landing Survey - Harmony	CLP	CLP	DES
2	Dec 2011	Revision Made per ExxonMobil Review	CLP	CLP	DES

04.64110024-2C CHART NO.: **2A of 2**

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5906800 5907000 5907200 5907400 5907600 5907800 5908000

120°10'10"W 120°10'05"W 120°10'00"W

1967000 1966800 1966600 1966400 1966200 1966000

34°22'50"N

Platform Landing Survey Area (1000 foot x 1000 foot)

PLATFORM HARMONY

20-inch OS Emulsion Line

20-inch Pipeline

12-Inch Pipeline

14-Inch Emulsion

12-Inch Sales

12-Inch Gas Line

Cable D1

Cable E

Cable E

Cable C (Abandoned)

Cable D

Cable A

Cable B

A2

T-066

0+00 1+00 1+00 2+00 2+00 3+00 3+00 4+00 4+00 5+00 5+00 6+00 6+00 7+00 7+00 8+00 8+00 9+00

G2/G2-Alt

F2/F2-Alt

Legend

Bathymetry

- Major Contours- contour interval = 50'
- Minor Contours- contour interval = 10'

Seafloor Features

- T-004 Side Scan Sonar Target with ID

Infrastructure

- 233+00 Proposed Cable Route and Stationing
- Existing Pipeline
- Existing Buried Pipeline
- Existing Power Cable
- Existing Buried Power Cable
- Platforms

Map Extents (in Key Map)

- Current Map Extent

Note: All legend items will not appear on all maps.

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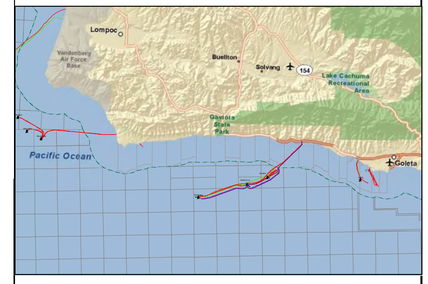
GEODETIC INFORMATION

DATUM:	NAD83
PROJECTION:	LAMBERT CONFORMAL CONIC CALIFORNIA COORDINATE SYSTEM
ZONE:	5
UNITS:	U.S. SURVEY FEET

N



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ExxonMobil

EXXONMOBIL

PLATFORM LANDING SURVEY SIDE SCAN SONAR MOSAIC

November 2011
Santa Barbara Channel, California

SCALE : 1 inch = 50 feet

50 25 0 50 100 Feet

REV:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
1	Nov 2011	Platform Landing Survey - Harmony	CLP	CLP	DES
2	Dec 2011	Revision Made per ExxonMobil Review	CLP	CLP	DES

04.64110024-2D CHART NO.: **2B of 2**

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APPENDIX A - REFERENCES

A.1 PROFESSIONAL LITERATURE REFERENCES

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A.2 MULTIBEAM BATHYMETRY DATASETS

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APPENDIX B - SURVEY FIELD REPORTS

DAILY PROGRESS REPORT

Fugro West Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	1
VESSEL:	Danny C	DATE:	September 7, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 2-4 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Ken Matthews	12	GENERAL CONDITIONS:
MMO	Ray Dewit		
MMO	Jenn Klaib		

TIME	EVENT
0700	OST crane and truck at office. Conducting safety meeting with JSA and lift plan.
0730	lifting Connex box onto truck and loading equipment.
0745	OST departs office
0830	OST arrives at Port Hueneme
0900	Danny C arrives dockside Port Hueneme, conducting lift plan, safety meeting, and JSA
0930	Start mobilization
1000	Welders onsite conducting safety meeting and Hot work permit
1100	OST crane and truck depart Port Hueneme, start welding
1445	Welding completed, welders conducting weld testing
1500	Welders depart vessel
1600	Reterminating Klein cable to winch
1900	Complete reterm, tested ok, depart vessel.

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro West Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	2
VESSEL:	Danny C	DATE:	September 8, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 2-4 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Ken Matthews	12	GENERAL CONDITIONS:
MMO	Ray Dewit		
MMO	Jenn Klaib	12	

TIME	EVENT
0700	Onboard Danny C, continue mobilization
0930	Jennifer Kleib onboard (Padre)
0940	Exxon Supt. Onboard vessel, continue mobilization
1230	Underway for seatrials
1400	Complete seatrials underway to Port Hueneme
1420	Arrive Port Hueneme exchange seamag, secure systems
1515	Danny C underway to Santa Barbara with MMO
1600	shipping out 2 extra mags to SES
1700	Complete logs docs.

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

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4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	3
VESSEL:	Danny C	DATE:	September 9, 2011
LOCATION:	SYU Nearshore	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 2-4 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Ken Matthews	12	GENERAL CONDITIONS:
MMO	Ray Dewit	12	
MMO	Jenn Klaib	12	

TIME	EVENT
0515	Depart Ventura
0600	Arrive at GPL
0630	Exxon swing rope training for FGSI personnel
0715	Training completed
0730	Conducted JSA for pier to boat transfer proceedures
0800	Enroute to Ellwood pier
0815	Onboard Danny C (all personnel)
0820	Underwqy to terminus location
0925	on location near terminus
0930	conducting systems checks and tuning
1030	conducting SVP cast
1145	safety meeting and JSA for systems deployment and recovery conducted
1200	deploying sensors
1235	start survey at line 111
1530	side scan towfish on deck repairing broken connection
1600	continue surveying lines 110,107, 104, 931 with subbottom and echosounder only, will run with
	side scan and mag tomorrow.
1730	complete retermination splice, conducted wet test, test good
1740	all systems on deck underway to Ellwood pier.

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

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Fugro West Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	4
VESSEL:	Danny C	DATE:	September 10, 2011
LOCATION:	SYU Nearshore	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
PARTY CHIEF	Patrick Nissen	10	
SENIOR SURVEYOR	Herb Tovar	10	
ARCHAEOLOGIST	Mark Melancon	10	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	10	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Ken Matthews	10	GENERAL CONDITIONS:
MMO	Ray Dewit	10	
MMO	Jenn Klaib	10	

TIME	EVENT
0630	All personnel arrive at GPL
0700	Offshore transportation JSA and Video conducted with all personnel
0730	Arrive at Ellwood Pier, board Danny C
0740	Underway to worksite, starting all survey systems
0800	Klein popping breaker, due to faulty cable (at splice)
0830	discussing options. Decision made to use kevlar cable for remaining survey lines.
0930	Conducting safety meeting and JSA for new tasks (layingout and marking kevlar cable, deployment
	and recovery activities)
0945	marking kevlar cable in 5 meter increments.
1030	SSS towfish and Magnetometer in the water
1040	commence survey with Mag and SSS only using kevlar cable and manual cable out.
1210	Complete geohazards survey , line run parallel to shoreline and kelp. Extents of survey data 150' N
	of terminus location.
1240	Commence pipeline and cable verification crossings survey.
1330	complete pipeline and cable verification crossings survey lines
1340	Recover towed sensors on deck.
1345	conduct sound velocity cast
1350	Underway to Ellwood pier.
1500	arrive at Ellwood pier, all disembark from Vessel
1515	Danny C departs underway to Santa Barbara

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

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CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	5
VESSEL:	Danny C	DATE:	September 11, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
PARTY CHIEF	Patrick Nissen	4	
SENIOR SURVEYOR	Herb Tovar	8	
ARCHAEOLOGIST	Mark Melancon	8	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	4	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Ken Matthews	4	GENERAL CONDITIONS:
MMO	Ray Dewit	0	
MMO	Jenn Klaib	8	

TIME	EVENT
1300	Personnel onboard Danny C, preparing demobilization activities
1600	All personnel depart vessel, enroute to Ventura office.
1620	Arrive at office, prep equipment for mobilization to Toby Tide
1700	Depart office

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	6
VESSEL:	Danny C/Toby Tide	DATE:	September 12, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	0	
MMO	Jenn Klaib	0	

TIME	EVENT
0800	Arrive Dock 2 Port Hueneme, to Demobe Danny C
0815	Safety meeting with Boat Crew, OST Crane/Rigging Crew, Coastal Welding and Fugro personnel
0830	Safety meeting and planning for demobe activity completed
0835	Hot work permit completed for Danny C
0845	Fire watch below and above deck, begin to cut A-frame free
0855	A-frame removed
0900	Winch removed
0930	Aggreco generators arrive, off loaded and staged
0945	Aggreco delivery person called office and provided fuel filter model numbers
1015	Deck of Danny C restored, welds ground flush
1030	Danny C demobe complete
1053	Toby Tide in postion, and OST crane ready
1100	Safety meeting and review mobilization activity
1130	Lift plan developed
1145	Hot work permit in place with boat captain and fire watch assigned
1245	Break for Lunch
1315	Welders and boat crew removing flat bar that lock in deck board and removing deck boards
1400	Off loading OST trailer with winch
1440	Winch and A-frame staged
1500	Herb releases crane for the day, operator instructed to return at 0700
1520	Herb and Brant depart Port Hueneme, welders still working on deck board fro winch area
1530	Welders completed removing framing for deck boards, welders are packing up for the day
1600	Boat crew finish removing deck boards, Bob Kurtz and Eddie Stutts arrive at dock
1630	Operations secured for the day

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

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Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
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CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	7
VESSEL:	Toby Tide	DATE:	September 13, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	0	
MMO	Jenn Klaib	0	

TIME	EVENT
0640	Arrive onsite
0700	OST Crane crew arrives
0705	Eddie outlines tasks for the day
0710	Gold Coast welders arrive
0735	Safety meeting with Boat crew, OST crane crew, Gold Coast welders and Fugro personnel
0755	Safety meeting completed
0810	Bob Mosher met visited wharfanger office to clear welding and cutting on the dock
0815	Hot work permit in place with boat captian
0820	Crane supporting hydrophone pole for welder to fit up base plate
0900	Bob Kurtz with Exxon arrives onsite
0905	Crane released from hydrophone pole
0915	Bob Mosher discussed the value of having an AED onboard, Mr. Kurtz agrees and calls for a rental
0955	Welder removing stern railing
0958	OST crane having issue with starting crane
1007	Crane back online, starter appeared to have been locked up
1015	Hyro Phone pole mounted
1022	Stern rail removed
1038	A-Frame Set
1040	Bob Kurtz requests to Bob Mosher cargo manifest for wharfanger be completed
1050	Crane lifting deck boards from vessel to dock
1100	Crane operators taking lunch Break
1105	A-Frame being welded down
1115	Mark with Fugro on board, Bob Mosher provides orientation and review of task JSA
1230	Oil Field Electric onboard for generator hook up, JSA developed and safety orientation completed
1405	Crane operations completed
1520	Oil Field Electric completed with power hook up
1700	NDE die penitrant inpsect done on winch and A-frame
1730	Welding Ops completed
1800	Testing Fish
1900	Depart vessel for evening, 0700 start

Party Chief		Approval	

DAILY PROGRESS REPORT

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	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	8
VESSEL:	Toby Tide	DATE:	September 14, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	0	
MMO	Jenn Klaib	0	

TIME	EVENT
0645	Onboard Toby Tide
0715	Bob Kurtz does Marine Mammal Awareness Training for those that have received training
0747	Video completed, Mr Kurtz reviews videos answers question and discusses project scope
0810	Safety meeting help with all hands
0830	Safety meeting completed
0900	Generator start up review by Bob Mosher to Brandt and Mark
0930	Several padeyes for sea fastening are pulling away from deck, have crew release load
1040	Irwin welders arrive, review their JSA and safety site safety concerns
1100	Hot work in place with captian
1130	Padre MMO Jen Klaib onboard, walk through slip and trips JSA and safety topics for the day
1240	Welders welding padeyes for stern safety chains
1245	Bob Mosher stops welding ops, ground clamp place 30" from fuel vent, has welder move to
	location close to work and discusses hazards with welders. HOC card written up
1530	Stern SVP Hydraulic winch moved into area with containment
1545	Welding complete for davit on sigle beam pole starboard side
1639	Fire watch in place below deck for SVP winch welding
1720	Test SVP hydraulics
1745	Welding complete, hot work closed out
1830	Operation secured for the evening, time set for 0630 tomorrow

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

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4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	9
VESSEL:	Toby Tide	DATE:	September 15, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-3 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	
MMO	Jenn Klaib	12	

TIME	EVENT
0630	Onboard Toby Tide
0645	Vessel oreintation by captain and all of project team
0710	Safety meeting, opereation overview, Jen Klaib discuss Marine mammal awareness
0730	Setting up sigle beam pole for starboard mount
0844	Walk though launch and recovery sequence
0900	Wet testing fish
0950	Recover fish, recovery difficult do to attitude of fish nose up
1015	Eye bolt being pick up to help to change attitude of fish for ease in recovery with hand line off nose
1110	Performing launch and recovery with eyebolt installed
1130	Launch and recovery plan agreed on by team, JSA will be developed
1140	Mains fired off for departure toward Hondo
1147	Vessel underway
1230	JSA developed for launch and recovery
1655	on location in approximately 200' water depth, approx. 3 miles north of platform hondo
1715	conducted SVP cast
1730	placed beacon on bottom, start USBL calibration
1900	complete calibration recover beacon and raise hydrophone pole.
1905	underway to Hondo mooring
1725	tied up to Hondo mooring for the evening.

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

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Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	10
VESSEL:	Toby Tide	DATE:	September 16, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 4-6 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	Overcast
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for launch and recovery discussed.
0700	Vessel man overboard drill conducted
0710	Underway to 90' water depth following centerline checking for existing crabpots within the survey
	area.
0740	Completed suveillance along centerline for crab pots. 3 pots located and positions taken.
0745	underway to USBL location
0753	Beacon on bottom for calibration
0800	start USBL calibration
1145	Retrieve calibration beacon, underway to start survey in 90' water depth
1300	Deploy towfish, hydrophone pole, and single beam pole
1330	Towfish on deck changing beacon location.
1400	towfish missing fin, arranging delivery from ventura office.
1500	underway to Ellwood to meet crew boat
1530	fins arrive at GPL
1645	Received fins from GPL, installed onto towfish
1700	launched towfish, sidescan, subbottom, and mag tested ok
1830	tied up to mooring at Hondo, secure ops for evening

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	11
VESSEL:	Toby Tide	DATE:	September 17, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours
ONSITE PROJECT MANAGER	Eddie Stutts	12
PARTY CHIEF	Patrick Nissen	12
SENIOR SURVEYOR	Herb Tovar	12
ARCHAEOLOGIST	Mark Melancon	12
GEOPHYSICAL TECH	Brandt Broussard	12
SAFETY REPRESENTATIVE	Bob Mosher	12
MMO	Patrick Cook	12
MMO	Jenn Klaib	12

HEALTH AND SAFETY:
Under rated sheave being used on hydrophone pole. changed out with proper rated sheave and shortened safety chain. Added safety line to sb pole.

WEATHER: Winds SE 8-10 kts
Seas and Swells W 4-6 feet

GENERAL CONDITIONS:
Overcast

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for launch and recovery, and pole deployment discussed.
0635	Underway to SOL 201
0715	Replacing sheave on hydrophone pole and shortened chain.
0730	Lowering Single beam pole, found to be bent from buoy hitting against pole yesterday evening.
0750	Drilling lock hole in single beam pole/mount to prevent from falling out. Transducer rubbing
	against side of vessel due bent pole. Sliding pole out board so as to clear hull.
0830	Single beam pole and hydrophone pole down . Underway to SOL
0850	Towfish in the water
0947	Start of Line 201
1047	towfish caught crab pot #53349. towfish at surface released crab pot.
1107	resumed survey on 201A.
1122	end of line 201A
1140	lost communications with towfish. Winching in
1145	Towfish on deck. Check out towfish to resolve issue.
1200	determined that a cable splice will be required.
1230	start splincing tow cable. Checking USBL beacons and calibration.
1400	replaced beacon trickle charge cable on towfish. (found to be shorted out) (pin broken on demo
	beacon from ses)
1630	completed splice checking out system. Splice block created and requires curing for 12 hours.
1645	systems check ok, continue with USBL checks.
1745	complete deck ops for day, recovering single beam pole and hydrophone pole.
1815	underway to Hondo buoy
1830	tied up to mooring at Hondo, secure ops for evening 7 line kilometers collected today

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	12
VESSEL:	Toby Tide	DATE:	September 18, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	clear with some fog in the morning
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for launch and recovery, and pole deployment discussed.
0635	Underway to SOL 211
0815	Towfish in the water
0837	Start surveying line 211-A
0847	Abort line 211-A due to vessel 40 meters off runline.
0855	lost communications with towfish. Winching in
0900	Conducting diagnostics on DS2000 system.
0910	Changing out processors
0935	Backup processor online
0950	lost communications with towfish. Contacting equipment manufacture for technical support.
1010	disconnected trickle charge cable to towfish and put back in water.
1020	lost communications again, recovery towfish
1057	Towfish on deck, replacing with backup towfish.
1204	backup towfish in the water, underway to line 211-B
1231	Start surveying line 211-B
1826	End surveying line 208
1835	Towfish on deck
1850	Hydrophone poles raised
1900	Underway to Hondo mooring.
1930	Tied up at Hondo mooring
1935	Checking and backing up data acquired today.
	35 line kilometers collected today

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	13
VESSEL:	Toby Tide	DATE:	September 19, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	clear with some fog in the morning
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for launch and recovery, and pole deployment discussed.
0635	Underway to start survey
0700	lowering poles in the water, conducting SVP
0735	towfish in water
0747	Start surveying line 209
0829	Abort/offline to avoid crab pot located online
0900	Crab pot line caught on towfish cable, recovering towfish to remove crab pot line.
0910	Crab pot line removed, towfish in water, underway to start lines from 300' water depth to 626'
	water depth.
1250	Magnetometer not operating properly, start towfish recovery.
1300	towfish on deck, trouble shooting
1420	towfish in water, magnetometer operating properly
1430	Online surveying line 314
1810	vessel making very sharp turns, (10 Degrees rudder or more) towfish diving unable to bring in cable due to
	cable due to wire angle (leading sharply off to port) had vessel speed up to raise fish off
	bottom (speed up to 5 knots).
1815	Magnetometer not operating properly, (water in housing error) start towfish recovery.
1830	towfish on deck, and poles raised.
1835	underway to Hondo mooring.
1900	arrive at mooring, backing up data and checking/trouble shooting magnetometer.

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	14
VESSEL:	Toby Tide	DATE:	September 20, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	clear with some fog in the morning
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for launch and recovery, and pole deployment discussed.
0650	complete safety meeting, start troublshooting magnetometer to towfish
0700	lowering poles in the water, conducting SVP
0830	underway to start of line 530, unable to resolve magnetometer issues, proceeding to run lines
	not requiring magnetometer data
0855	Poles down
0911	Tow fish in water underway to start of line 530
0935	start survey line 530 sss/sb and single beam
1820	end survey day at line 601
1835	tow fish on deck, raising poles
1845	poles raised, conducting SVP
1855	Complete SVP, underway to Hondo mooring.
1915	Arrive at Hondo mooring

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	15
VESSEL:	Toby Tide	DATE:	September 21, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	15	Near miss recorded, vessel engaged engines astern
PARTY CHIEF	Patrick Nissen	15	while recovering towfish
SENIOR SURVEYOR	Herb Tovar	15	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts
GEOPHYSICAL TECH	Brandt Broussard	15	Seas and Swells W 2-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	15	GENERAL CONDITIONS:
MMO	Patrick Cook	12	clear with some fog in the morning
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for back deck operations.
0650	complete safety meeting, standing by at platform Hondo to take on vessel crew.
0725	offload vessel personnel to platform hondo, start testing magnetometer
0800	conducting svp cast
0815	complete SVP cast, underway to pick up vessel personnel
0835	vessel personnl onboard, underway to start survey line 522
0915	lowering poles in the water
0941	Porpoise spotted 100' off starboard side, standing by to launch towfish
0950	cleared to launch and activate towfish
0955	towfish in the water underway to line 522
1430	winch remote not operating, abort line, bringing in cable.
1530	towfish on deck, repairing winch remote
1600	remote repaired, underway to start of line
1620	towfish in the water underway to line 718, unable to ramp up due to sea lion in close proximity
1625	created a mangement of change for operating winch on deck
1640	Surveying online 718
1700	winch remote not operating, P. Nissen operating winch on deck
1743	end survey line 718.
1800	Towfish on deck, all stop raising poles.
1815	poles raised, conduct SVP cast
1830	underway to Hondo Mooring
1900	tied up to mooring can, magnetometer repaired. Replaced SES power/communication module
	in mag fish with fugro module., Continue working on winch
2130	Possibly resolved problem with winch will change out local control to remote tomorrow.

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

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CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	16
VESSEL:	Toby Tide	DATE:	September 22, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	13	
PARTY CHIEF	Patrick Nissen	13	
SENIOR SURVEYOR	Herb Tovar	13	
ARCHAEOLOGIST	Mark Melancon	13	WEATHER: Winds SE 8-10 kts to NW 10-15 kts.
GEOPHYSICAL TECH	Brandt Broussard	13	Seas and Swells W 2-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	fog in the morning wind in the afternoon
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for back deck operations.
0650	complete safety meeting, underway to Harmony to start survey lines.
0750	winch remote repaired (swapped out local unit to remote) both options functional
0820	lowering poles in the water
0830	towfish in the water
0853	start survey line 711 running towards Heritage
1256	Winch remote non operational, notifiying vendor. Operating winch from on deck
1300	DT Marine personnel advised to turn voltage on power supply to 13-15 volts
1830	End survey at line 707
1855	towfish on deck, raising poles
1900	poles raised underway to mooring.
1940	arrive at mooring, checking data coverage, quality and backing up.
2000	end survey day

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	17
VESSEL:	Toby Tide	DATE:	September 23, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	Job site safety audit conducted. Incident report completed
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds SE 8-10 kts to NW 10-15 kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	fog in the morning wind in the afternoon
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for back deck operations.
0650	complete safety meeting, refueling main generator 60 gallons. Increased voltage to remote
	on power supply at winch.
0735	alongside Platform Hondo taking on supplies and sending in DS2000 electronics bottle.
0745	offloading trash bins to Platform Hondo.
0752	Underway to start line 712
0818	Onlocation lowering poles
0835	poles down, towfish in the water.
0900	start survey at line 710
1853	end of survey line 508
1900	Prior to recovering towfish on deck, towfish was raised out of water before deck personnel were
	ready for full recovery. Tow fish hits stern of vessel while swinging out of water. Tow arm bent
	broken cable from ore beacon to transducer, and mild fiberglass damage incurred. Towfish was
	checked and appeared to be fully operational.
1915	towfish on deck replacing tow arm and beacon. Incident report completed.
2000	secured from survey operations

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	18
VESSEL:	Toby Tide	DATE:	September 24, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds calm kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 2-4 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	fog in the morning wind in the afternoon
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for towfish launch and recovery operations.
0650	complete safety meeting, conducting SVP cast
0705	installing beacon 4360B onto cable, marking armor cable at 30 and 10 meter marks.
0730	towfish in water, underway to start of survey line
0813	start survey line 319, running slope lines.
1230	Magnetometer not operating properly.
1235	Towfish on deck, trouble shooting magnetometer
1245	Underway to platform Hondo, to offload Exxon Rep (Bob Kurtz)
1330	alongside platform Hondo, conducting Exxon crew change
1400	Darrell Landry Exxon Rep onboard
1410	Magnetometer operational with tow fish as tested on deck, underway to resume surveying
	on slope line 404.
1630	end survey
1645	towfish on deck, raising poles
1655	poles raised, underway to conduct surveillence along survey route from 300' (top of slope) to
	90' water depth.
1800	Completed surveillence survey along survey route, located 4 crab pot buoys within survey area.
	Notified JOFLO rep. Craig Faisaro and Bill Grady of locations and numbers with request to remove
	crab pots from survey area.
1830	tied up to hondo mooring

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	19
VESSEL:	Toby Tide	DATE:	September 25, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	revised JSA for launch and recovery, added caution
PARTY CHIEF	Patrick Nissen	12	line to back deck. Additional tag line added to
SENIOR SURVEYOR	Herb Tovar	12	recovery hook.
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 5-20 kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 3-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	Clear skies
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. JSA for towfish launch and recovery operations.
	discussed revising procedures for towfish recovery, decision made to add a second tag line
	to the towfish recovery hook eliminating the need for anyone to be near the A-frame opening.
0700	deploying poles
0715	poles deployed, launching towfish
0730	towfish in the water, underway to start survey
0800	start survey line 408
1030	Towfish on deck removing magnetometer
1045	Towfish in the water, underway to start of line 5210
1820	End survey line 719, end of survey day
1840	Towfish on deck underway to mooring
1900	tied up to Hondo mooring buoy

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	20
VESSEL:	Toby Tide	DATE:	September 26, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	H2S drill conducted onboard vessel
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 5-20 kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 3-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	Clear skies
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	H2S drill conducted onboard. All personnel demonstrated donning SBCA's and connecting into
	vessel emergency air system
0645	Safety meeting with survey crew. JSA for towfish launch and recovery operations.
0700	release from mooring, underway to tieline 2002
0745	Magnetometer not reading, disconnect from towfish
0800	towfish in the water underway to line.
0830	start line 2002
1004	Jennifer Klaib (Padre MMO) had verbal communications with Craig Faisaro (JOFLO) regarding
	crab pot buoy within survey area. Craig Faisaro relayed our request for trap removal to fisherman
	and owner of the trap gave permission for us to move his trap out of survey area.
1030	end of survey tie line recovering towfish
1040	tow fish on deck underway to start running remaining survey lines from 300' to 90' water depth
1115	trouble shooting magnetometer
1145	towfish in the water underway to line.
1215	start line 204
1328	crab pot line caught on towfish cable, cleared line with not damage.
1345	crab pot line caught on towfish cable, cleared line with not damage.
1350	back on line
1530	breaking offline due to crab pot, unable to continue line due to crab pots online
1545	started running tie lines.
1818	end survey tie lines, recover towfish and poles
1826	underway to Hondo
1850	taking on groceries
1900	tied up to Hondo mooring

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	21
VESSEL:	Toby Tide	DATE:	September 27, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 5-20 kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 3-5 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	Clear skies
MMO	Jenn Klaib	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. Discussed towfish entanglement emergency procedures.
0640	underway to Heritage
0645	refueled starboard generator, 56 gallons taken on
0753	start of line 724, Danny C on SE buoy pulling to the south
1645	released Danny C, and notified him that crab pots need to be moved by 0900 hrs. tomorrow.
1721	End survey line, start recovering tow fish
1735	towfish on deck, raising poles
1745	poles raised underway to hondo
1845	tied up at Hondo mooring

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	22
VESSEL:	Toby Tide	DATE:	September 28, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours
ONSITE PROJECT MANAGER	Eddie Stutts	12
PARTY CHIEF	Patrick Nissen	12
SENIOR SURVEYOR	Herb Tovar	12
ARCHAEOLOGIST	Mark Melancon	12
GEOPHYSICAL TECH	Brandt Broussard	12
SAFETY REPRESENTATIVE	Bob Mosher	12
MMO	Patrick Cook	12
MMO	Kevin Couch	12

HEALTH AND SAFETY:
Reviewed Towfish deployment, recovery, and towing operations with survey crew and new vessel captain.

WEATHER: Winds W 5-10 kts.
Seas and Swells W 4-6 feet

GENERAL CONDITIONS:
Clear skies

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. Discussed towfish entanglement emergency procedures with relief
0745	at platform Hondo, vessel personnel transfer to platform
0845	at platform Hondo, vessel personnel transfer to vessel. Underway to start survey lines to shore
0900	contacting OST, Gold Coast, and Aggreko with updates on demob schedule.
0926	poles lowered, and tow fish in the water, underway to runline.
0930	Danny C Moves 2 Crab pots
1030	Crab Pot caught on tow fish cable online 206
1107	back on line 206
1228	end of line 206
1250	tow fish on deck, poles raised, underway to platform Heritage
1300	Danny C. relocates all crab traps back to original locations, and is released.
1343	on location at Platform Heritage
1455	offline, Tow fish on bottom, abort line. Vessel coming astern retrieving cable.
1545	tow fish on deck. Meeting with vessel captain to determine why vessel manuevered more than
	with more than 5 degrees rudder, and allowed speed to drop to less than 2 kts. As stated by
	captain: that a current pushed the vessel +30 meters offline and that he was trying to get back
	online. No apparent damage to towfish.
1630	Towfish in the water, underway to start of line.
1710	Start line 903A
1825	end of line 904
1835	towfish on deck, raising poles
1845	underway to Hondo mooring
1920	Arrive at Hondo mooring

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	23
VESSEL:	Toby Tide	DATE:	September 29, 2011
LOCATION:	Offshore Goleta SYU	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	reviewed projected operations for the day, reminded everyone not to get complacent.
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 5-10 kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 4-6 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO	Patrick Cook	12	Clear skies
MMO	Kevin Couch	12	

TIME	EVENT
0600	Exxon Field meeting
0615	Daily Ops meeting with Exxon, Vessel, MMO, Safety, and Survey
0630	Safety meeting with survey crew. Discussed the importance of good communications.
0645	underway to runline
0705	pole lowered, towfish in the water
0732	start line 915
1255	End of Survey
1315	towfish on deck, pole raised, underway to Port Hueneme.
1845	Arrive Port Hueneme

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

DAILY PROGRESS REPORT

Fugro Cosultants Inc.
4820 McGrath St., Suite 100, Ventura CA 93003
Phone: 805-658-0455 Fax: 805-658-6679

CLIENT:	ExxonMobil	DIVISION:	Fugro Consultants
JOB DESCRIPTION:	SYU OBSRB Geohazards	REPORT No.:	24
VESSEL:	Toby Tide	DATE:	September 30, 2011
LOCATION:	Port Hueneme	JOB No.:	4.64110024
HORIZONTAL DATUM/ZONE:	NAD 83 UTM 11 Meters	PROJ. MANAGER:	Eddie Stutts
VERTICAL DATUM:	NA	TELEPHONE:	805.650.7000

PERSONNEL	Name	Hours	HEALTH AND SAFETY:
ONSITE PROJECT MANAGER	Eddie Stutts	12	reviewed projected operations for the day, reminded everyone not to get complacent.
PARTY CHIEF	Patrick Nissen	12	
SENIOR SURVEYOR	Herb Tovar	12	
ARCHAEOLOGIST	Mark Melancon	12	WEATHER: Winds W 5-10 kts.
GEOPHYSICAL TECH	Brandt Broussard	12	Seas and Swells W 4-6 feet
SAFETY REPRESENTATIVE	Bob Mosher	12	GENERAL CONDITIONS:
MMO			Clear skies
MMO			

TIME	EVENT
0700	Fugro personnel arrive at Port Hueneme Dockside Toby Tide
0715	Conduct safety meetings with welders, vessel crew, and survey crew
0800	OST crane and truck arrive, conduct lift plan
1700	completed demobilization

Party Chief		Approval	
	Fugro Consultants Inc.		Company representative

APPENDIX C - GEOPHYSICAL LINE LOGS

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04 64110024	Page: 1 of 1
Surveyor: Herb	Vessel: Danny C	Date: 9-8-11 & 9-9-11
Geodesy: UTM-11N METER	Location: Port Hue	Devices: Mag, Log

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
Test	174	2.7	100	1				7.5		7.5			5.6	4.9
9.9 111	356	4	100	15	1835	23	1940			3		Back SS Mag 11 m	4.6	5
108	176	4	75	24	1942	31	1948	3.9		3.9		"		
105	356	4	75	32	2024	39	2030	36		5		"	4	4
102	176	4	75	40	2036	45	2041	5		32		"	5	4
101	356	4	75	46	2048	52	2053	32		5.8		"	4	2
103	176	4	75	53	2104	58	2109	6		25.3		"	3	7
106	356	4	75	59	2134	66	2140	25		3		"	8	6
109	176	3.9	75	67	2143	73	2149	3		24			2	8
110	356	4.1	95	74	2203	77	2205	28.1				About Line	4	—
110-A	356	4	-	78	2306	85	2312	-		-		CHIRP SB ONLY	—	—
107	176	4	-	86	2313	93	2320	-		-		CHIRP/SB ONLY	—	—
104	356	4	-	94	2323	102	2330	-		-		CHIRP/SB ONLY	—	—
931	085	4	-	103	2339	110	2346	-		-		CHIRP/SB ONLY	—	—

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04.64110024	Page: 1 of 1
Surveyor: P. NISSEN	Vessel: Danny C	Date: 9 JUL 2011
Geodesy: UTM-11N METER	Location: LFC	Devices: SSS, KLEIN 3000

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
111	356	3.7	100	15	1934	23	1941	34.2	–	3	–		8	9
108	176	4	75	24	1942	31	1950	3	–	31.9	–	KELP AT BEGINNING	8	7
105	356	4	75	32	2024	39	2030	36.7	–	5.3	–	KELP AT END	7	5
102	176	4	75	33	2036	45	2041	5.8	–	32.4	–		7	6
101	356	4	75	46	2048	52	2053	32.4	–	5.8	–	KELP AT END	6	7
103	176	4	75	53	2104	58	2109	5.8	–	25.3	–		7	9
106	356	4	75	59	2134	66	2140	25.3	–	3.4	–		10	8
109	176	4	75	67	2143	73	2149	3.4	–	24.8	–		8	9
110	356	4	75	74	2203	77	2205	28.1	–	6.3	–	ABORT LINE	7	6
110A	356	4	75	78					–		–			

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04 6411 0024	Page: 1 of 1
Surveyor: H. TOVAR	Vessel: Danny C	Date: 9-10-11
Geodesy: UTM-11N METERS	Location: LFC	Devices: STARFIX, MAG

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
104	354	3	75	112	1741	117	1747	30		15	1	5m in at 1742	16	9
931	263	2.7	75	118	1758	122	1802	10		10			5	7
931-A	83	2.6	75	125	1810	128	1816	10		10			5	6
931-B	83	2.7	75	129	1826	135	1834	3		3			3	3
107	176	2.2	75	136	1833	141	1850	3		30			3	6
110	354	2.6	75	142	1857	148	1904	30		5			14	7
933	263	2.7	75	149	1940	154	1946	20		20		mag, SB	5	8
932	85	2.2	75	155	2000	160	—	14		14			13	10
934	263	3.5	75	161	2017	166	2021	10		5		5m in 2020	8	5
935	83	4	—	167	2030	172	2034	3		3			3	3

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04.6411.0024	Page: 1 of 1
Surveyor: P. NISSEN	Vessel: Danny C	Date: 10 JUL 2011
Geodesy: UTM - 11N METER	Location: LFL	Devices: SSS KLEIN 3000

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
104	356	2	75	112	1741	117	1747	30	-	10	-	SOFT TOW	9	6
931	083	3	75	118	1758	122	1802	10	-	10	-	SOFT TOW	7	7
931	263	2.6	75	123	1810	128	1816	10	-	10	-	P/L CALIBRATION	7	8
931	083	2.7	75	129	1826	135	1834	3	-	3	-	NEARSHORE KELP	6	7
107	174	2.2	75	136	1843	141	1850	3	-	30	-	MAG /SSS RE SHOT	7	10
110	354	2.5	75	142	1857	148	1904	30	-	5	-	MAG/SSS RE-SHOT	14	
933	263	2.1	75	149	1940	154	1946	20	-	20	-	P/L CROSSING MAG XSTAR	8	14
932	083	2.7	75	155	2000	160	2007	14	-	14	-	P/L CROSSING MAG XSTAL	8	10
934	263	4	75	161	2017	166	2021	10	-	5	-	P/L CROSSING MAG XSTAR	6	8
935	083	4	75	167	2030	172	2034	2	-	2	-	P/L CROSSING (KELP)	6	

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04.64110024	Page: 1 of 1
Surveyor: Herb	Vessel: Toby Tide	Date: 9-17-11
Geodesy: UTM-11N METERS	Location: SB CHANNEL	Devices: STARFIX.NAV

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
201	46	4	75		1647	683	1758	190				Trap on line	6	
201-A	46			684	1809	803	1822	93		34		Restart at 684		
211	226	3.3		806	1835	779	1858	33					5	5
9-18 211A	226	3.4	75	2	1537	710	1547	24				Apart	6	
211B	46	3.6	75	110	1931	806	2030	239		15			4	7
202	226	4.1	75	800	2037	100	2140	24		145		Rename 211B to 202	5	6
210	46	3.9	75	100	2201	860	2256	341		19		3569 - 611 Trap on port	8	8
203	226	3.6	75	800	2307	100	0005	171		24			7	5
208	46	3.5	75	100	0038	800	0126	292		7			8	4

1508 902
942 8043

GEOPHYSICAL LINE SUMMARY LOG

ROB

Client: EXXON	Project No.: 04.641024	Page: 1 of
Surveyor: B.B	Vessel: TOBY TIDE	Date: 18SEP2011
Geodesy: NAD 1983 original ~~WGS~~ XTF ; Sat Geo	Location: SYU	Devices: SSS SBP

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
201	46	4	75	100	1647							OBS ted due to Buoy	~~75~~	
201A	46	4	75	653	1809	806		937				2308 - 746 60 max	9	9
211	226	4	75	806	1835			29				ABoated	11	10
9/18 211A	226	4	75	806	1537	100		24				(1) 7) 60 (2) 460 doing	8	7.5
211B	46	4	75	100		806	2030			30m		31-7 16A	25	8
202	226	4	75	800	2037	100		24				"	7	7
210	46	4	75	100	800	9256	600	341		35m		Offline from 613- Due to coon pot	7.5	7.5
203	226	4	75	800	2307	100	00 09 ~~000~~	1623		171			8	8
209	46	4	75	100	0030	800	0126	292		28			10	10

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04.641100024	Page: 1 of 1
Surveyor: HT	Vessel: TOBY TIDE	Date: 19 SEP 2011
Geodesy: UTM 11N -METERS	Location: SYU	Devices: NAV

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
209	46	3.4	75	100	1447	571	1529	202		87	Shot	556 more for Trap end shot	13	9
209A	46	3	75	540	1550	608	1604	102				1600 Time H.T Trap	8	??
323	181	3.5	75	262	1651	111	1453	98		440		SLOPE	8	10
313	1.5	3.9	75	111	1742	100	1751	664		100		Bad Tracking on Beach	9	7
322	181	3.8	75	100	1837	111	1848	430		220			5	15
322A	1.5	37	75	111	1928	100	1939	683		177		No mag at EOL	10	8
314	181	4.0	75	100	2139	111	2149	140		516			14	9
321	1.5	3.9	75	111	2210	100	2020			240			17	6
315	181	3.9	75	100	2247	111	2057	183		540			6	12
320	1.5	3.9	75	111	2341	100	2350	677		600			11	15
314	181	3.9	75	100	0027	111	0036	190		540			6	7
319	1.5	1.5	75	111	0104			448				Abort	9	

GEOPHYSICAL LINE SUMMARY LOG

FUGRO

Client:	Project No.:	Page: of
Surveyor:	Vessel:	Date:
Geodesy:	Location:	Devices: SSS SBP

9-19-11 Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
209	46	4	75	100	1447	571	1529	202				31-7 SBP Jst only 16 19 aBorted Bouy	10	
209A	46	4	75	540	1550								8	
323	181	3.5	75	262	1651	111	1653	98		440		Bad tracking	8	10
313	1.5	3.9	75	111	1742	100	1751	661		100		Bad tracking	9	7
322	181	3.8	75	100	1831	111	1848	153		220			8	7
222A	1.5	3.7	75	111	1928	100	1939	683		177			8	8
314	181	4.0	75	100	2139	111	2140	140		510		-	8	10
321														

3 time longer water depth

GEOPHYSICAL LINE SUMMARY LOG

FUGRO

Client: Exxon	Project No.: 04.6411024	Page: 1 of 1
Surveyor: Herb Tovar	Vessel: Tody Tide	Date: 9-20-11
Geodesy:	Location: SEG	Devices: No Mag

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
530	246	3.9	150	148	1635	100	1716	600		1400		no mag		
526	66	3.9	150	0004	[illegible]	149	1903	1140		640		"		
521	232	3.8	150	125	1937	100	2000	222		667		Faded to 527		
527	246	3.8	150	140	2001	100	2035	667		1260		"		
529	66	3.8	150	100	2137	142	2215	1223		~~1260~~ 920		Faded to 524		
524	52	3.6	150	100	2217	125	2246	970		461		"		
523	232	3.8	150	125	2314	263	2359	302		620		Change line SEG		
528	246	4.0	150	148	2339	264	0013	620		1400				
601	54	3.9	150	100	0052	116	0105	200		991				

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04.64110024	Page: 1 of 1
Surveyor: B. BROUSSARD	Vessel: TORY TIDE	Date: 20 SEP 2011
Geodesy: UTM 11N - METERS	Location: SYU	Devices: SSS SBP

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
530	246	3.9	150	148	1635	100	1716	600		1400		No mag	16	18
526	66	3.9	150	100	1802	149	1903	1140		640			15	17
521	232	3.8	150	125	1937	100	2000	722		667			18	15
527	246	3.8	150	140	2001	100	2033	667		1260		on line 521	20	21
529	66	3.8	150	100	2137	142	2215 ~~2055~~	1223		1280			22	16
524	52	3.8	150	100	2217	125	2243 ~~2215~~	970		461				
523	232	3.6	150	125	2314	263	2359 ~~2240~~	302		620				
528	246	4	150	148	2332	264	0013 ~~2354~~	620		1200				
601	54	3.9	150	100	0052	116	0105	800		991				

GEOPHYSICAL LINE SUMMARY LOG

Client: Exxon	Project No.: 04.6411 0024	Page: of
Surveyor: H.T	Vessel: TOBY TIDE	Date: 21 SEP 2011
Geodesy: UTM IN - METERS	Location: SYU	Devices: NAV, SB, SSS

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
522	232	3.8	150	116	1724	264	1746	323	1724	840	1746	-NO mag-	20	20
525	052	3.8	150	100	1834	125	1859	789		457	1934		20	20
502	241	3.8	150	100	1925	145	2004	201		906		Rerun 525_1 TO 502		
512	257	3.8	150	110	2006	142	2017	906		1037		502 TO 512		
517	268	3.8	150					1037				512 to 517		
604	69	3.8	150	100	2022			905				Abort		
718	71	3.9	150	100	2339	160	0037	718	2343	1140	0047			

GEOPHYSICAL LINE SUMMARY LOG

Client: EXXON	Project No.: 04 64110024	Page: 1 of 1
Surveyor: H. T.	Vessel: TOBY TIDE	Date: 23 SEP 2011
Geodesy: UTM IN-METER	Location: SYO	Devices: SS, SS NAV

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start
710	272	3.8	150	118	1600	100	1616	1100		1265		CHANGE 52101 TO 710	
603	069	3.4	150	100	1744	116	1802	1221		1073			30
6041	249	3.9	150	116	1846	100	1859	871		1143			30
516	088	3.6	150	100	2151	110	2201			1018		FADE →	25
511	077	3.6	150	100	2202	106	2207	1018		1036		FADE →	25
506	061	3.6	150	148	2211	100	2254	1036		480		→	25
510	241	3.8	150	100	2311	147	2351	420		913		SHOT 114 - 132 BACK OFF AT BOUY	
515	257	3.8	150	110	2353	101	0000	930				→	
518	088	3.6	150	104	0057	110	0057	878		1009		→	
513	077	3.5	150	100	0059	110	0118	1009		997		→	
508	061	3.5	150	142	0114	100	0153	997		437		→	

GEOPHYSICAL LINE SUMMARY LOG

Client: Exxon	Project No.: 04.6411.0024	Page: 1 of
Surveyor: HTT	Vessel: Tony Tide	Date: 9-24-11
Geodesy: UTM 11N METERS	Location: SYU	Devices: Mag

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
319	181	3.9	75	101	1514	111	1523	175		458				
401	14	3.9	75	100	1540	112	1601	514		214			5	6
318	181	3.8	75	100	1616	111	1626	204		478			6	6
402	14	4.0	75	100	1652	112	1703	580		288			10	7
317	181	3.9	75	100	1720	111	1730	177		474			7	8
403	14	3.9	75	100	1756	112	1807	612		203			7	9
411	194	4.0	75	113	1820	100	1831	177		550			8	7
404	14	3.7	75	100	1859	112	1910			210		SS only no mag	?	?
404	14	3.9	75	100	2147	112	2159	633		198		mag working	9	8
410	194	3.9	75	113	2212	100	2223	152		413			8	9
405	14	3.7	75	100	2248	113	2300	577		236			8	7
409	194	4.0	75	113	2316	100	2326	184		456			9	9

917 R

GEOPHYSICAL LINE SUMMARY LOG

508 514

Client: Exxon	Project No.: 04.6411.0024	Page: of
Surveyor: H.T	Vessel: Tody Tide	Date: 9-25-11
Geodesy:	Location:	Devices: mag / Nav

Line No.	Heading	Speed	Range Scale (m)	First Shot Point Event No.	First Shot Point Time	Last Shot Point Event No.	Last Shot Point Time	Layback Start Cable Out (m)	Layback Start Time	Layback End Cable Out (m)	Layback End Time	Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
408	14	3.6	75	100	1459	113	1512	348		190	1513	MAG	8	9
406	194	3.7	75	113	1538	100	1551	196		410		MAG	7	8
407	14	3.9	75	100	1621	113	1633	627		188		MAG	7	9
925	124	3.8	75	105	1648	100	1652	162				Tie-Line MAG	10	6
923	284	4.0	75	109	1709	100	1718	351		456		Tie Line MAG	11	5
5210	232	4.0	150	124	1820	100	1842	258		680		No mag	15	
5260	246	4.0	150	148	1927	100	2007	738		1100		"	25	
2000	297	4.0	150	128	2153	100	2220	890		1152		"		
514	77	3.6	150	100	2306	103	2309	959		907		"		
508	61	3.3	150	150	2315	124	2340	892		803				
508A	241	3.8	150	100	0021	123	0041	200		570				
917	150	3.1	150	100	0101	104	0106	458		801		Tie-line		

X Time
Y - d

New line
3000 - 30009
to

GEOPHYSICAL LINE SUMMARY LOG

Client: Exxon	Project No.: 04.641100.24	Page: of
Surveyor: H.T	Vessel: Toby Tide	Date: 9-26-11
Geodesy: UTM H-Meter	Location: SEO	Devices: None

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
2002	297	3.7	150	100	1532	128	1556	1043		1142		No Mag		
913X	153	3.9	150	100	1655	111	707	738		1032		No Mag		
204	46	3.5	75	100	1912	170	2016	310		A		Mag	6	5
207	226	4.0	75	167	2028			10				Mag. Trap Shot 145	6	5
207.1	226	3.3	75	140	2055	100	2130	53		9		Re Start	5	4
205	46	3.7	75	100	2145	149	2226	210		121		Car off	5	5
209A	46	4.4	75	150	2248	161	2237			44		Abort	5	6
930	135	4.4	75	103	2249	100	2253	51		59		Tie line	5	6
929	314	4.2	75	100	2310	104	2313	101		108		"	5	5
928	135	3.9	75	100	2329	104	2332	124		128		"	6	6
927	315	4.1	75	100	2349	104	2352	101		133		"	6	6
926	133	4	75	100	0010	104	0015	??		202		"	5	5
921X	314	3.9	150	110	0055	100	0104	551		570		" No mag		

New line
3000 to 30009

GEOPHYSICAL LINE SUMMARY LOG

Client: Exxon	Project No.: 04.641100 29	Page: of
Surveyor: HT	Vessel: Tody Tide	Date: 9-27-11
Geodesy: UTM 11 Meter	Location: SEO	Devices: Nav

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
724	260	3.6	150	119	1453	100	1511	715		888				
30009	94	3.3	150	100	1557	103	1559			925				
723	80	3.3	150	101	1602	119	1622	725		970				
722	260	3.8	150	119	1705	107	1720	903		1041				
30008	274	3.7	150	107	1720	100	1726	1041		1021				
30007	94	3.6	150	100	1809	109	1818	1020		902				
721	80	3.1	150	101	1819	119	1837	902		981				
720	260	3.8	150	119	1922	101	938	945		1040				
3002-2101	274	3.8	150	110	1939	100	1947	1040		968				
3002-2101	94	3.2	300	100	2037	112	2070	1020						
3000	275	3.6	250	109	2123	100	2131	850		820				
3001	4	3.6	250	105	2223	100	2229	689		821				
3005	184	4.1	150	100	2306	109	2316	789		880				
719	80	3.7	150	100	0003	119	0021	590		1000				

GEOPHYSICAL LINE SUMMARY LOG

Client: Exxon	Project No.: 04 104 10024	Page: of
Surveyor: H-T	Vessel: Jody Tide	Date: 9-28-11
Geodesy: UTM 11 - Meter	Location: SEO	Devices: Mag/Nav

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
206	46	3.6	75	100	1653	146	1732	288		19		Abat at Shot 146 mag over pipeline	5	4
209A	226	3.8	75	168	1807	146	1826	31		93		mag	5	5
205	46	3.7	75	143	1834	169	1858	73				mag	4	3
206A	226	3.3	75	166	1907	141	1928	25		120		mag	5	5
3003	184	4.6	150	101	2118	110	2124	810		1200		No Mag	30	30
903	353	5.0	150	104	2216	100	2219	1460		1557		Fish on bottom	30	0
903A	173	3.6	150	100	0010	104	0015			1025		Redo	30	28
904	346	4.3	150	104	0107	100	0110			1200				

4000 Add line

GEOPHYSICAL LINE SUMMARY LOG

Client: Exxon	Project No.: 04 6041 0024	Page: of
Surveyor: H.T	Vessel: Tody Tide	Date: 9-29-11
Geodesy: UTM 11 - Meter	Location: Sky U	Devices: Nav

Line No.	Heading	Speed	Range Scale (m)	First Shot Point		Last Shot Point		Layback Start		Layback End		Remarks	Towfish Height off Bottom Start	Towfish Height off Bottom End
				Event No.	Time	Event No.	Time	Cable Out (m)	Time	Cable Out (m)	Time			
915 x	152	3.9	150	100	1432	110	1440	876		1030		Tie line	30	30
4000	326	4.5	150	117	1532	100	1545	1258		1467		Add line	30	30
908	160	3.2	150	100	1637	104	1641	1198		1241		Tie line	30	30
907	339	4.1	150	104	1726	100	1740	1423		1340		Tie line Renamed 709	30	30
906	162	4.0	150	100		104	1835	1205		1387		Tie-line	30	30
905	341	3.8	150	140	1929	100	1934	1185		1380		Tie line	30	

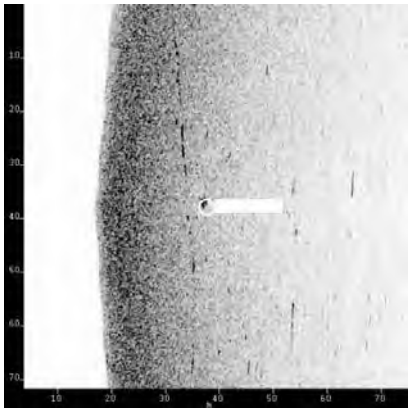
APPENDIX D - SIDE SCAN SONAR TARGET REPORT

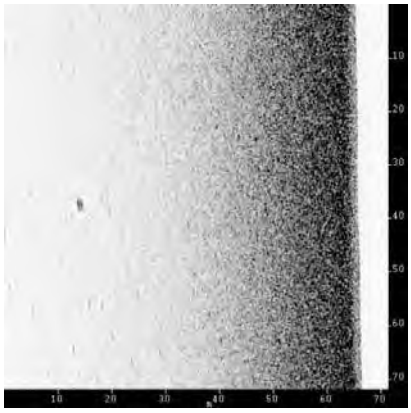
ExxonMobil OPSRB
Side Scan Sonar Target Report

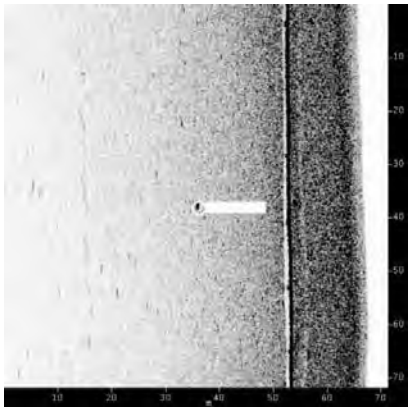
Revised 11/04/2011

(All Coordinates and Measurements are in UTM Zone 11 Meters)

Contact Image







Contact Info

T-004

- Sonar Time at Target: 09/26/2011 20:29:24
- Click Position (Lat/Lon Coordinates)
  34° 27.17674' N 120° 02.70355' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220248.73 (Y) 3816587.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207.jsf
- Ping Number: 1071
- Range to Target: 27.29 Meters
- Fish Height: 7.61 Meters
- Heading: 200.700 degrees
- Line Name: 207

T-005

- Sonar Time at Target: 09/18/2011 22:52:49
- Click Position (Lat/Lon Coordinates)
  34° 27.09777' N 120° 02.71636' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220225.20 (Y) 3816442.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.002.jsf
- Ping Number: 106231
- Range to Target: 61.99 Meters
- Fish Height: 9.81 Meters
- Heading: 32.800 degrees
- Line Name: 210.002

T-006

- Sonar Time at Target: 09/26/2011 20:11:04
- Click Position (Lat/Lon Coordinates)
  34° 27.10487' N 120° 02.91320' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219924.05 (Y) 3816464.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 35684
- Range to Target: -38.99 Meters
- Fish Height: 9.52 Meters
- Heading: 31.390 degrees
- Line Name: 204.002

User Entered Info

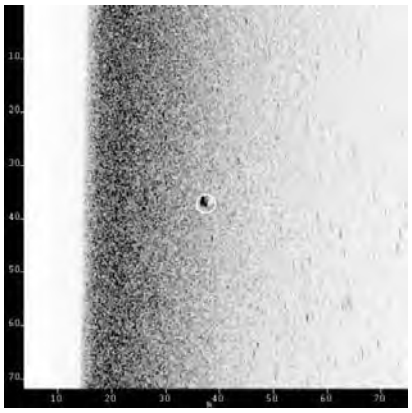
Dimensions
Target Height: = 0.2 Meters
Target Length: 2.2 Meters
Target Shadow: 0.7 Meters
Target Width: 1.3 Meters

Description: probable crab trap

Dimensions
Target Height: = 0.3 Meters
Target Length: 2.5 Meters
Target Shadow: 1.7 Meters
Target Width: 1.3 Meters

Description: probable crab trap

Dimensions
Target Height: = 0.0 Meters
Target Length: 1.8 Meters
Target Shadow: 0.0 Meters
Target Width: 0.7 Meters
:
Description: probable crab trap

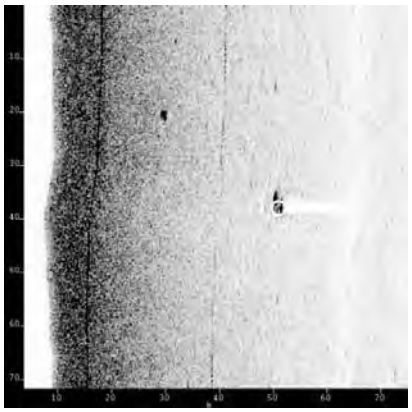


T-007

- Sonar Time at Target: 09/18/2011 22:53:12
- Click Position (Lat/Lon Coordinates)
  34° 27.08587' N 120° 02.64953' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220326.53 (Y) 3816417.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.002.jsf
- Ping Number: 106412
- Range to Target: 30.29 Meters
- Fish Height: 8.64 Meters
- Heading: 30.100 degrees
- Event Number: 0
- Line Name: 210.002

Dimensions
Target Height: = 0.4 Meters
Target Length: 2.0 Meters
Target Shadow: 1.6 Meters
Target Width: 1.4 Meters

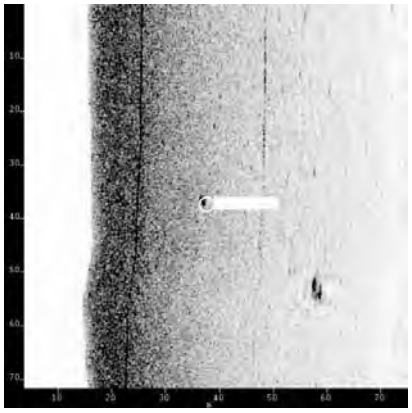
Description: probable crab trap



T-008

- Sonar Time at Target: 09/26/2011 20:31:42
- Click Position (Lat/Lon Coordinates)
  34° 27.07420' N 120° 02.84774' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220022.28 (Y) 3816404.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207.jsf
- Ping Number: 2164
- Range to Target: 50.94 Meters
- Fish Height: 8.49 Meters
- Heading: 214.500 degrees
- Event Number: 0
- Line Name: 207

Dimensions
Target Height: = 0.4 Meters
Target Length: 4.4 Meters
Target Shadow: 2.4 Meters
Target Width: 2.0 Meters
:
Description: probable crab trap

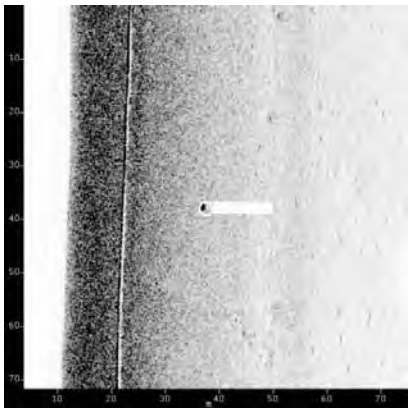


T-009

- Sonar Time at Target: 09/26/2011 20:31:34
- Click Position (Lat/Lon Coordinates)
  34° 27.07168' N 120° 02.83081' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220048.52 (Y) 3816399.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207.jsf
- Ping Number: 2098
- Range to Target: 30.38 Meters
- Fish Height: 9.96 Meters
- Heading: 212.200 degrees
- Event Number: 0
- Line Name: 207

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.2 Meters
Target Shadow: 0.0 Meters
Target Width: 1.2 Meters

Description: probable crab trap

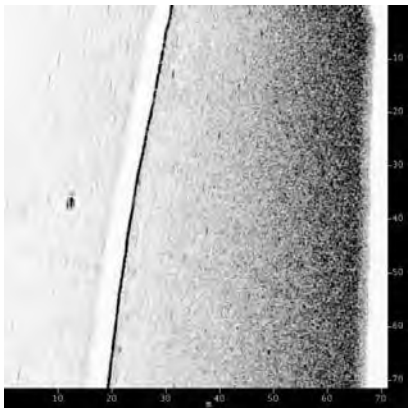


T-010

- Sonar Time at Target: 09/26/2011 20:10:54
- Click Position (Lat/Lon Coordinates)
  34° 27.07168' N 120° 02.88894' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219959.00 (Y) 3816402.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 35610
- Range to Target: 33.57 Meters
- Fish Height: 10.40 Meters
- Heading: 32.500 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.3 Meters
Target Length: 1.6 Meters
Target Shadow: 1.0 Meters
Target Width: 1.0 Meters

Description: probable crab trap

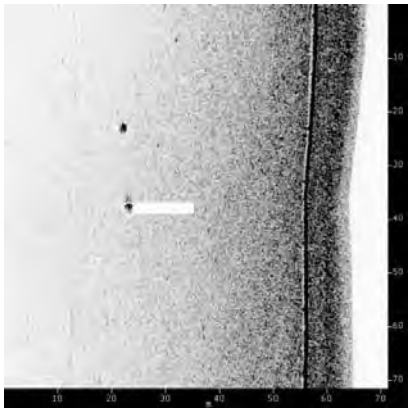


T-011

- Sonar Time at Target: 09/18/2011 20:46:02
- Click Position (Lat/Lon Coordinates)
  34° 26.98173' N 120° 03.02398' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219747.61 (Y) 3816241.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\202.jsf
- Ping Number: 46071
- Range to Target: -62.36 Meters
- Fish Height: 7.76 Meters
- Heading: 213.200 degrees
- Event Number: 0
- Line Name: 202

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.8 Meters
Target Shadow: 0.0 Meters
Target Width: 1.7 Meters

Description: contact along
pipeline (possible crab trap)

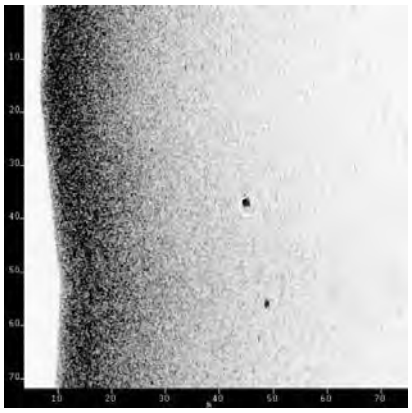


T-012

- Sonar Time at Target: 09/26/2011 20:07:47
- Click Position (Lat/Lon Coordinates)
  34° 26.96891' N 120° 03.09127' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219643.80 (Y) 3816221.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 34131
- Range to Target: -51.67 Meters
- Fish Height: 13.18 Meters
- Heading: 32.500 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.3 Meters
Target Shadow: 0.0 Meters
Target Width: 0.8 Meters

Description: probable crab trap

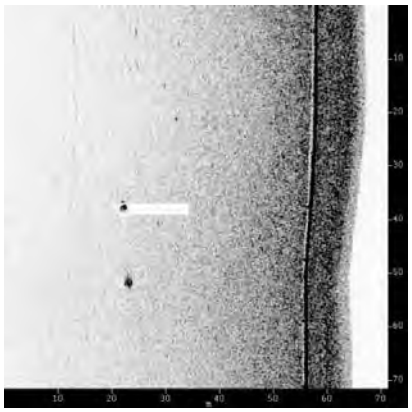


T-013

- Sonar Time at Target: 09/18/2011 20:24:24
- Click Position (Lat/Lon Coordinates)
  34° 26.95243' N 120° 02.76306' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220145.00 (Y) 3816175.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\211B.002.jsf
- Ping Number: 35809
- Range to Target: 44.38 Meters
- Fish Height: 9.66 Meters
- Heading: 31.800 degrees
- Event Number: 0
- Line Name: 211B.002

Dimensions
Target Height: = 0.1 Meters
Target Length: 3.0 Meters
Target Shadow: 0.7 Meters
Target Width: 1.5 Meters

Description: probable crab trap

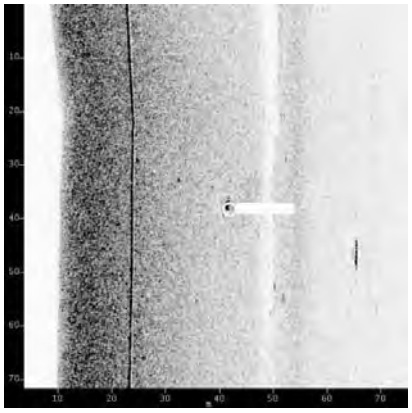


T-014

- Sonar Time at Target: 09/26/2011 20:07:39
- Click Position (Lat/Lon Coordinates)
  34° 26.96411' N 120° 03.09860' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219632.02 (Y) 3816212.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 34067
- Range to Target: -52.53 Meters
- Fish Height: 10.84 Meters
- Heading: 31.190 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.0 Meters
Target Shadow: 1.0 Meters
Target Width: 1.5 Meters

Description: probable crab trap

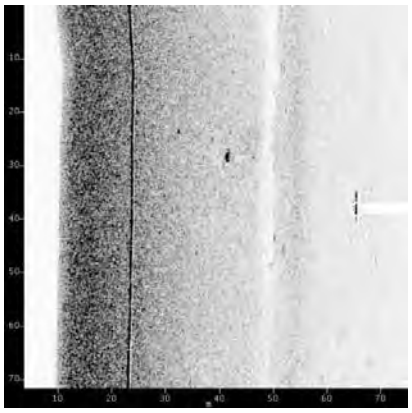


T-015

- Sonar Time at Target: 09/26/2011 20:07:56
- Click Position (Lat/Lon Coordinates)
  34° 26.94053' N 120° 03.04275' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219716.36 (Y) 3816166.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 34197
- Range to Target: 41.07 Meters
- Fish Height: 12.30 Meters
- Heading: 31.300 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.0 Meters
Target Shadow: 0.9 Meters
Target Width: 0.7 Meters

Description: probable crab trap

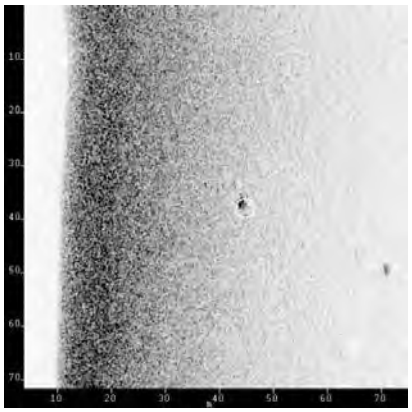


T-016

- Sonar Time at Target: 09/26/2011 20:08:01
- Click Position (Lat/Lon Coordinates)
  34° 26.93527' N 120° 03.02581' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219742.00 (Y) 3816156.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 34237
- Range to Target: 65.20 Meters
- Fish Height: 12.30 Meters
- Heading: 31.390 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 5.4 Meters
Target Shadow: 0.0 Meters
Target Width: 0.5 Meters

Description: linear contact

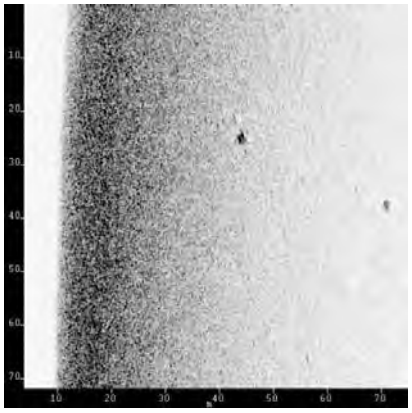


T-017

- Sonar Time at Target: 09/18/2011 22:49:59
- Click Position (Lat/Lon Coordinates)
  34° 26.91352' N 120° 02.84408' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220018.92 (Y) 3816107.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.002.jsf
- Ping Number: 104887
- Range to Target: 43.64 Meters
- Fish Height: 10.98 Meters
- Heading: 33.190 degrees
- Event Number: 0
- Line Name: 210.002

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.8 Meters
Target Shadow: 1.0 Meters
Target Width: 1.7 Meters

Description: probable crab trap

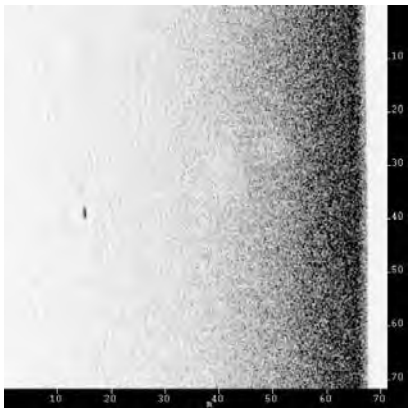


T-018

- Sonar Time at Target: 09/18/2011 22:50:04
- Click Position (Lat/Lon Coordinates)
  34° 26.90803' N 120° 02.82531' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 220047.22 (Y) 3816096.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.002.jsf
- Ping Number: 104930
- Range to Target: 70.68 Meters
- Fish Height: 10.69 Meters
- Heading: 33.600 degrees
- Event Number: 0
- Line Name: 210.002

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.9 Meters
Target Shadow: 1.3 Meters
Target Width: 1.2 Meters

Description: probable crab trap

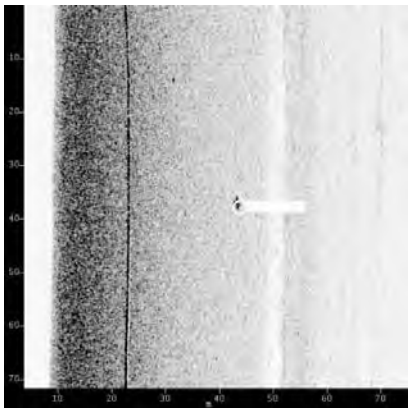


T-019

- Sonar Time at Target: 09/18/2011 22:48:41
- Click Position (Lat/Lon Coordinates)
  34° 26.88125' N 120° 02.96997' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219824.52 (Y) 3816053.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.001.jsf
- Ping Number: 104269
- Range to Target: -59.62 Meters
- Fish Height: 7.91 Meters
- Heading: 32.800 degrees
- Event Number: 0
- Line Name: 210.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.6 Meters
Target Shadow: 0.0 Meters
Target Width: 0.9 Meters

Description: probable crab trap

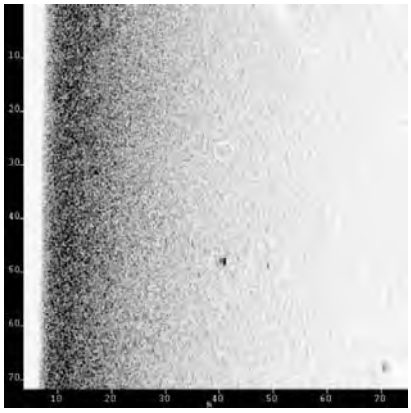


T-020

- Sonar Time at Target: 09/26/2011 20:06:48
- Click Position (Lat/Lon Coordinates)
  34° 26.89361' N 120° 03.09631' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219631.47 (Y) 3816082.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 33665
- Range to Target: 42.99 Meters
- Fish Height: 10.54 Meters
- Heading: 31.000 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.6 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: probable crab trap

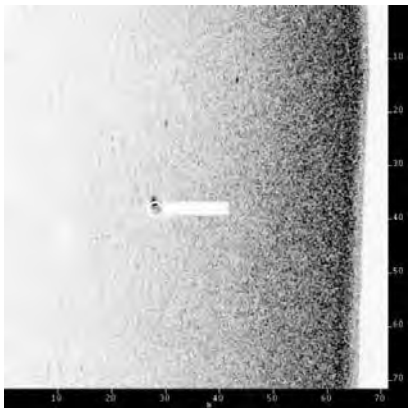


T-021

- Sonar Time at Target: 09/18/2011 22:49:11
- Click Position (Lat/Lon Coordinates)
  34° 26.87438' N 120° 02.89031' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219946.34 (Y) 3816037.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.001.jsf
- Ping Number: 104512
- Range to Target: 40.27 Meters
- Fish Height: 7.18 Meters
- Heading: 31.390 degrees
- Event Number: 0
- Line Name: 210.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 1.7 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: probable crab trap

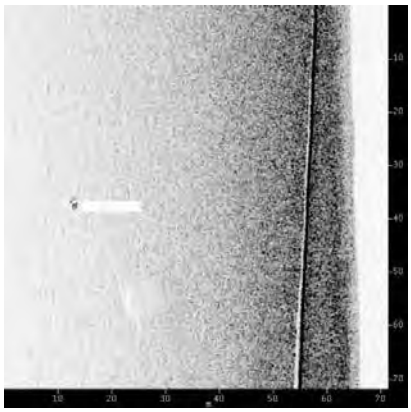


T-022

- Sonar Time at Target: 09/26/2011 20:35:25
- Click Position (Lat/Lon Coordinates)
  34° 26.86614' N 120° 03.01116' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219760.20 (Y) 3816027.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207.jsf
- Ping Number: 3924
- Range to Target: 46.69 Meters
- Fish Height: 8.93 Meters
- Heading: 208.600 degrees
- Event Number: 0
- Line Name: 207

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.3 Meters
Target Shadow: 1.3 Meters
Target Width: 1.4 Meters

Description: probable crab trap

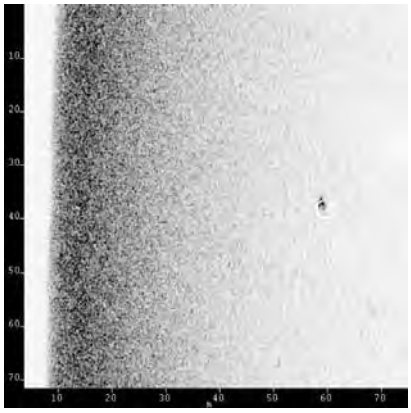


T-023

- Sonar Time at Target: 09/26/2011 20:05:09
- Click Position (Lat/Lon Coordinates)
  34° 26.86363' N 120° 03.22631' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219430.80 (Y) 3816032.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 32876
- Range to Target: -61.74 Meters
- Fish Height: 12.15 Meters
- Heading: 36.600 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.7 Meters
Target Shadow: 1.0 Meters
Target Width: 1.4 Meters

Description: probable crab trap

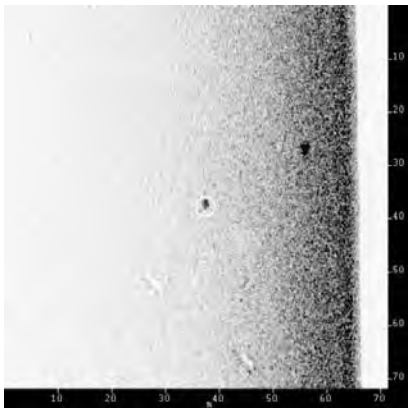


T-024

- Sonar Time at Target: 09/18/2011 22:48:17
- Click Position (Lat/Lon Coordinates)
  34° 26.81716' N 120° 02.93838' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219869.36 (Y) 3815933.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.001.jsf
- Ping Number: 104081
- Range to Target: 58.72 Meters
- Fish Height: 8.93 Meters
- Heading: 37.390 degrees
- Event Number: 0
- Line Name: 210.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.9 Meters
Target Shadow: 0.0 Meters
Target Width: 1.5 Meters

Description: probable crab trap

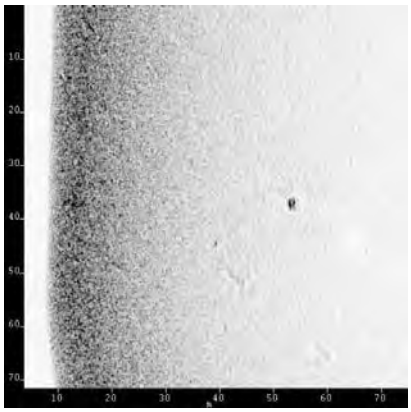


T-025

- Sonar Time at Target: 09/18/2011 22:45:20
- Click Position (Lat/Lon Coordinates)
  34° 26.70272' N 120° 03.16177' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219520.86 (Y) 3815732.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.001.jsf
- Ping Number: 102680
- Range to Target: -35.58 Meters
- Fish Height: 8.05 Meters
- Heading: 30.600 degrees
- Event Number: 0
- Line Name: 210.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.1 Meters
Target Shadow: 0.0 Meters
Target Width: 1.3 Meters

Description: probable crab trap

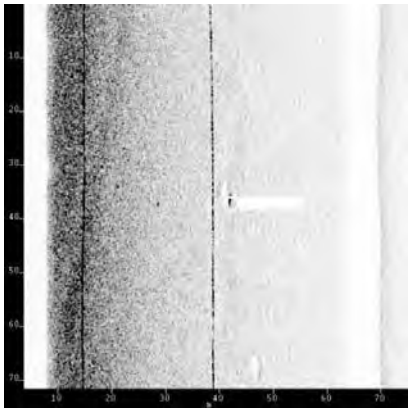


T-026

- Sonar Time at Target: 09/19/2011 01:13:42
- Click Position (Lat/Lon Coordinates)
  34° 26.67274' N 120° 03.20846' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219447.31 (Y) 3815678.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\208.001.jsf
- Ping Number: 173084
- Range to Target: 53.09 Meters
- Fish Height: 8.64 Meters
- Heading: 33.100 degrees
- Event Number: 0
- Line Name: 208.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.5 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: probable crab trap

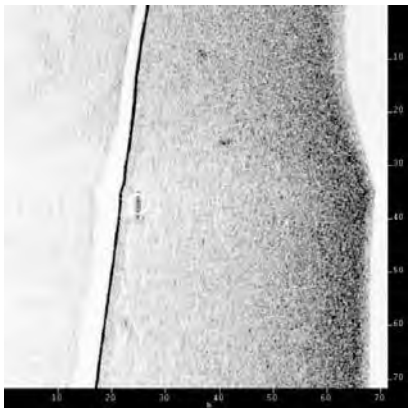


T-027

- Sonar Time at Target: 09/26/2011 20:40:47
- Click Position (Lat/Lon Coordinates)
  34° 26.64962' N 120° 03.34716' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219233.80 (Y) 3815642.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207.jsf
- Ping Number: 6476
- Range to Target: 41.01 Meters
- Fish Height: 8.49 Meters
- Heading: 210.700 degrees
- Event Number: 0
- Line Name: 207

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.5 Meters
Target Shadow: 0.0 Meters
Target Width: 0.6 Meters

Description: linear contact next to pipeline

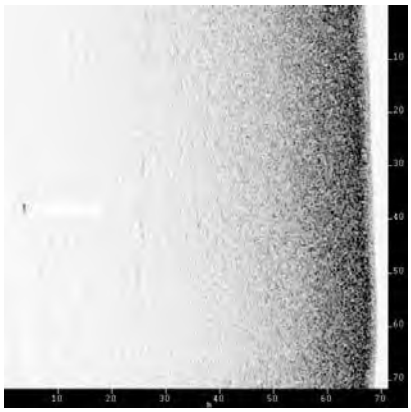


T-028

- Sonar Time at Target: 09/18/2011 20:55:03
- Click Position (Lat/Lon Coordinates)
  34° 26.61964' N 120° 03.46755' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219047.75 (Y) 3815592.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\202.jsf
- Ping Number: 50351
- Range to Target: -49.69 Meters
- Fish Height: 6.88 Meters
- Heading: 215.200 degrees
- Event Number: 0
- Line Name: 202

Dimensions
Target Height: = 0.0 Meters
Target Length: 5.7 Meters
Target Shadow: 0.0 Meters
Target Width: 1.2 Meters

Description: contact along pipeline

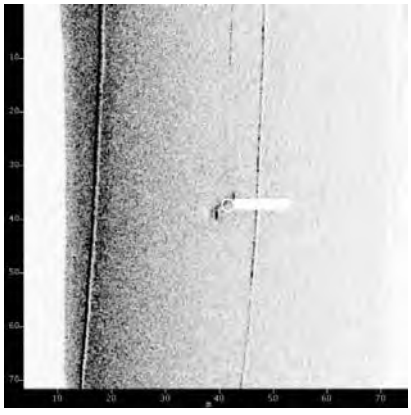


T-029

- Sonar Time at Target: 09/26/2011 22:30:21
- Click Position (Lat/Lon Coordinates)
  34° 26.60797' N 120° 03.34533' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219234.34 (Y) 3815565.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\205.001.jsf
- Ping Number: 55716
- Range to Target: -71.03 Meters
- Fish Height: 7.18 Meters
- Heading: 28.100 degrees
- Event Number: 0
- Line Name: 205.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.2 Meters
Target Shadow: 0.0 Meters
Target Width: 0.8 Meters

Description: probable crab trap

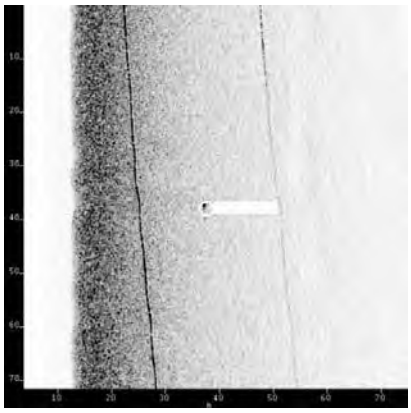


T-030

- Sonar Time at Target: 09/26/2011 19:59:09
- Click Position (Lat/Lon Coordinates)
  34° 26.58210' N 120° 03.49731' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219000.13 (Y) 3815524.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.002.jsf
- Ping Number: 30035
- Range to Target: 40.36 Meters
- Fish Height: 12.30 Meters
- Heading: 35.100 degrees
- Event Number: 0
- Line Name: 204.002

Dimensions
Target Height: = 0.4 Meters
Target Length: 6.1 Meters
Target Shadow: 1.2 Meters
Target Width: 1.8 Meters

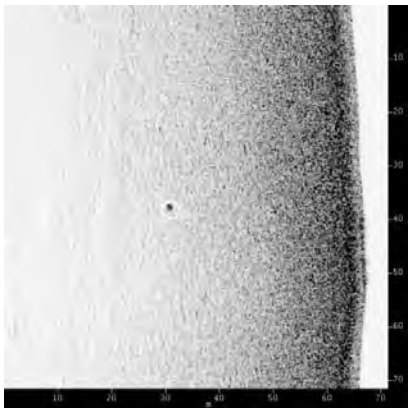
Description: unidentified contact next to pipeline



T-031

- Sonar Time at Target: 09/26/2011 20:42:47
- Click Position (Lat/Lon Coordinates)
  34° 26.55075' N 120° 03.45016' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 219070.50 (Y) 3815464.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207.jsf
- Ping Number: 7424
- Range to Target: 32.18 Meters
- Fish Height: 8.49 Meters
- Heading: 201.000 degrees
- Event Number: 0
- Line Name: 207

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.0 Meters
Target Shadow: 0.9 Meters
Target Width: 0.9 Meters
:
Description: probable crab trap

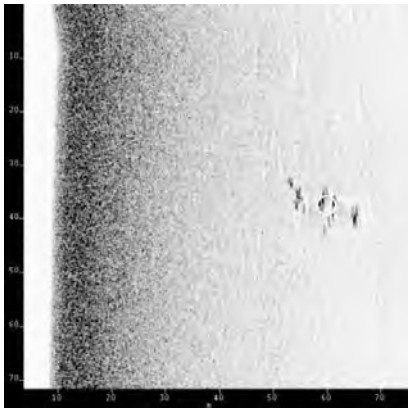


T-032

- Sonar Time at Target: 09/26/2011 19:52:57
- Click Position (Lat/Lon Coordinates)
  34° 26.34910' N 120° 03.84521' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 218453.70 (Y) 3815109.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.001.jsf
- Ping Number: 27094
- Range to Target: -43.72 Meters
- Fish Height: 8.79 Meters
- Heading: 38.000 degrees
- Event Number: 0
- Line Name: 204.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 1.5 Meters
Target Shadow: 0.0 Meters
Target Width: 1.6 Meters

Description: probable crab trap

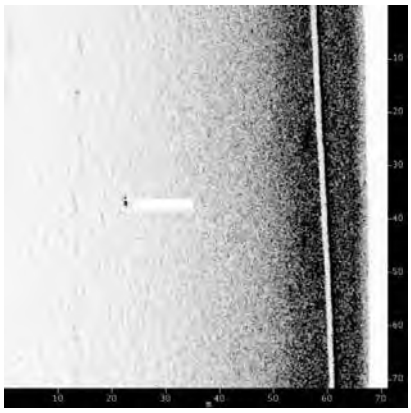


T-033

- Sonar Time at Target: 09/19/2011 15:21:50
- Click Position (Lat/Lon Coordinates)
  34° 25.97900' N 120° 03.97750' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 218230.20 (Y) 3814431.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\209.001.jsf
- Ping Number: 18169
- Range to Target: 58.98 Meters
- Fish Height: 9.96 Meters
- Heading: 29.100 degrees
- Event Number: 0
- Line Name: 209.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 18.0 Meters
Target Shadow: 0.0 Meters
Target Width: 8.4 Meters

Description: probable seafloor outcropping

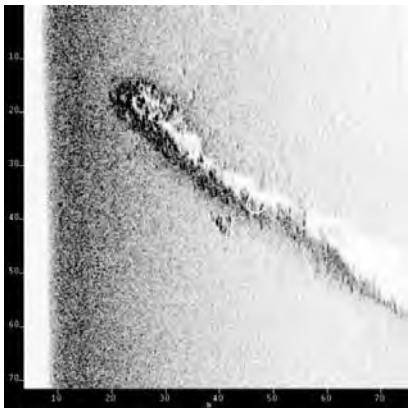


T-034

- Sonar Time at Target: 09/26/2011 19:44:26
- Click Position (Lat/Lon Coordinates)
  34° 25.97763' N 120° 04.27734' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 217771.30 (Y) 3814443.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.001.jsf
- Ping Number: 23053
- Range to Target: -52.20 Meters
- Fish Height: 9.37 Meters
- Heading: 33.690 degrees
- Event Number: 0
- Line Name: 204.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.3 Meters
Target Shadow: 0.0 Meters
Target Width: 0.9 Meters

Description: probable crab trap

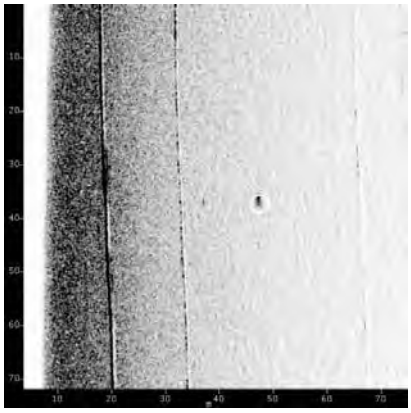


T-035

- Sonar Time at Target: 09/18/2011 23:40:26
- Click Position (Lat/Lon Coordinates)
  (removed per BOEM/BSEE)
- Click Position (Projected Coordinates)
  (removed per BOEM/BSEE)
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\203.001.jsf
- Ping Number: 128830
- Range to Target: 47.12 Meters
- Fish Height: 9.08 Meters
- Heading: 210.890 degrees
- Event Number: 0
- Line Name: 203.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 70.7 Meters
Target Shadow: 0.0 Meters
Target Width: 10.2 Meters

Description: seafloor outcropping

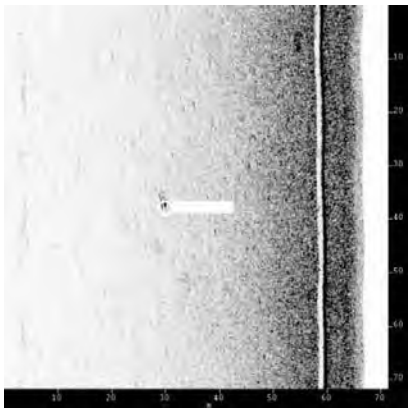


T-036

- Sonar Time at Target: 09/26/2011 19:44:30
- Click Position (Lat/Lon Coordinates)
  34° 25.93917' N 120° 04.23339' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 217835.94 (Y) 3814370.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.001.jsf
- Ping Number: 23080
- Range to Target: 47.17 Meters
- Fish Height: 8.93 Meters
- Heading: 33.890 degrees
- Event Number: 0
- Line Name: 204.001

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.4 Meters
Target Shadow: 1.0 Meters
Target Width: 1.3 Meters

Description: probable crab trap

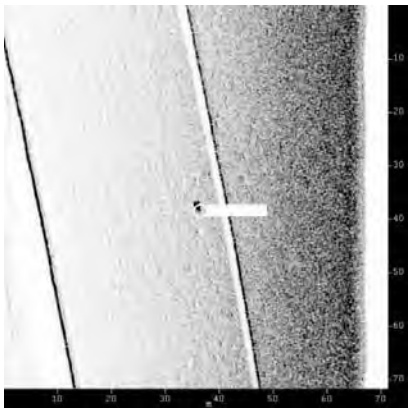


T-037

- Sonar Time at Target: 09/26/2011 19:29:43
- Click Position (Lat/Lon Coordinates)
  34° 25.35942' N 120° 05.01480' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 216606.30 (Y) 3813334.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.jsf
- Ping Number: 16066
- Range to Target: -44.94 Meters
- Fish Height: 10.25 Meters
- Heading: 35.500 degrees
- Event Number: 0
- Line Name: 204

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.9 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: unidentified contact

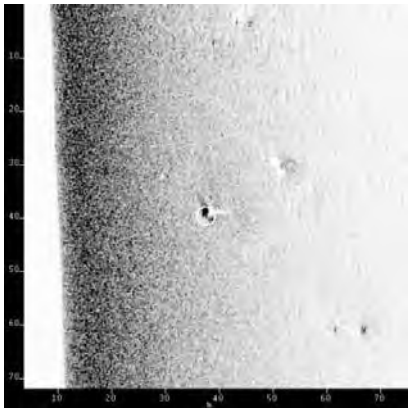


T-038

- Sonar Time at Target: 09/26/2011 19:25:30
- Click Position (Lat/Lon Coordinates)
  34° 25.17242' N 120° 05.22811' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 216268.78 (Y) 3812998.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.jsf
- Ping Number: 14065
- Range to Target: -39.21 Meters
- Fish Height: 8.93 Meters
- Heading: 34.100 degrees
- Event Number: 0
- Line Name: 204

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.3 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: probable crab trap

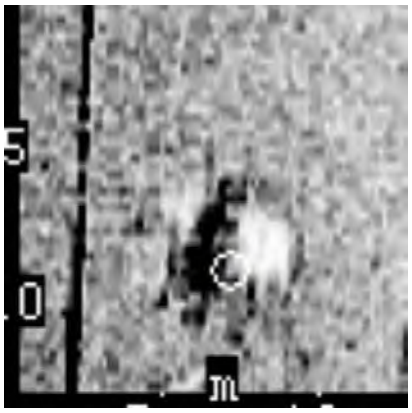


T-039

- Sonar Time at Target: 09/18/2011 19:38:48
- Click Position (Lat/Lon Coordinates)
  34° 24.86457' N 120° 05.31646' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 216115.95 (Y) 3812433.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\211B.jsf
- Ping Number: 14171
- Range to Target: 35.81 Meters
- Fish Height: 9.37 Meters
- Heading: 26.000 degrees
- Event Number: 0
- Line Name: 211B

Dimensions
Target Height: = 0.8 Meters
Target Length: 3.3 Meters
Target Shadow: 3.6 Meters
Target Width: 1.5 Meters

Description: seafloor outcrop

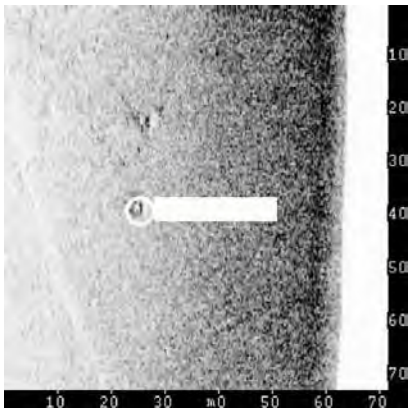


T-040

- Sonar Time at Target: 09/26/2011 21:27:40
- Click Position (Lat/Lon Coordinates)
  34° 24.81445' N 120° 05.52658' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 215791.28 (Y) 3812350.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\207a.001.jsf
- Ping Number: 25973
- Range to Target: 31.14 Meters
- Fish Height: 12.30 Meters
- Heading: 206.390 degrees
- Event Number: 0
- Line Name: 207a.001

Dimensions
Target Height: = 0.7 Meters
Target Length: 3.3 Meters
Target Shadow: 2.1 Meters
Target Width: 1.4 Meters

Description: probable seafloor outcropping

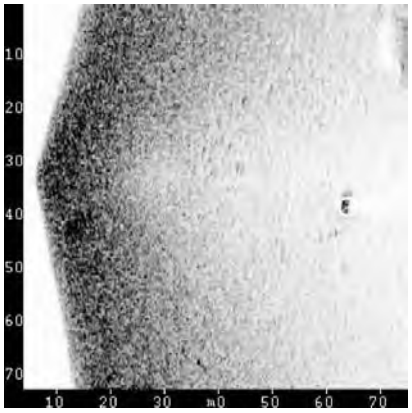


T-041

- Sonar Time at Target: 09/25/2011 15:13:54
- Click Position (Lat/Lon Coordinates)
  34° 24.71099' N 120° 05.76828' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 215414.97 (Y) 3812170.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\408.jsf
- Ping Number: 10804
- Range to Target: -49.62 Meters
- Fish Height: 12.74 Meters
- Heading: 2.190 degrees
- Event Number: 0
- Line Name: 408

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.1 Meters
Target Shadow: 0.0 Meters
Target Width: 2.6 Meters

Description: unidentified contact

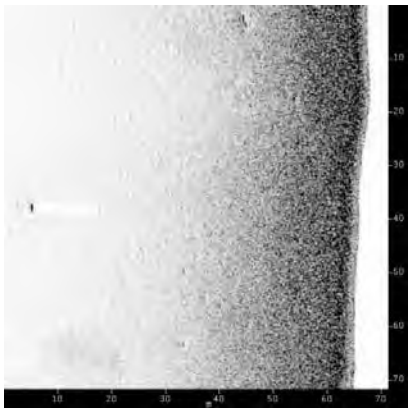


T-042

- Sonar Time at Target: 09/19/2011 18:38:33
- Click Position (Lat/Lon Coordinates)
  34° 24.45442' N 120° 05.62362' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 215622.47 (Y) 3811689.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\322.jsf
- Ping Number: 42232
- Range to Target: 63.05 Meters
- Fish Height: 7.18 Meters
- Heading: 166.000 degrees
- Event Number: 0
- Line Name: 322

Dimensions
Target Height: = 0.6 Meters
Target Length: 8.4 Meters
Target Shadow: 6.5 Meters
Target Width: 1.9 Meters

Description: seafloor outcrop

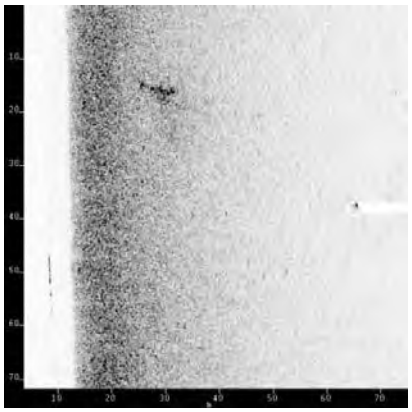


T-043

- Sonar Time at Target: 09/26/2011 19:10:18
- Click Position (Lat/Lon Coordinates)
  34° 24.51416' N 120° 06.08551' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 214918.23 (Y) 3811821.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\204.jsf
- Ping Number: 6854
- Range to Target: -69.62 Meters
- Fish Height: 9.52 Meters
- Heading: 37.800 degrees
- Event Number: 0
- Line Name: 204

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.9 Meters
Target Shadow: 0.0 Meters
Target Width: 1.3 Meters

Description: unidentified contact

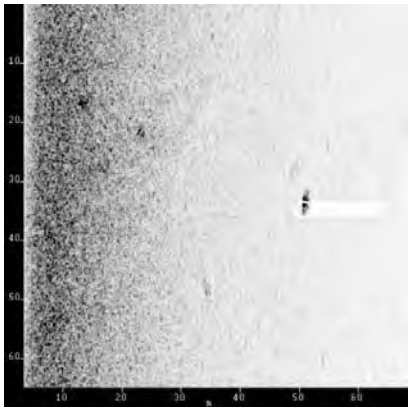


T-044

- Sonar Time at Target: 09/24/2011 18:01:29
- Click Position (Lat/Lon Coordinates)
  34° 24.11270' N 120° 06.00448' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 215019.42 (Y) 3811075.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\403.jsf
- Ping Number: 93510
- Range to Target: 65.14 Meters
- Fish Height: 13.91 Meters
- Heading: 358.690 degrees
- Event Number: 0
- Line Name: 403

Dimensions
Target Height: = 0.1 Meters
Target Length: 2.1 Meters
Target Shadow: 0.8 Meters
Target Width: 0.6 Meters

Description: unidentified contact

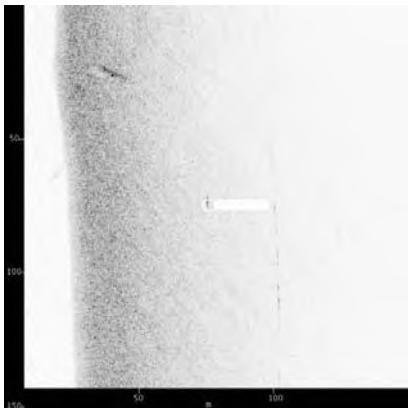


T-045

- Sonar Time at Target: 09/24/2011 16:26:53
- Click Position (Lat/Lon Coordinates)
  34° 24.03167' N 120° 05.73577' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 215426.86 (Y) 3810913.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\318.jsf
- Ping Number: 48627
- Range to Target: 57.44 Meters
- Fish Height: 10.10 Meters
- Heading: 160.890 degrees
- Event Number: 0
- Line Name: 318

Dimensions
Target Height: = 0.6 Meters
Target Length: 4.7 Meters
Target Shadow: 0.0 Meters
Target Width: 4.0 Meters

Description: unidentified contact

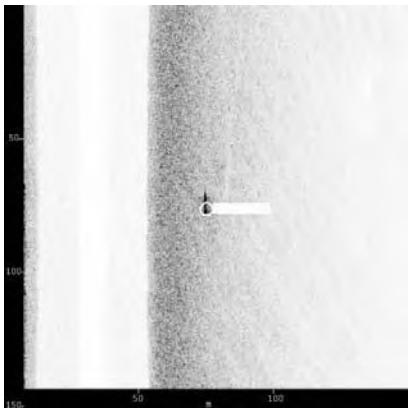


T-046

- Sonar Time at Target: 09/23/2011 22:55:53
- Click Position (Lat/Lon Coordinates)
  34° 24.15870' N 120° 06.03378' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 214977.08 (Y) 3811162.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\516.002.jsf
- Ping Number: 115525
- Range to Target: 75.36 Meters
- Fish Height: 24.02 Meters
- Heading: 48.500 degrees
- Event Number: 0
- Line Name: 516.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.6 Meters
Target Shadow: 0.0 Meters
Target Width: 1.0 Meters

Description: Linear contact

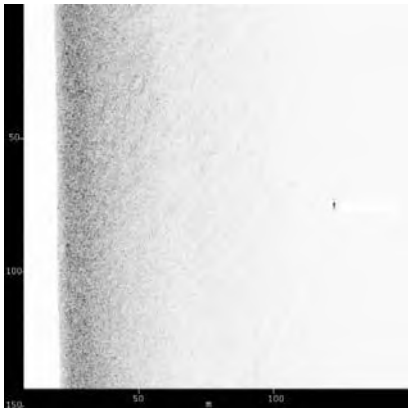


T-047

- Sonar Time at Target: 09/26/2011 00:29:34
- Click Position (Lat/Lon Coordinates)
  34° 23.86848' N 120° 06.37664' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 214435.00 (Y) 3810641.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\508_001.jsf
- Ping Number: 107283
- Range to Target: 41.07 Meters
- Fish Height: 21.39 Meters
- Heading: 224.700 degrees
- Event Number: 0
- Line Name: 508_001

Dimensions
Target Height: = 0.0 Meters
Target Length: 9.5 Meters
Target Shadow: 0.0 Meters
Target Width: 1.2 Meters

Description: unidentifed contact

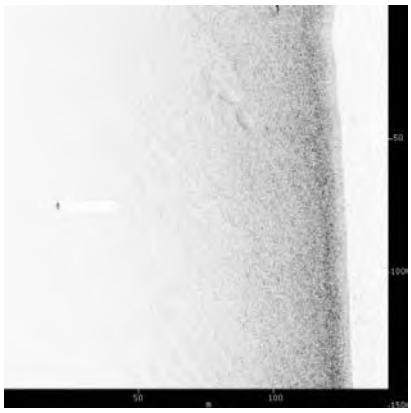


T-048

- Sonar Time at Target: 09/27/2011 01:08:19
- Click Position (Lat/Lon Coordinates)
  34° 23.87809' N 120° 06.53594' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 214191.61 (Y) 3810666.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\921X.jsf
- Ping Number: 126686
- Range to Target: 122.34 Meters
- Fish Height: 23.14 Meters
- Heading: 297.800 degrees
- Event Number: 0
- Line Name: 921X

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.9 Meters
Target Shadow: 0.0 Meters
Target Width: 0.7 Meters

Description: linear contact

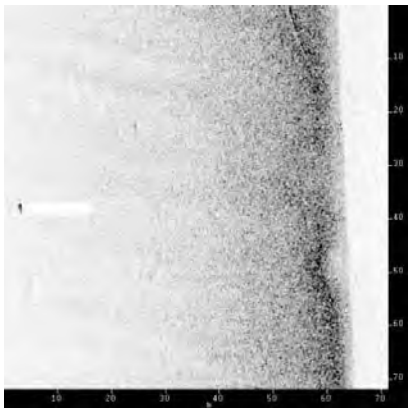


T-049

- Sonar Time at Target: 09/23/2011 22:46:04
- Click Position (Lat/Lon Coordinates)
  34° 23.96392' N 120° 06.70715' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213933.94 (Y) 3810833.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\516.002.jsf
- Ping Number: 112921
- Range to Target: -129.88 Meters
- Fish Height: 23.73 Meters
- Heading: 48.890 degrees
- Event Number: 0
- Line Name: 516.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.8 Meters
Target Shadow: 0.0 Meters
Target Width: 1.7 Meters

Description: Unidentified contact

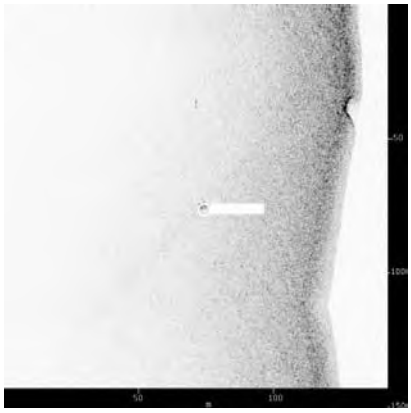


T-050

- Sonar Time at Target: 09/24/2011 18:58:53
- Click Position (Lat/Lon Coordinates)
  34° 23.68606' N 120° 06.19079' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 214709.72 (Y) 3810295.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\404.jsf
- Ping Number: 120743
- Range to Target: -71.94 Meters
- Fish Height: 13.18 Meters
- Heading: 0.300 degrees
- Event Number: 0
- Line Name: 404

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.7 Meters
Target Shadow: 0.0 Meters
Target Width: 0.8 Meters

Description: unidentified contact

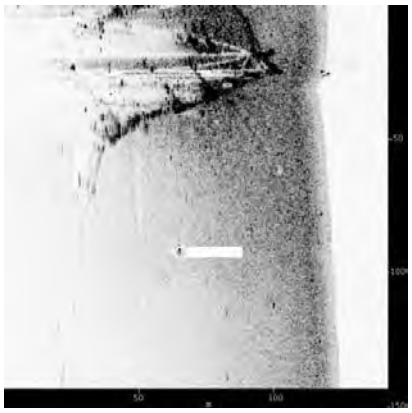


T-051

- Sonar Time at Target: 09/23/2011 22:43:26
- Click Position (Lat/Lon Coordinates)
  34° 23.85841' N 120° 06.85638' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213699.34 (Y) 3810645.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\516.002.jsf
- Ping Number: 112225
- Range to Target: -75.82 Meters
- Fish Height: 24.90 Meters
- Heading: 48.300 degrees
- Event Number: 0
- Line Name: 516.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.2 Meters
Target Shadow: 0.0 Meters
Target Width: 2.2 Meters

Description: Unidentified contact

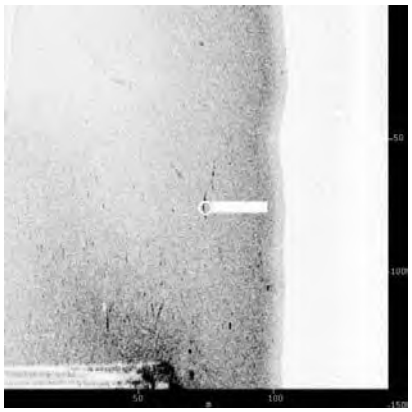


T-052

- Sonar Time at Target: 09/24/2011 01:38:30
- Click Position (Lat/Lon Coordinates)
  34° 23.45626' N 120° 07.25555' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213064.53 (Y) 3809920.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\518.001.jsf
- Ping Number: 158612
- Range to Target: -84.95 Meters
- Fish Height: 29.59 Meters
- Heading: 50.100 degrees
- Event Number: 0
- Line Name: 518.001

Dimensions
Target Height: = 0.6 Meters
Target Length: 4.6 Meters
Target Shadow: 1.7 Meters
Target Width: 1.9 Meters

Description: Unidentified contact around structure



T-053

- Sonar Time at Target: 09/24/2011 01:37:02
- Click Position (Lat/Lon Coordinates)
  34° 23.40087' N 120° 07.34252' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 212928.25 (Y) 3809822.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\518.001.jsf
- Ping Number: 158225
- Range to Target: -58.51 Meters
- Fish Height: 35.15 Meters
- Heading: 50.600 degrees
- Event Number: 0
- Line Name: 518.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 9.0 Meters
Target Shadow: 0.0 Meters
Target Width: 0.9 Meters

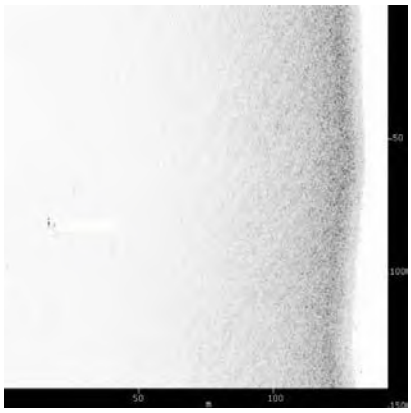
Description: Linear contact around structure

T-054

- Sonar Time at Target: 09/23/2011 23:31:16
- Click Position (Lat/Lon Coordinates)
  34° 23.48144' N 120° 07.04177' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213393.56 (Y) 3809956.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\510.jsf
- Ping Number: 124898
- Range to Target: 44.07 Meters
- Fish Height: 30.17 Meters
- Heading: 225.590 degrees
- Event Number: 0
- Line Name: 510

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.6 Meters
Target Shadow: 0.0 Meters
Target Width: 0.9 Meters

Description: probable crab trap

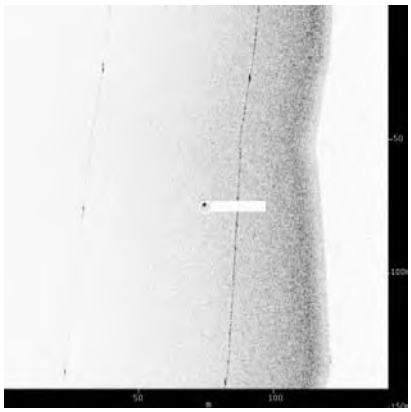


T-055

- Sonar Time at Target: 09/27/2011 01:00:38
- Click Position (Lat/Lon Coordinates)
  34° 23.39675' N 120° 06.13952' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 214772.22 (Y) 3809758.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\921X.jsf
- Ping Number: 124647
- Range to Target: -130.51 Meters
- Fish Height: 21.09 Meters
- Heading: 299.400 degrees
- Event Number: 0
- Line Name: 921X

Dimensions
Target Height: = 0.0 Meters
Target Length: 8.6 Meters
Target Shadow: 0.0 Meters
Target Width: 4.1 Meters

Description: unidentified contact

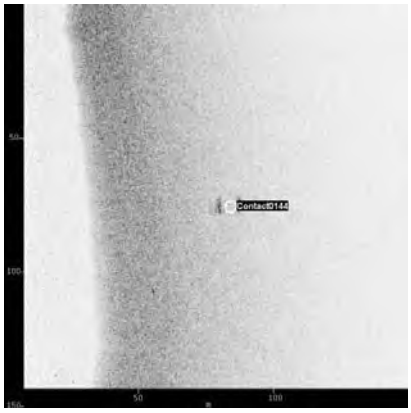


T-056

- Sonar Time at Target: 09/24/2011 01:22:49
- Click Position (Lat/Lon Coordinates)
  34° 22.99713' N 120° 08.25439' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 211506.81 (Y) 3809118.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\518.001.jsf
- Ping Number: 154454
- Range to Target: -69.81 Meters
- Fish Height: 28.71 Meters
- Heading: 50.190 degrees
- Event Number: 0
- Line Name: 518.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.7 Meters
Target Shadow: 0.0 Meters
Target Width: 1.7 Meters

Description: Unidentified contact next to pipeline

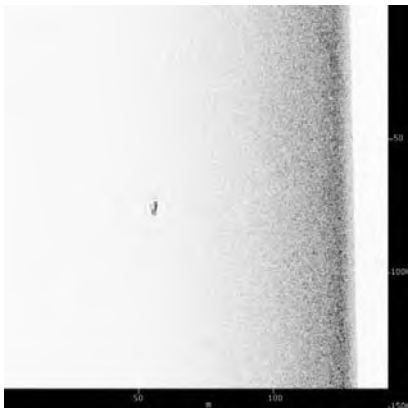


T-057

- Sonar Time at Target: 09/26/2011 16:54:05
- Click Position (Lat/Lon Coordinates)
  34° 23.13812' N 120° 09.55581' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 209519.94 (Y) 3809441.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\913X.jsf
- Ping Number: 28025
- Range to Target: 83.57 Meters
- Fish Height: 34.28 Meters
- Heading: 130.700 degrees
- Event Number: 0
- Line Name: 913X

Dimensions
Target Height: = 0.0 Meters
Target Length: 12.2 Meters
Target Shadow: 0.0 Meters
Target Width: 6.2 Meters

Description: unidentified contact

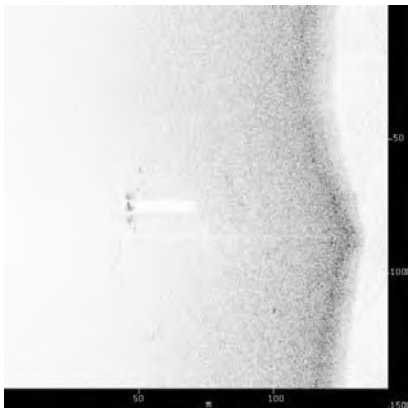


T-058

- Sonar Time at Target: 09/20/2011 18:52:44
- Click Position (Lat/Lon Coordinates)
  34° 23.17840' N 120° 07.44689' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 212755.52 (Y) 3809415.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\526.002.jsf
- Ping Number: 44471
- Range to Target: 95.30 Meters
- Fish Height: 21.39 Meters
- Heading: 51.890 degrees
- Event Number: 0
- Line Name: 526.002

Dimensions
Target Height: = 0.8 Meters
Target Length: 7.8 Meters
Target Shadow: 4.1 Meters
Target Width: 3.1 Meters

Description: unidentified contact

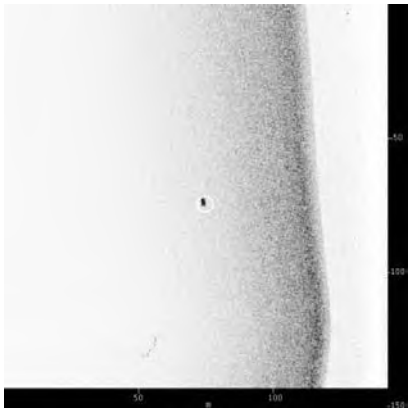


T-059

- Sonar Time at Target: 09/25/2011 19:43:17
- Click Position (Lat/Lon Coordinates)
  34° 22.88795' N 120° 07.76962' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 212243.88 (Y) 3808894.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\5260.jsf
- Ping Number: 31428
- Range to Target: 104.33 Meters
- Fish Height: 20.80 Meters
- Heading: 233.590 degrees
- Event Number: 0
- Line Name: 5260

Dimensions
Target Height: = 0.0 Meters
Target Length: 12.2 Meters
Target Shadow: 0.0 Meters
Target Width: 3.7 Meters

Description: unidentified contact
(possible geologic)

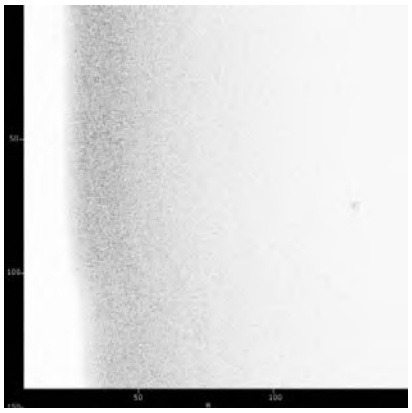


T-060

- Sonar Time at Target: 09/20/2011 22:17:58
- Click Position (Lat/Lon Coordinates)
  34° 23.07266' N 120° 06.94473' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213519.20 (Y) 3809196.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\529.002.jsf
- Ping Number: 98855
- Range to Target: 65.23 Meters
- Fish Height: 21.68 Meters
- Heading: 50.390 degrees
- Event Number: 0
- Line Name: 529.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.1 Meters
Target Shadow: 0.0 Meters
Target Width: 1.6 Meters

Description: unidentified contact

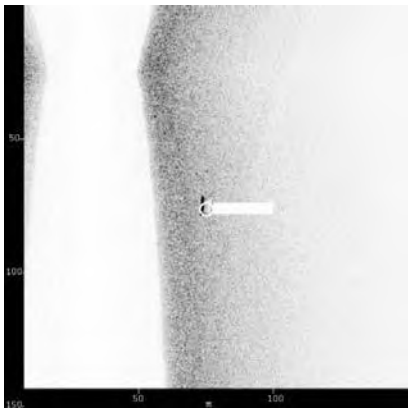


T-061

- Sonar Time at Target: 09/21/2011 18:36:11
- Click Position (Lat/Lon Coordinates)
  34° 22.71446' N 120° 07.12371' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213224.67 (Y) 3808542.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\525.jsf
- Ping Number: 33508
- Range to Target: 129.16 Meters
- Fish Height: 22.85 Meters
- Heading: 39.690 degrees
- Event Number: 0
- Line Name: 525

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.4 Meters
Target Shadow: 0.0 Meters
Target Width: 3.6 Meters

Description: unidentified contact

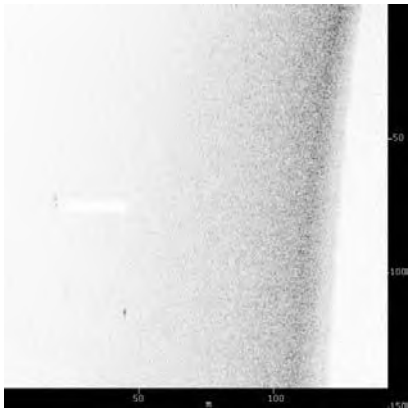


T-062

- Sonar Time at Target: 09/25/2011 19:51:23
- Click Position (Lat/Lon Coordinates)
  34° 22.71743' N 120° 08.39492' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 211275.34 (Y) 3808608.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\5260.001.jsf
- Ping Number: 33574
- Range to Target: 39.79 Meters
- Fish Height: 26.07 Meters
- Heading: 227.900 degrees
- Event Number: 0
- Line Name: 5260.001

Dimensions
Target Height: = 1.5 Meters
Target Length: 7.0 Meters
Target Shadow: 2.8 Meters
Target Width: 1.4 Meters

Description: unidentified contact

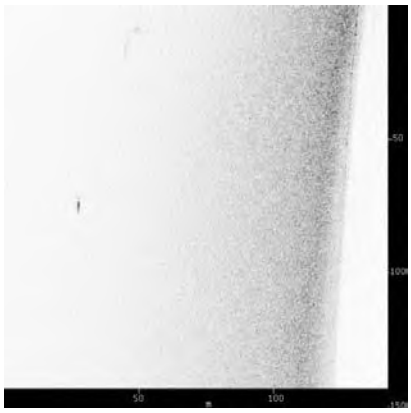


T-063

- Sonar Time at Target: 09/25/2011 19:49:59
- Click Position (Lat/Lon Coordinates)
  34° 22.68196' N 120° 08.24798' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 211499.27 (Y) 3808535.50
- Map Proj: UTM83-11
- Acoustic Source File: D:\California
Exxon\24111058\Deepwater\Sonar
Wiz\XTF\5260.001.jsf
- Ping Number: 33204
- Range to Target: -130.37 Meters
- Fish Height: 25.49 Meters
- Heading: 229.290 degrees
- Event Number: 0
- Line Name: 5260.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 5.6 Meters
Target Shadow: 0.0 Meters
Target Width: 2.3 Meters

Description: unidentified contact

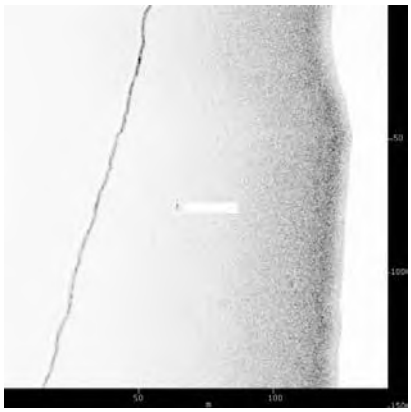


T-064

- Sonar Time at Target: 09/20/2011 20:13:31
- Click Position (Lat/Lon Coordinates)
  34° 22.88520' N 120° 07.45788' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 212721.77 (Y) 3808874.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\521.001.jsf
- Ping Number: 65878
- Range to Target: -122.06 Meters
- Fish Height: 25.19 Meters
- Heading: 224.500 degrees
- Event Number: 0
- Line Name: 521.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 6.8 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: unidentified contact

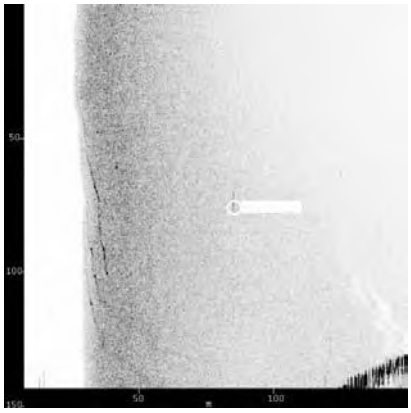


T-065

- Sonar Time at Target: 09/24/2011 01:02:14
- Click Position (Lat/Lon Coordinates)
  34° 22.65678' N 120° 09.20013' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 210037.81 (Y) 3808534.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\518.jsf
- Ping Number: 149002
- Range to Target: -84.94 Meters
- Fish Height: 24.61 Meters
- Heading: 97.890 degrees
- Event Number: 0
- Line Name: 518

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.5 Meters
Target Shadow: 0.0 Meters
Target Width: 0.8 Meters

Description: Linear contact next to pipeline

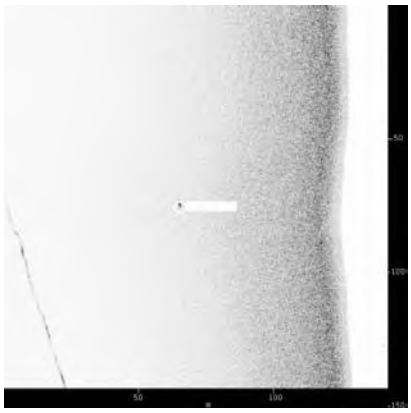


T-066

- Sonar Time at Target: 09/23/2011 19:00:43
- Click Position (Lat/Lon Coordinates)
  34° 22.58193' N 120° 10.01861' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 208778.36 (Y) 3808435.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\6041.jsf
- Ping Number: 53227
- Range to Target: 85.48 Meters
- Fish Height: 29.68 Meters
- Heading: 226.700 degrees
- Event Number: 0
- Line Name: 6041

Dimensions
Target Height: = 0.0 Meters
Target Length: 6.5 Meters
Target Shadow: 0.0 Meters
Target Width: 1.2 Meters

Description: Linear contact next to structure

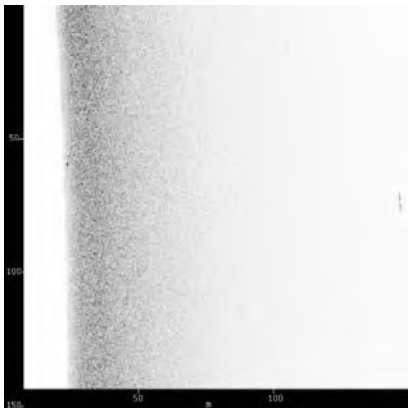


T-067

- Sonar Time at Target: 09/23/2011 17:50:37
- Click Position (Lat/Lon Coordinates)
  34° 22.45674' N 120° 10.92269' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 207385.19 (Y) 3808247.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\603.001.jsf
- Ping Number: 34651
- Range to Target: 85.32 Meters
- Fish Height: 26.37 Meters
- Heading: 54.600 degrees
- Event Number: 0
- Line Name: 603.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.3 Meters
Target Shadow: 0.0 Meters
Target Width: 1.2 Meters

Description: unidentified contact

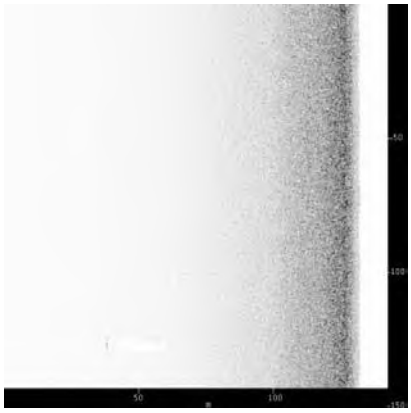


T-069

- Sonar Time at Target: 09/23/2011 00:26:32
- Click Position (Lat/Lon Coordinates)
  34° 22.26516' N 120° 09.62768' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 209359.56 (Y) 3807830.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\707.jsf
- Ping Number: 139008
- Range to Target: 146.68 Meters
- Fish Height: 25.19 Meters
- Heading: 262.300 degrees
- Event Number: 0
- Line Name: 707

Dimensions
Target Height: = 0.0 Meters
Target Length: 7.1 Meters
Target Shadow: 0.0 Meters
Target Width: 1.1 Meters

Description: Linear contact

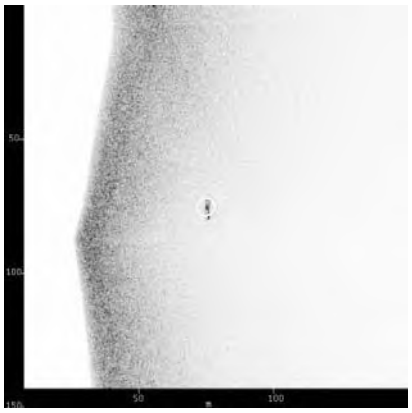


T-070

- Sonar Time at Target: 09/22/2011 23:47:46
- Click Position (Lat/Lon Coordinates)
  34° 22.20932' N 120° 09.51004' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 209536.89 (Y) 3807721.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\714.004.jsf
- Ping Number: 128733
- Range to Target: -111.27 Meters
- Fish Height: 19.33 Meters
- Heading: 78.790 degrees
- Event Number: 0
- Line Name: 714.004

Dimensions
Target Height: = 0.0 Meters
Target Length: 5.7 Meters
Target Shadow: 0.0 Meters
Target Width: 1.0 Meters

Description: Linear contact

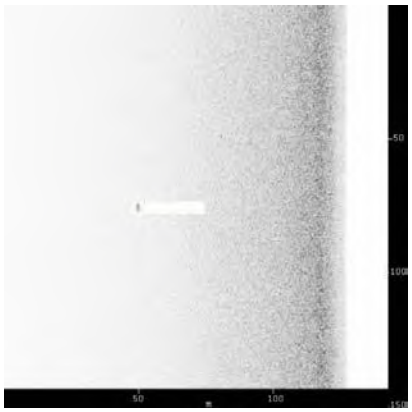


T-071

- Sonar Time at Target: 09/20/2011 17:17:14
- Click Position (Lat/Lon Coordinates)
  34° 22.07977' N 120° 09.32739' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 209809.34 (Y) 3807473.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\530.001.jsf
- Ping Number: 19169
- Range to Target: 61.82 Meters
- Fish Height: 17.87 Meters
- Heading: 232.500 degrees
- Event Number: 0
- Line Name: 530.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 8.9 Meters
Target Shadow: 0.0 Meters
Target Width: 2.3 Meters

Description: unidentified contact

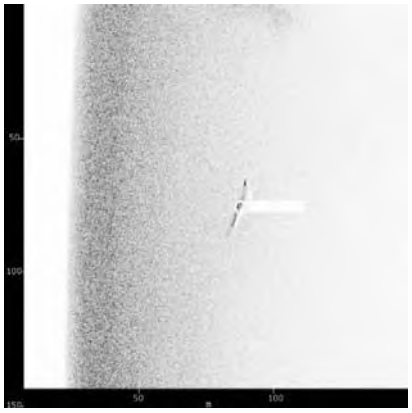


T-072

- Sonar Time at Target: 09/22/2011 20:21:39
- Click Position (Lat/Lon Coordinates)
  34° 22.04566' N 120° 09.78790' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 209101.30 (Y) 3807432.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\709.jsf
- Ping Number: 74120
- Range to Target: 101.11 Meters
- Fish Height: 25.49 Meters
- Heading: 257.190 degrees
- Event Number: 0
- Line Name: 709

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.6 Meters
Target Shadow: 0.0 Meters
Target Width: 1.7 Meters

Description: Unidentified contact

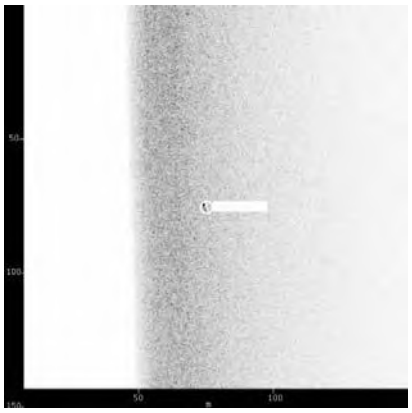


T-073

- Sonar Time at Target: 09/23/2011 01:20:36
- Click Position (Lat/Lon Coordinates)
  34° 21.69548' N 120° 13.50677' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 203378.58 (Y) 3806964.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\707.002.jsf
- Ping Number: 153334
- Range to Target: 86.22 Meters
- Fish Height: 25.78 Meters
- Heading: 235.500 degrees
- Event Number: 0
- Line Name: 707.002

Dimensions
Target Height: = 0.0 Meters
Target Length: 17.2 Meters
Target Shadow: 0.0 Meters
Target Width: 2.0 Meters

Description: Unidentified contact
(probable sediment)

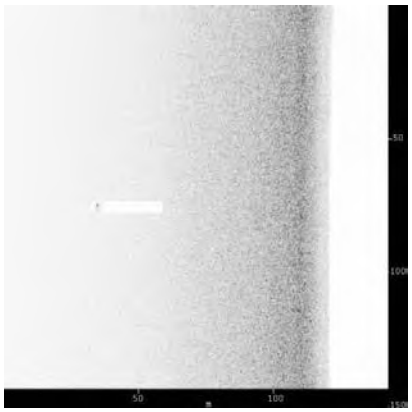


T-074

- Sonar Time at Target: 09/22/2011 00:23:01
- Click Position (Lat/Lon Coordinates)
  34° 21.44508' N 120° 13.16665' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 203885.30 (Y) 3806485.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\718.001.jsf
- Ping Number: 12035
- Range to Target: 53.49 Meters
- Fish Height: 28.42 Meters
- Heading: 59.800 degrees
- Event Number: 0
- Line Name: 718.001

Dimensions
Target Height: = 0.3 Meters
Target Length: 5.8 Meters
Target Shadow: 0.6 Meters
Target Width: 0.8 Meters

Description: Unidentied contact

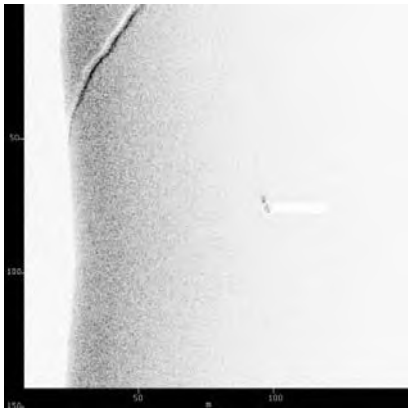


T-076

- Sonar Time at Target: 09/28/2011 00:28:54
- Click Position (Lat/Lon Coordinates)
  34° 21.16401' N 120° 15.17440' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 200789.56 (Y) 3806063.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\719.jsf
- Ping Number: 139636
- Range to Target: -114.38 Meters
- Fish Height: 31.35 Meters
- Heading: 65.390 degrees
- Event Number: 0
- Line Name: 719

Dimensions
Target Height: = 0.2 Meters
Target Length: 3.2 Meters
Target Shadow: 0.9 Meters
Target Width: 1.3 Meters

Description: unidentified contact

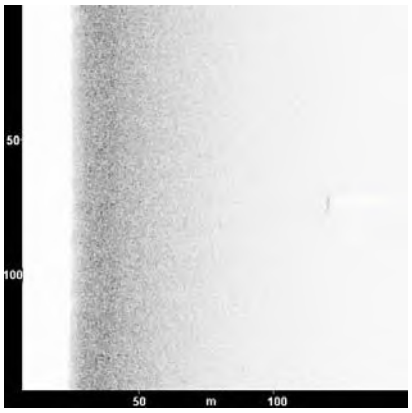


T-077

- Sonar Time at Target: 09/27/2011 23:09:54
- Click Position (Lat/Lon Coordinates)
  34° 21.52519' N 120° 16.71752' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198444.31 (Y) 3806807.50
- Map Proj: UTM83-11
- Acoustic Source File: D:\California Exxon\24111058\Deepwater\Sonar Wiz\XTF\3005.jsf
- Ping Number: 118703
- Range to Target: 97.85 Meters
- Fish Height: 29.00 Meters
- Heading: 171.600 degrees
- Event Number: 0
- Line Name: 3005

Dimensions
Target Height: = 0.0 Meters
Target Length: 7.3 Meters
Target Shadow: 0.0 Meters
Target Width: 2.0 Meters

Description: unidentified contact (probable sediment mound)

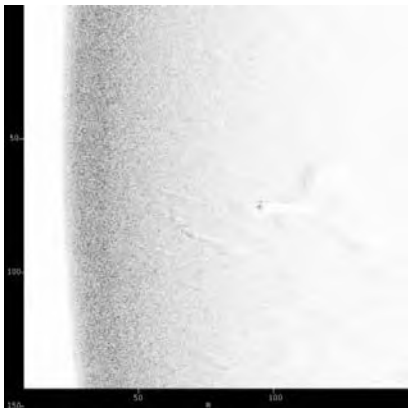


T-078

- Sonar Time at Target: 09/27/2011 19:33:37
- Click Position (Lat/Lon Coordinates)
  34° 21.14822' N 120° 15.22613' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 200709.20 (Y) 3806037.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\720.jsf
- Ping Number: 77671
- Range to Target: 120.11 Meters
- Fish Height: 29.00 Meters
- Heading: 239.900 degrees
- Event Number: 0
- Line Name: 720

Dimensions
Target Height >= 0 Meters
Target Length2 Meters
Target Shadow:0 Meters
Target Width:0 Meters

Description: unidentified contact

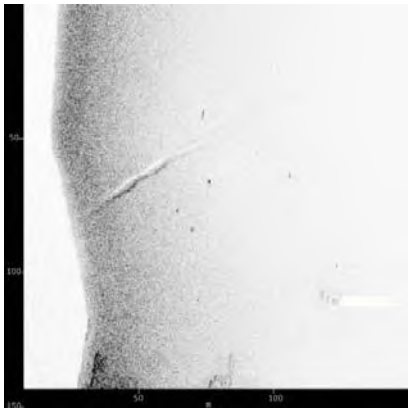


T-079

- Sonar Time at Target: 09/22/2011 00:01:30
- Click Position (Lat/Lon Coordinates)
  34° 20.98457' N 120° 14.53994' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 201752.05 (Y) 3805700.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\718.jsf
- Ping Number: 6350
- Range to Target: 93.99 Meters
- Fish Height: 23.73 Meters
- Heading: 57.600 degrees
- Event Number: 0
- Line Name: 718

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.9 Meters
Target Shadow: 0.0 Meters
Target Width: 2.7 Meters

Description: Unidentified contact

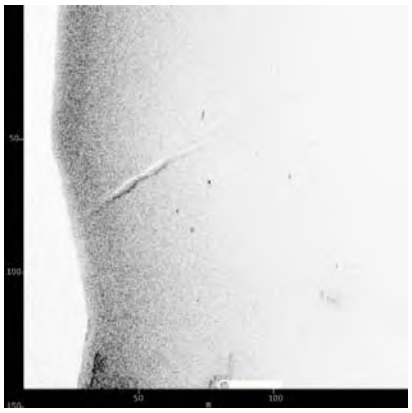


T-080

- Sonar Time at Target: 09/27/2011 17:34:54
- Click Position (Lat/Lon Coordinates)
  34° 20.83808' N 120° 16.64154' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198520.28 (Y) 3805533.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\722.001.jsf
- Ping Number: 46216
- Range to Target: 119.96 Meters
- Fish Height: 33.69 Meters
- Heading: 254.500 degrees
- Event Number: 0
- Line Name: 722.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 8.5 Meters
Target Shadow: 0.0 Meters
Target Width: 3.0 Meters

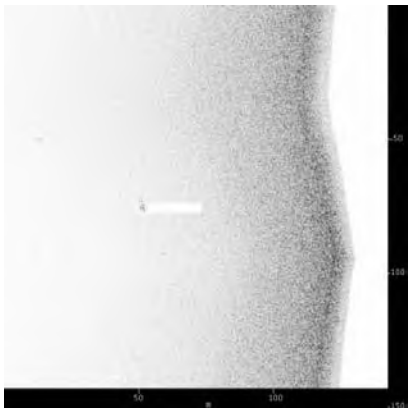
Description: unidentified
sediment variation



T-082

- Sonar Time at Target: 09/27/2011 17:35:15
- Click Position (Lat/Lon Coordinates)
  34° 20.82115' N 120° 16.69052' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198443.64 (Y) 3805504.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\722.001.jsf
- Ping Number: 46305
- Range to Target: 80.19 Meters
- Fish Height: 29.00 Meters
- Heading: 256.000 degrees
- Event Number: 0
- Line Name: 722.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 11.5 Meters
Target Shadow: 0.0 Meters
Target Width: 8.9 Meters
Mag Anomaly:
Avoidance Area:
Classification 1:
Classification 2:
Area:
Block:
Description: unidentified contact next to structure

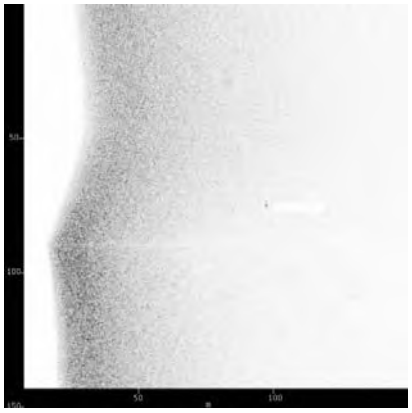


T-083

- Sonar Time at Target: 09/21/2011 23:52:21
- Click Position (Lat/Lon Coordinates)
  34° 20.90194' N 120° 15.12588' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 200848.58 (Y) 3805576.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\718.jsf
- Ping Number: 3932
- Range to Target: -98.58 Meters
- Fish Height: 24.61 Meters
- Heading: 59.000 degrees
- Event Number: 0
- Line Name: 718

Dimensions
Target Height: = 0.0 Meters
Target Length: 6.2 Meters
Target Shadow: 0.0 Meters
Target Width: 2.0 Meters

Description: Unidentified contact

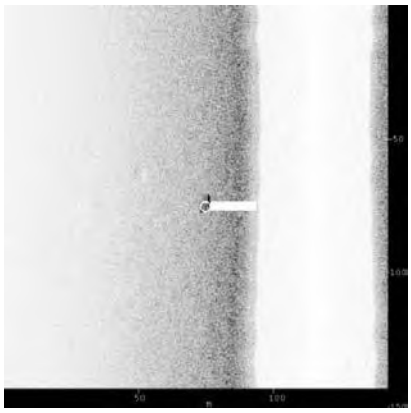


T-084

- Sonar Time at Target: 09/21/2011 23:55:22
- Click Position (Lat/Lon Coordinates)
  34° 20.86418' N 120° 14.91119' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 201175.80 (Y) 3805496.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\718.jsf
- Ping Number: 4728
- Range to Target: 96.76 Meters
- Fish Height: 22.56 Meters
- Heading: 57.890 degrees
- Event Number: 0
- Line Name: 718

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.3 Meters
Target Shadow: 0.0 Meters
Target Width: 1.2 Meters

Description: Unidentified contact

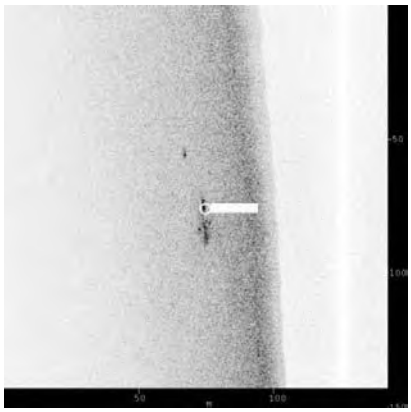


T-085

- Sonar Time at Target: 09/27/2011 18:06:41
- Click Position (Lat/Lon Coordinates)
  34° 20.96672' N 120° 17.38037' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197394.39 (Y) 3805807.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3007.jsf
- Ping Number: 54636
- Range to Target: 41.25 Meters
- Fish Height: 21.09 Meters
- Heading: 114.790 degrees
- Event Number: 0
- Line Name: 3007

Dimensions
Target Height: = 0.0 Meters
Target Length: 6.7 Meters
Target Shadow: 0.0 Meters
Target Width: 3.6 Meters

Description: unidentified contact

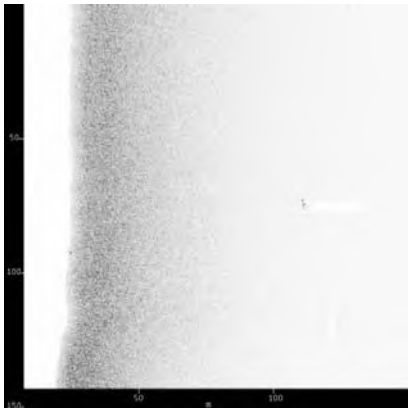


T-086

- Sonar Time at Target: 09/27/2011 18:15:33
- Click Position (Lat/Lon Coordinates)
  34° 20.86944' N 120° 16.96792' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198021.64 (Y) 3805607.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3007.jsf
- Ping Number: 56983
- Range to Target: 53.21 Meters
- Fish Height: 25.19 Meters
- Heading: 90.700 degrees
- Event Number: 0
- Line Name: 3007

Dimensions
Target Height: = 0.5 Meters
Target Length: 5.1 Meters
Target Shadow: 0.9 Meters
Target Width: 1.8 Meters

Description: unidentified contact

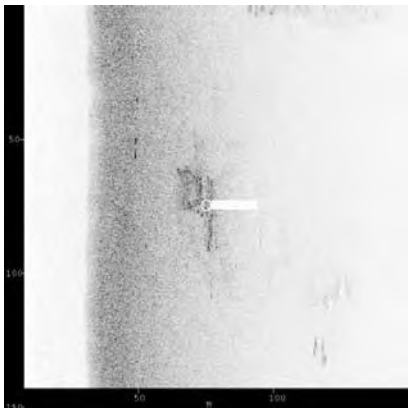


T-087

- Sonar Time at Target: 09/27/2011 15:00:50
- Click Position (Lat/Lon Coordinates)
  34° 20.92025' N 120° 14.91165' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 201178.13 (Y) 3805599.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\724.jsf
- Ping Number: 5392
- Range to Target: 110.56 Meters
- Fish Height: 28.12 Meters
- Heading: 242.090 degrees
- Event Number: 0
- Line Name: 724

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.9 Meters
Target Shadow: 0.0 Meters
Target Width: 1.4 Meters

Description: unidentified contact

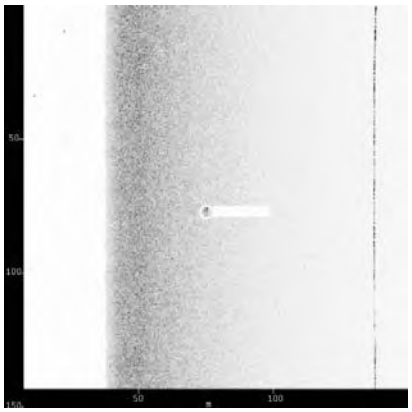


T-088

- Sonar Time at Target: 09/27/2011 18:10:38
- Click Position (Lat/Lon Coordinates)
  34° 20.86944' N 120° 17.21237' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197646.50 (Y) 3805619.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3007.jsf
- Ping Number: 55681
- Range to Target: 67.83 Meters
- Fish Height: 24.02 Meters
- Heading: 103.000 degrees
- Event Number: 0
- Line Name: 3007

Dimensions
Target Height: = 0.0 Meters
Target Length: 35.2 Meters
Target Shadow: 0.0 Meters
Target Width: 13.4 Meters

Description: unidentified contact with sediment variation

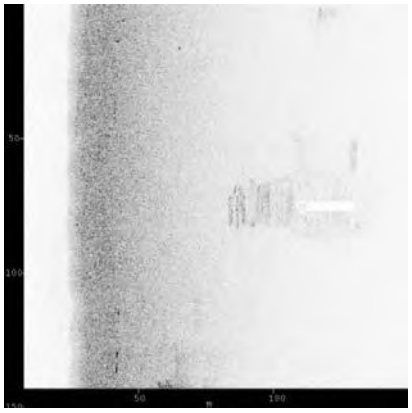


T-089

- Sonar Time at Target: 09/27/2011 17:22:59
- Click Position (Lat/Lon Coordinates)
  34° 20.87837' N 120° 15.73333' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 199915.72 (Y) 3805562.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\722.001.jsf
- Ping Number: 43056
- Range to Target: 60.54 Meters
- Fish Height: 26.95 Meters
- Heading: 240.590 degrees
- Event Number: 0
- Line Name: 722.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.6 Meters
Target Shadow: 0.0 Meters
Target Width: 1.8 Meters

Description: unidentified contact

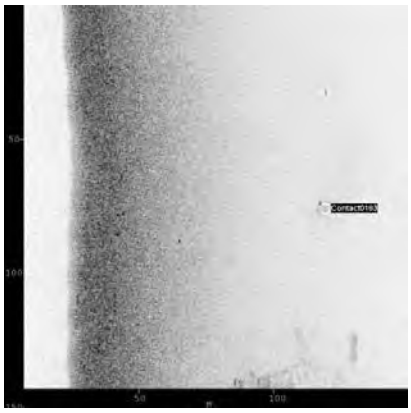


T-090

- Sonar Time at Target: 09/27/2011 18:09:42
- Click Position (Lat/Lon Coordinates)
  34° 20.85708' N 120° 17.25494' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197580.25 (Y) 3805598.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3007.jsf
- Ping Number: 55435
- Range to Target: 108.10 Meters
- Fish Height: 23.73 Meters
- Heading: 107.100 degrees
- Event Number: 0
- Line Name: 3007

Dimensions
Target Height: = 0.0 Meters
Target Length: 59.3 Meters
Target Shadow: 0.0 Meters
Target Width: 27.0 Meters

Description: unidentified sediment variation

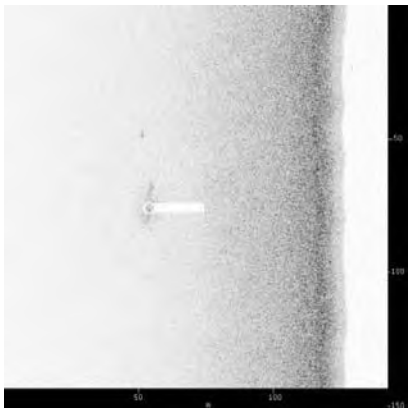


T-091

- Sonar Time at Target: 09/27/2011 18:08:58
- Click Position (Lat/Lon Coordinates)
  34° 20.85983' N 120° 17.29064' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197526.08 (Y) 3805605.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3007.jsf
- Ping Number: 55241
- Range to Target: 118.88 Meters
- Fish Height: 24.61 Meters
- Heading: 110.000 degrees
- Event Number: 0
- Line Name: 3007

Dimensions
Target Height: = 0.0 Meters
Target Length: 8.5 Meters
Target Shadow: 0.0 Meters
Target Width: 5.6 Meters

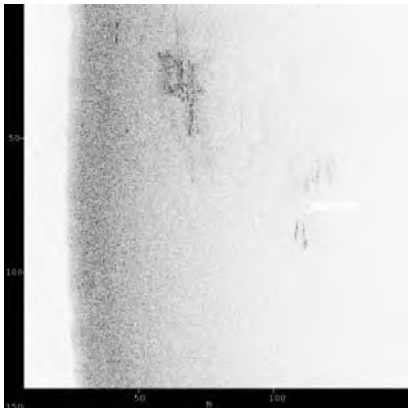
Description: unidentified sediment variation



T-092

- Sonar Time at Target: 09/27/2011 15:57:38
- Click Position (Lat/Lon Coordinates)
  34° 20.91247' N 120° 17.03063' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197927.80 (Y) 3805690.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3009.jsf
- Ping Number: 20444
- Range to Target: -96.81 Meters
- Fish Height: 23.44 Meters
- Heading: 99.500 degrees
- Event Number: 0
- Line Name: 3009

Dimensions
Target Height: = 0.0 Meters
Target Length: 17.5 Meters
Target Shadow: 0.0 Meters
Target Width: 5.9 Meters
Mag Anomaly:
Avoidance Area:
Classification 1:
Classification 2:
Area:
Block:
Description: sediment variation (possible geologic)

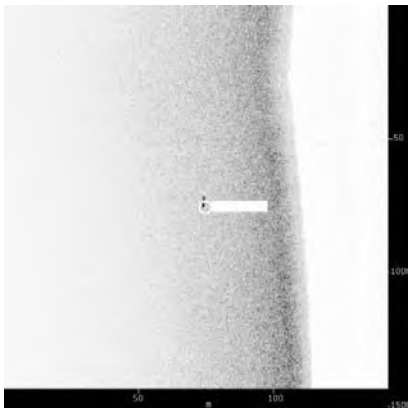


T-093

- Sonar Time at Target: 09/27/2011 18:10:53
- Click Position (Lat/Lon Coordinates)
  34° 20.83717' N 120° 17.20046' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197663.03 (Y) 3805559.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3007.jsf
- Ping Number: 55748
- Range to Target: 118.87 Meters
- Fish Height: 23.14 Meters
- Heading: 102.790 degrees
- Event Number: 0
- Line Name: 3007

Dimensions
Target Height: = 0.0 Meters
Target Length: 0.0 Meters
Target Shadow: 0.0 Meters
Target Width: 0.0 Meters

Description: unidentified contact

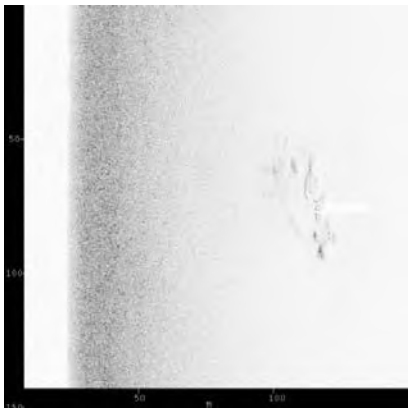


T-094

- Sonar Time at Target: 09/27/2011 17:28:28
- Click Position (Lat/Lon Coordinates)
  34° 20.74218' N 120° 16.17782' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 199225.77 (Y) 3805333.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\722.001.jsf
- Ping Number: 44511
- Range to Target: -59.12 Meters
- Fish Height: 25.78 Meters
- Heading: 246.400 degrees
- Event Number: 0
- Line Name: 722.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.7 Meters
Target Shadow: 0.0 Meters
Target Width: 1.5 Meters

Description: unidentified contact

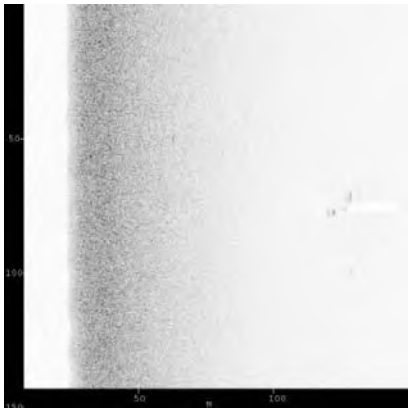


T-095

- Sonar Time at Target: 09/27/2011 16:09:06
- Click Position (Lat/Lon Coordinates)
  34° 20.68611' N 120° 16.36459' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198935.45 (Y) 3805238.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3009.jsf
- Ping Number: 23480
- Range to Target: 113.54 Meters
- Fish Height: 23.73 Meters
- Heading: 76.200 degrees
- Event Number: 0
- Line Name: 3009

Dimensions
Target Height: = 0.0 Meters
Target Length: 48.3 Meters
Target Shadow: 0.0 Meters
Target Width: 17.5 Meters

Description: unidentified contact
(possible geologic)

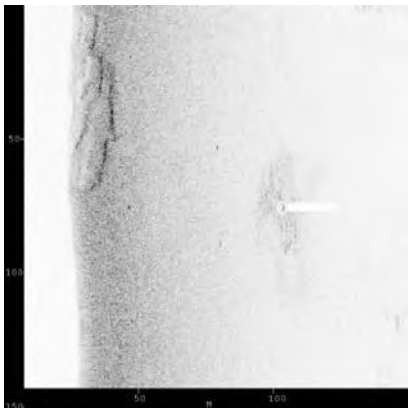


T-096

- Sonar Time at Target: 09/27/2011 16:07:26
- Click Position (Lat/Lon Coordinates)
  34° 20.68588' N 120° 16.46713' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198778.39 (Y) 3805243.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3009.jsf
- Ping Number: 23039
- Range to Target: 127.50 Meters
- Fish Height: 23.14 Meters
- Heading: 79.390 degrees
- Event Number: 0
- Line Name: 3009

Dimensions
Target Height: = 0.0 Meters
Target Length: 12.1 Meters
Target Shadow: 0.0 Meters
Target Width: 2.9 Meters

Description: unidentified contact

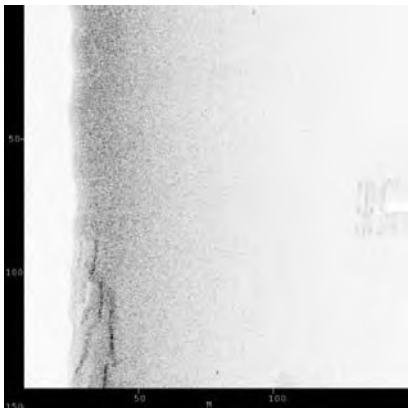


T-097

- Sonar Time at Target: 09/27/2011 15:52:57
- Click Position (Lat/Lon Coordinates)
  34° 20.89210' N 120° 17.26684' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197564.64 (Y) 3805664.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3009.jsf
- Ping Number: 19202
- Range to Target: 107.79 Meters
- Fish Height: 24.90 Meters
- Heading: 107.290 degrees
- Event Number: 0
- Line Name: 3009

Dimensions
Target Height: = 0.0 Meters
Target Length: 40.0 Meters
Target Shadow: 0.0 Meters
Target Width: 14.7 Meters

Description: unidentified sediment variation (possible geologic)

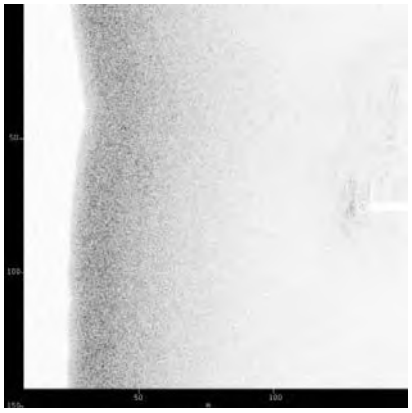


T-098

- Sonar Time at Target: 09/27/2011 15:52:03
- Click Position (Lat/Lon Coordinates)
  34° 20.88981' N 120° 17.31262' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197494.22 (Y) 3805662.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3009.jsf
- Ping Number: 18962
- Range to Target: 141.68 Meters
- Fish Height: 26.66 Meters
- Heading: 106.890 degrees
- Event Number: 0
- Line Name: 3009

Dimensions
Target Height: = 0.0 Meters
Target Length: 29.1 Meters
Target Shadow: 0.0 Meters
Target Width: 18.1 Meters

Description: unidentified contact with sediment variation

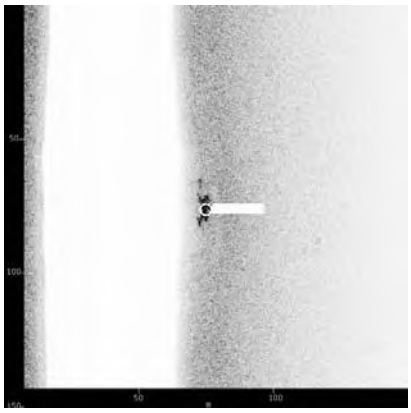


T-099

- Sonar Time at Target: 09/27/2011 15:55:43
- Click Position (Lat/Lon Coordinates)
  34° 20.82572' N 120° 17.13088' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 197768.63 (Y) 3805534.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3009.jsf
- Ping Number: 19936
- Range to Target: 135.36 Meters
- Fish Height: 25.19 Meters
- Heading: 102.890 degrees
- Event Number: 0
- Line Name: 3009

Dimensions
Target Height: = 0.0 Meters
Target Length: 32.9 Meters
Target Shadow: 0.0 Meters
Target Width: 15.4 Meters

Description: unidentified contact with sediment variation

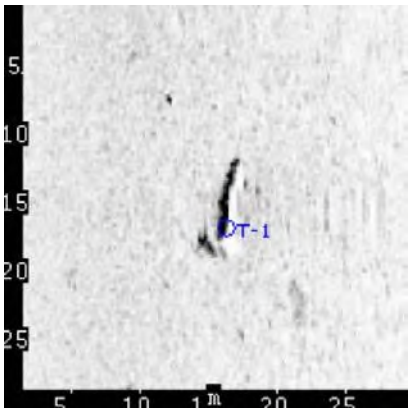


T-100

- Sonar Time at Target: 09/22/2011 17:43:53
- Click Position (Lat/Lon Coordinates)
  34° 20.51651' N 120° 16.09634' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 199337.03 (Y) 3804911.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\717.jsf
- Ping Number: 32395
- Range to Target: 34.95 Meters
- Fish Height: 26.95 Meters
- Heading: 33.800 degrees
- Event Number: 0
- Line Name: 717

Dimensions
Target Height: = 0.0 Meters
Target Length: 18.1 Meters
Target Shadow: 0.0 Meters
Target Width: 4.5 Meters

Description: Unidentified contact (Possible Hondo Tie-off can anchor)

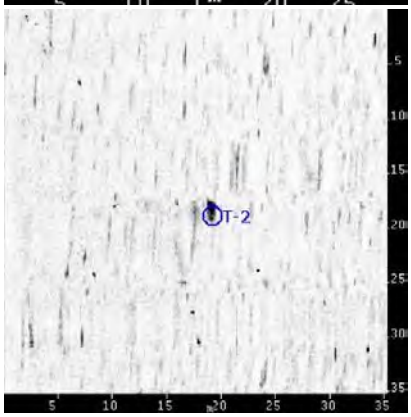


T-101

(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 19:39:18
- Click Position (Lat/Lon Coordinates)
  34° 27.46994' N 120° 02.46185' W (Local)
- Click Position (Projected Coordinates)
  (X) 220635.22 (Y) 3817118.75
- Map Proj: UTM83-11
- Fish Height: 8.69 Meters

Dimensions
Target Height: = 0.2 Meters
Target Length: 7.8 Meters
Target Shadow: 0.8 Meters
Target Width: 3.1 Meters
Description: unidentified linear object

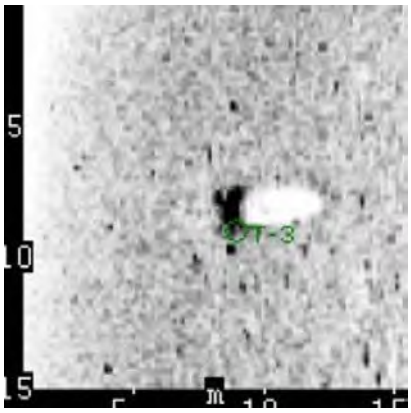


T-102

(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 21:06:49
- Click Position (Lat/Lon Coordinates)
  34° 27.44911' N 120° 02.64907' W (Local)
- Click Position (Projected Coordinates)
  (X) 220347.70 (Y) 3817088.75
- Map Proj: UTM83-11
- Fish Height: 7.32 Meters

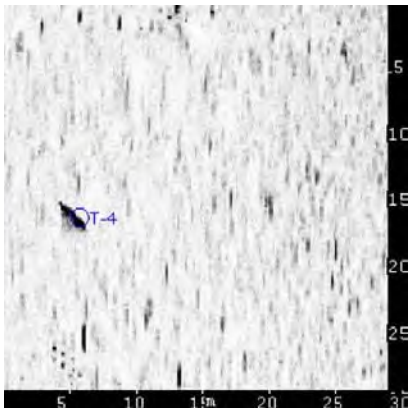
Dimensions
Target Height: = 0.0 Meters
Target Length: 2.1 Meters
Target Shadow: 0.0 Meters
Target Width: 0.9 Meters
Description: unidentified target



T-103
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 20:52:22
- Click Position (Lat/Lon Coordinates)
  34° 27.36328' N 120° 02.70858' W (Local)
- Click Position (Projected Coordinates)
  (X) 220251.78 (Y) 3816932.75
- Map Proj: UTM83-11
- Fish Height: 4.69 Meters

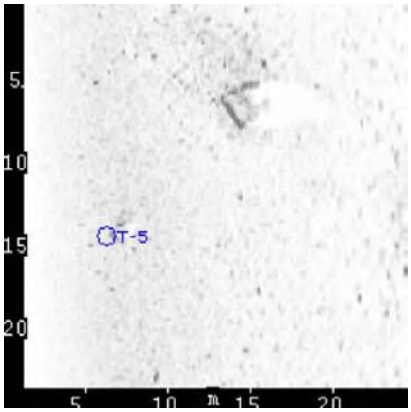
Dimensions
Target Height: = 0.8 Meters
Target Length: 2.7 Meters
Target Shadow: 2.8 Meters
Target Width: 0.8 Meters
Description: unidentified target



T-104
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 20:52:15
- Click Position (Lat/Lon Coordinates)
  34° 27.34977' N 120° 02.77038' W (Local)
- Click Position (Projected Coordinates)
  (X) 220156.22 (Y) 3816910.50
- Map Proj: UTM83-11
- Fish Height: 6.88 Meters

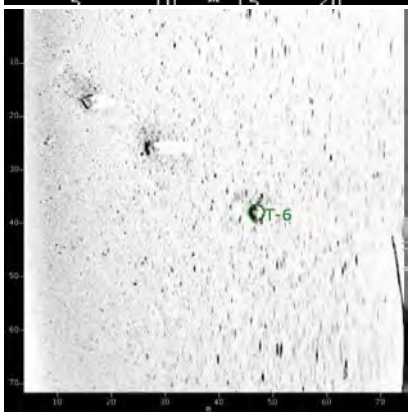
Dimensions
Target Height: = 0.0 Meters
Target Length: 2.8 Meters
Target Shadow: 0.0 Meters
Target Width: 0.7 Meters
Description: unidentified target



T-105
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 20:27:57
- Click Position (Lat/Lon Coordinates)
  34° 27.29965' N 120° 02.61795' W (Local)
- Click Position (Projected Coordinates)
  (X) 220387.13 (Y) 3816810.75
- Map Proj: UTM83-11
- Fish Height: 4.04 Meters

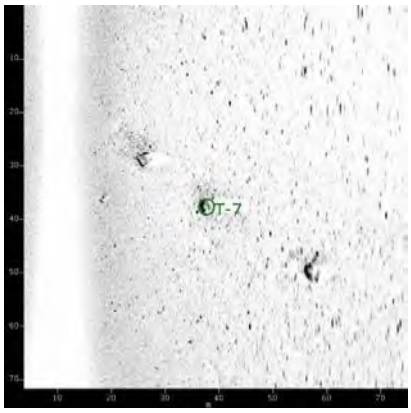
Dimensions
Target Height: = 0.0 Meters
Target Length: 0.0 Meters
Target Shadow: 0.0 Meters
Target Width: 0.0 Meters
Description: Unidentified Target



T-106
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 20:28:04
- Click Position (Lat/Lon Coordinates)
  34° 27.30949' N 120° 02.59323' W (Local)
- Click Position (Projected Coordinates)
  (X) 220425.08 (Y) 3816827.75
- Map Proj: UTM83-11
- Fish Height: 3.17 Meters

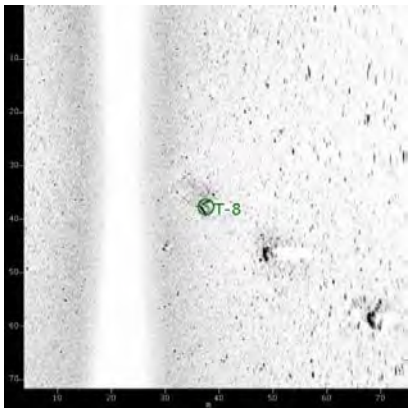
Dimensions
Target Height: = 0.3 Meters
Target Length: 6.2 Meters
Target Shadow: 4.1 Meters
Target Width: 1.4 Meters
Description: unidentified rectangular object



T-107
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 21:36:52
- Click Position (Lat/Lon Coordinates)
  34° 27.30056' N 120° 02.60375' W (Local)
- Click Position (Projected Coordinates)
  (X) 220408.88 (Y) 3816811.75
- Map Proj: UTM83-11
- Fish Height: 9.64 Meters

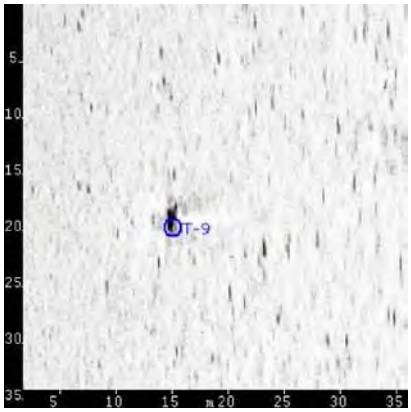
Dimensions
Target Height: = 0.6 Meters
Target Length: 2.7 Meters
Target Shadow: 7.4 Meters
Target Width: 1.4 Meters
Description: unidentified rectangular object



T-108
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 21:36:47
- Click Position (Lat/Lon Coordinates)
  34° 27.29507' N 120° 02.61245' W (Local)
- Click Position (Projected Coordinates)
  (X) 220395.16 (Y) 3816802.00
- Map Proj: UTM83-11
- Fish Height: 9.77 Meters

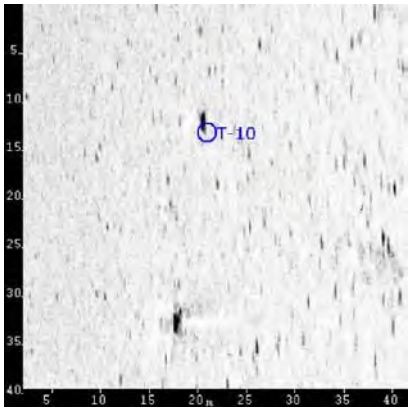
Dimensions
Target Height: = 0.0 Meters
Target Length: 3.3 Meters
Target Shadow: 0.0 Meters
Target Width: 1.8 Meters
Description: unidentified rectangular object



T-109
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 20:26:45
- Click Position (Lat/Lon Coordinates)
  34° 27.22389' N 120° 02.58361' W (Local)
- Click Position (Projected Coordinates)
  (X) 220435.44 (Y) 3816669.25
- Map Proj: UTM83-11
- Fish Height: 8.06 Meters

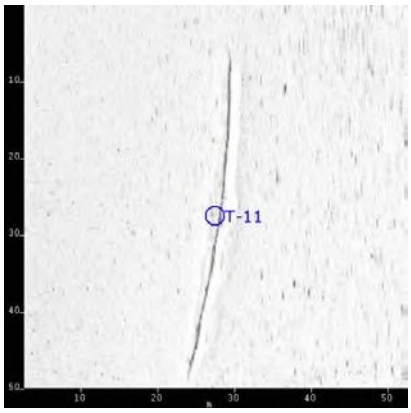
Dimensions
Target Height: = 0.8 Meters
Target Length: 2.4 Meters
Target Shadow: 4.8 Meters
Target Width: 0.9 Meters
Description: unidentified target



T-110
(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 20:26:35
- Click Position (Lat/Lon Coordinates)
  34° 27.21313' N 120° 02.57949' W (WGS84)
  34° 27.21313' N 120° 02.57949' W (Local)
- Click Position (Projected Coordinates)
  (X) 220441.08 (Y) 3816649.00
- Map Proj: UTM83-11
- Fish Height: 9.08 Meters

Dimensions
Target Height: = 0.2 Meters
Target Length: 2.3 Meters
Target Shadow: 0.8 Meters
Target Width: 0.6 Meters
Description: unidentified target

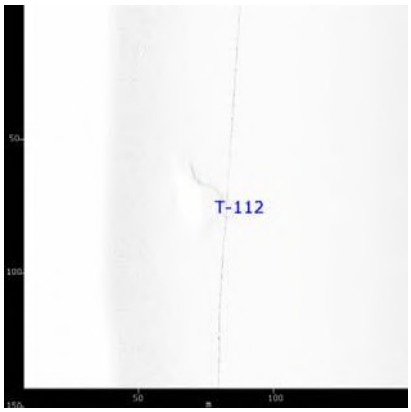


T-111

(image to left is mislabeled)

- Sonar Time at Target: 09/09/2011 21:37:15
- Click Position (Lat/Lon Coordinates)
  34° 27.32574' N 120° 02.57766' W (WGS84)
  34° 27.32574' N 120° 02.57766' W (Local)
- Click Position (Projected Coordinates)
  (X) 220450.09 (Y) 3816857.00
- Map Proj: UTM83-11
- Fish Height: 7.76 Meters

Dimensions
Target Height: = 0.4 Meters
Target Length: 42.5 Meters
Target Shadow: 1.7 Meters
Target Width: 0.4 Meters
Description: Unidentifed linear target

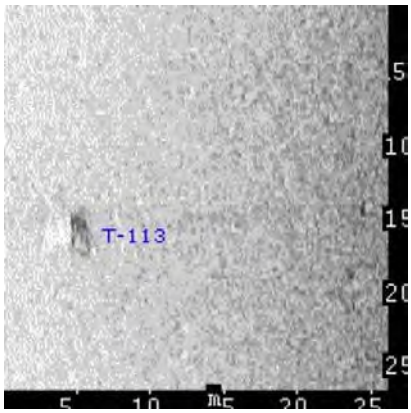


T-112

- Sonar Time at Target: 09/20/2011 23:40:14
- Click Position (Lat/Lon Coordinates)
  34° 23.22189' N 120° 06.81884' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 213720.73 (Y) 3809466.25
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\523.001.jsf
- Ping Number: 120654
- Range to Target: 62.68 Meters
- Fish Height: 22.26 Meters
- Heading: 218.900 degrees
- Event Number: 0
- Line Name: 523.001

Dimensions
Target Height: = 0.0 Meters
Target Length: 21.0 Meters
Target Shadow: 0.0 Meters
Target Width: 3.3 Meters

Description: Unidentified Target

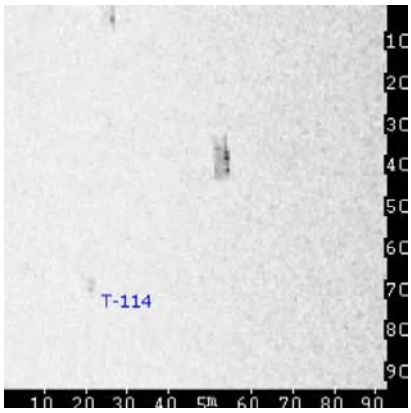


T-113

- Sonar Time at Target: 09/18/2011 22:18:02
- Click Position (Lat/Lon Coordinates)
  34° 25.28778' N 120° 04.86236' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 216836.00 (Y) 3813194.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\210.jsf
- Ping Number: 89730
- Range to Target: 47.16 Meters
- Fish Height: 11.13 Meters
- Heading: 37.890 degrees
- Event Number: 0
- Line Name: 210

Dimensions
Target Height: = 0.4 Meters
Target Length: 3.1 Meters
Target Shadow: 1.7 Meters
Target Width: 1.1 Meters

Description: Unidentified Target



T-114

- Sonar Time at Target: 09/27/2011 20:47:26
- Click Position (Lat/Lon Coordinates)
  34° 20.96168' N 120° 16.79168' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198297.48 (Y) 3805769.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3002-2101.jsf
- Ping Number: 91228
- Range to Target: -182.26 Meters
- Fish Height: 50.39 Meters
- Heading: 82.290 degrees
- Event Number: 0
- Line Name: 3002-2101

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.0 Meters
Target Shadow: 0.0 Meters
Target Width: 2.3 Meters

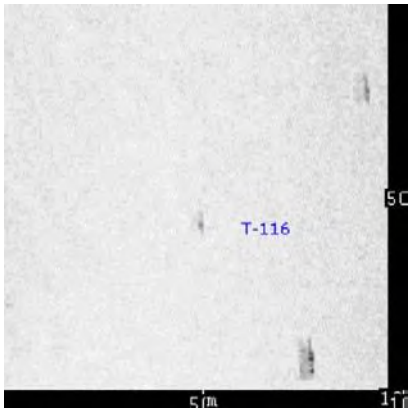
Description: Anode Sled S-4

T-115

- Sonar Time at Target: 09/27/2011 20:47:07
- Click Position (Lat/Lon Coordinates)
  34° 20.94474' N 120° 16.81137' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198266.20 (Y) 3805738.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3002-2101.jsf
- Ping Number: 91185
- Range to Target: -151.16 Meters
- Fish Height: 49.81 Meters
- Heading: 82.200 degrees
- Event Number: 0
- Line Name: 3002-2101

Dimensions
Target Height: = 0.0 Meters
Target Length: 8.6 Meters
Target Shadow: 0.0 Meters
Target Width: 2.6 Meters

Description: Anode Sled S-3

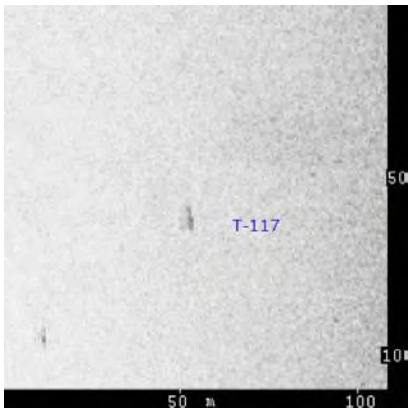


T-116

- Sonar Time at Target: 09/27/2011 20:46:48
- Click Position (Lat/Lon Coordinates)
  34° 20.95985' N 120° 16.83151' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198236.06 (Y) 3805767.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3002-2101.jsf
- Ping Number: 91140
- Range to Target: 176.35 Meters
- Fish Height: 49.22 Meters
- Heading: 81.390 degrees
- Event Number: 0
- Line Name: 3002-2101

Dimensions
Target Height: = 0.0 Meters
Target Length: 3.0 Meters
Target Shadow: 0.0 Meters
Target Width: 1.9 Meters

Description: Anode Sled S-2

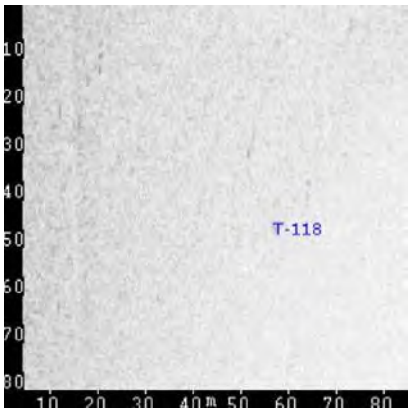


T-117

- Sonar Time at Target: 09/27/2011 20:46:29
- Click Position (Lat/Lon Coordinates)
  34° 20.93742' N 120° 16.85485' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198199.19 (Y) 3805727.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3002-2101.jsf
- Ping Number: 91096
- Range to Target: 135.59 Meters
- Fish Height: 48.64 Meters
- Heading: 81.600 degrees
- Event Number: 0
- Line Name: 3002-2101

Dimensions
Target Height: = 0.0 Meters
Target Length: 4.5 Meters
Target Shadow: 0.0 Meters
Target Width: 1.7 Meters

Description: Anode Sled S-1

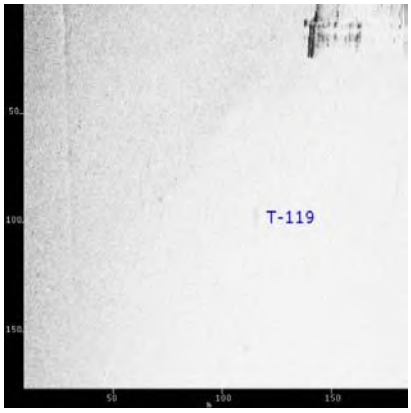


T-118

- Sonar Time at Target: 09/27/2011 22:34:51
- Click Position (Lat/Lon Coordinates)
  34° 21.08963' N 120° 16.89422' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198147.63 (Y) 3806010.75
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3001.jsf
- Ping Number: 109764
- Range to Target: 137.73 Meters
- Fish Height: 32.72 Meters
- Heading: 347.390 degrees
- Event Number: 0
- Line Name: 3001

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.5 Meters
Target Shadow: 0.0 Meters
Target Width: 1.9 Meters

Description: Anode Sled N-1

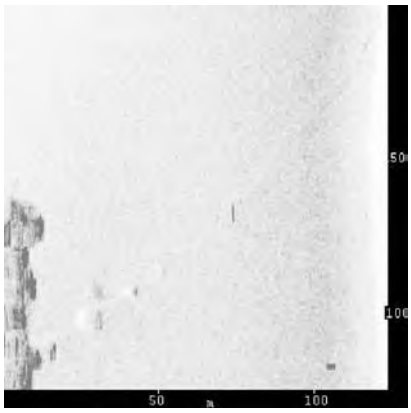


T-119

- Sonar Time at Target: 09/27/2011 22:34:55
- Click Position (Lat/Lon Coordinates)
  34° 21.09237' N 120° 16.86584' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198191.27 (Y) 3806014.50
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3001.jsf
- Ping Number: 109775
- Range to Target: 180.31 Meters
- Fish Height: 32.72 Meters
- Heading: 346.500 degrees
- Event Number: 0
- Line Name: 3001

Dimensions
Target Height: = 0.0 Meters
Target Length: 5.1 Meters
Target Shadow: 0.0 Meters
Target Width: 2.9 Meters

Description: Anode Sled N-2



T-120

- Sonar Time at Target: 09/27/2011 21:37:12
- Click Position (Lat/Lon Coordinates)
  34° 21.10015' N 120° 16.81091' W (WGS84)
- Click Position (Projected Coordinates)
  (X) 198275.75 (Y) 3806026.00
- Map Proj: UTM83-11
- Acoustic Source File:
\\192.10.0.100\Exxon2011\SSS\3000.jsf
- Ping Number: 99431
- Range to Target: 56.64 Meters
- Fish Height: 41.02 Meters
- Heading: 259.590 degrees
- Event Number: 0
- Line Name: 3000

Dimensions
Target Height: = 0.0 Meters
Target Length: 2.3 Meters
Target Shadow: 0.0 Meters
Target Width: 2.3 Meters

Description: Anode Sled N-4

APPENDIX E - MARINE MAMMAL WILDLIFE REPORT

padre associates, inc.
ENGINEERS, GEOLOGISTS & ENVIRONMENTAL SCIENTISTS

October 19, 2011

Padre Project No. 1102-1151

Mr. Jeff Carothers, Survey Manager
Fugro Consultants, Inc.
4820 McGrath Street, Suite 100
Ventura, CA 93003-7778

Subject: Marine Wildlife Monitoring Report
Exxon Mobil SYU Offshore Power System Reliability Project (OPSRB)
Pre-Project Geophysical/Archaeological Survey

Dear Mr. Carothers:

In accordance with the procedures outlined in the California State Lands Commission (CSLC)-approved project-specific Marine Wildlife Contingency Plan (MWCP), Padre Associates, Inc. (Padre) is pleased to submit this report for incorporation into Fugro's Field Operations Report. This report summarizes observations made by Padre's onboard marine wildlife monitors during: vessel transit to and from the survey area (Figure 1), the shallow water geophysical data collection (September 8 through September 11, 2011), and the deep water geophysical data collection (September 15 through September 29, 2011).

SURVEY METHODS AND EQUIPMENT

The shallow water survey collected data in water depths to 27 m (90 ft) and the deep water survey collected data in water depths from 27 to approximately 366 m (90 to 1,200 ft). Both surveys were completed during daylight hours (no nighttime operations).

Shallow Water Survey

The shallow water survey utilized the M/V *Danny C*, a 23.5 m (77 ft) vessel owned and operated by Castagnola Tug Service, Santa Barbara. During the observation period, geophysical equipment consisted of a subbottom profiling (CHiRP) System, a magnetometer, and a singlebeam echosounder. The survey vessel initially mobilized from Port Hueneme, Ventura County and transited between the Ellwood Pier (Santa Barbara County) and the project site during each of the survey days. In the evening the survey vessel utilized an existing mooring buoy adjacent to Ellwood Pier.

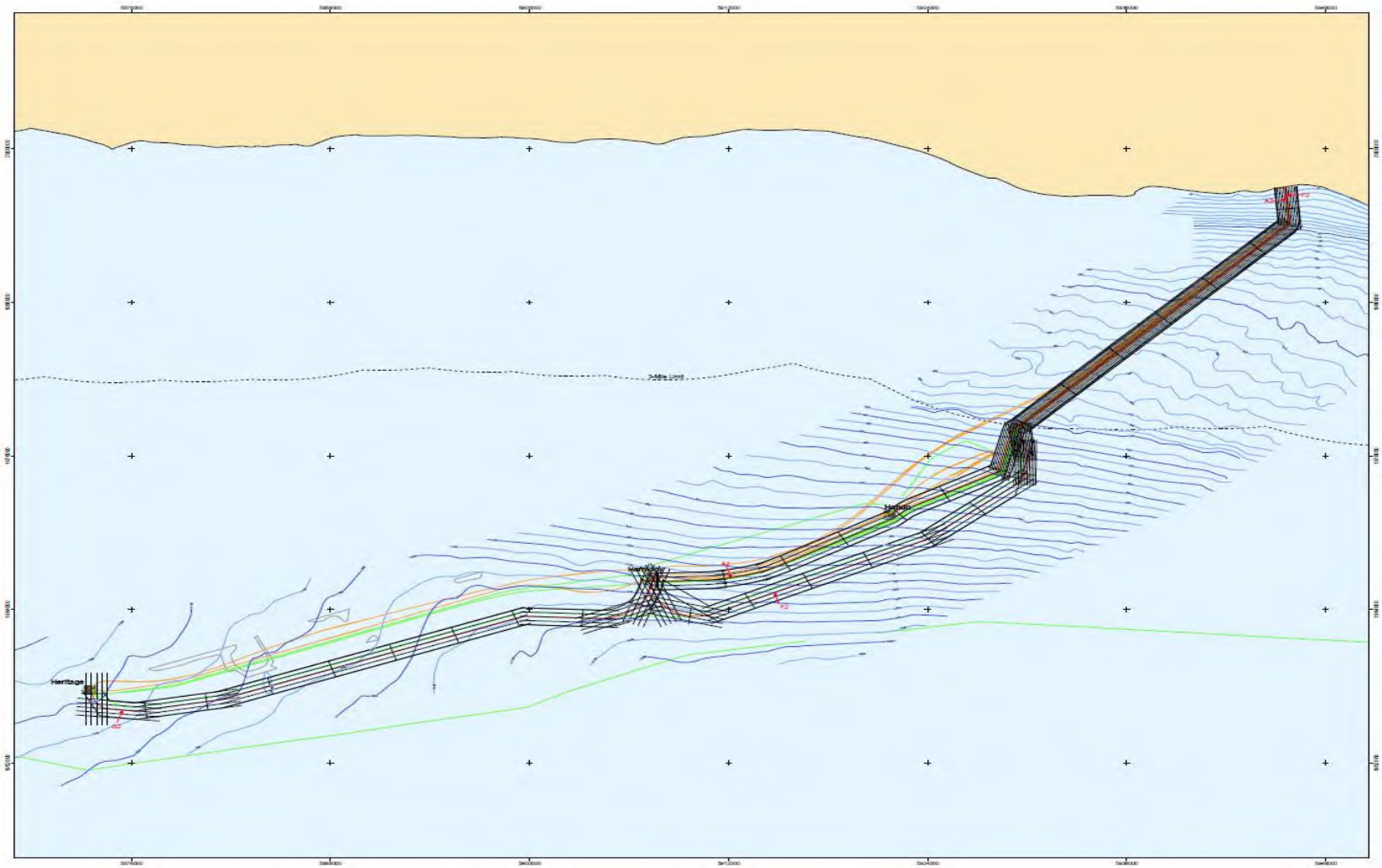


Figure 1 - Survey Area

Deep Water Survey

The deep water survey utilized the M/V *Toby Tide*, a 54.9 m (180 ft) vessel owned and operated by Tidewater Marine, Oxnard. During the observation period, geophysical equipment consisted of a combined side scan sonar and subbottom profiling system, a magnetometer, and singlebeam echosounder. The survey vessel initially mobilized from Port Hueneme to the project site and moored at an existing buoy at Platform Hondo in the evening for the duration of the survey.

MARINE WILDLIFE MONITORING METHODOLOGY

Transit Periods

While the vessel was in transit, an onboard wildlife monitor was located in the wheelhouse where observations of marine wildlife within an approximately 200^0 view area, centered on the direction of vessel travel, were recorded. Marine wildlife observed while the vessel was transiting were noted on the observer's reporting form and the vessel operator was informed if an animal was observed and if a collision with the animal was imminent.

Survey Periods

Once onsite and prior to initiating geophysical data collection, an onboard marine wildlife observer was located on the upper deck or within the wheelhouse of the vessel and surveyed the surrounding area while the survey crew readied the equipment for deployment. Once the geophysical survey equipment was deployed, the observer and survey chief coordinated the startup of the equipment. The survey chief informed the observer when the vessel was 15 minutes from the start point at which time the observer initiated observations within the 100 m- (330 ft-) radius safety zone utilizing 10 X 50 reticular binoculars. One minute prior to start up of geophysical equipment, the survey chief informed the observer and the equipment was turned on only after the observer indicated that there was no marine wildlife within the safety zone. The 100 m- (330 ft-) radius safety zone was based on a previously-completed analysis of the sound levels expected from the survey equipment and exceeded the distance within which the 160 dBA re 1µPa rms sound level was expected.

If marine mammals were observed outside of the safety zone, the survey chief was informed and warned of possible alteration or termination of the data collection if the animals moved into the safety zone during equipment operation and displayed unusual behavior. The observer continued monitoring and recording the presence and activities of marine wildlife throughout geophysical data collection and also during vessel maneuvering when the equipment was "turned off". If a marine mammal approached the safety zone, the observer notified the survey chief who informed the vessel captain and survey crew, and an alert of possible data collection termination was forwarded to all crew members. All observations were recorded on pre-printed log sheets.

Fishing Gear Clearance

In accordance with Section 3.2.2 of the project-specific MWCP, each day prior to the initiation of the geophysical data collection, the onboard monitors observed and noted the presence of commercial fishing gear within the survey area. For each fishing buoy observed within the project site the location, the buoy number and water depth were recorded.

RESULTS

Sea Trial

Shallow Water Survey

On September 8, 2011 the vessel transited approximately one mile south of the port of Port Hueneme entrance to conduct pre-survey equipment "sea trials". During the equipment testing, no marine mammals were observed within the survey area. During transit from the sea trail site back to Port Hueneme, 10 California sea lions (*Zalophus californianus*) and 25 to 30 common dolphin (*Delphinus* spp.) were observed. No vessel interactions with marine mammals occurred.

Deep Water Survey

On September 15, 2011 the vessel transited to approximately three miles northeast of Platform Hondo to conduct pre-survey equipment "sea trials" and equipment calibration. During the equipment testing, one California sea lion was observed within the survey area. The sea lion did not display any signs of distress or disturbance. During transit from the sea trail site back to Port Hueneme, nine California sea lions and 20 to 30 common dolphin were observed. No vessel interactions with marine mammals occurred.

Transit and Survey Periods

Prior to the initiation of the deep water survey, four crab pot buoys were identified within the survey area. Buoy identification number, coordinates and water depth were noted and Dr. Craig Fusaro, of the Joint Oil/Fisheries Liaison Office (Santa Barbara), and the California Department of Fish and Game – Santa Barbara Office were notified of the buoy number and location.

Appendix A provides two tables that detail the observations recorded by the onboard monitors during the shallow and deep water surveys. Table A1 lists the observations during transit activities, and Table A2 details observations made during the two sea trial and during the two survey periods. The following summarizes the observations made during those three periods.

Marine mammal species observed during vessel transit were: California sea lions, common dolphins, southern sea otter (*Enhydra lutris nereis*), and Pacific harbor seal (*Phoca vitulina*).

Observations recorded by the monitors during geophysical data collection (survey) activities included California sea lions, common dolphins, killer whales (*Orcinus orca*), bottlenose dolphins (*Tursiops truncatus*), and unidentified dolphin species.

Summary and Conclusions

An estimated 915 individual marine mammals representing six identified taxa and one unidentified taxon were recorded during the 19-day observation period (including transit and survey periods). No marine reptiles were observed during either period. The mammals observed included three toothed whale species (killer whale, common dolphin, and bottlenose dolphin), two pinnipeds (California sea lion and Pacific harbor seal), and one fissiped (southern sea otter). The two most commonly observed were the common dolphin (547 individuals) and California sea lion (344 individuals). Table 1 below summarizes the number individuals recorded during the transit and survey periods.

Table 1 Summary of Marine Mammals Recorded

Taxa	Number of Individuals		
	Transit	Survey	Total
Common dolphin[1]	497	50	547
California sea lion[1]	110	234	344
Unidentified dolphins	0	10	10
Bottlenose dolphin	0	6	6
Killer whale	0	5	5
Pacific harbor seal	2	0	2
Southern sea otter	1	0	1
Total	*610*	*305*	*915*

[1] Multiple observations of same individuals could have occurred.

During the 19 observation days, equipment start-up was delayed on three occasions due to limited visibility and/or the presence of a marine mammal within the safety zone. In addition, on two occasions, the onboard observer requested that the survey vessel to be slowed to less than three knots or stopped, or alter vessel course. These actions were precautionary as no negative effects of the vessel or the geophysical equipment on marine wildlife were observed throughout the survey and transit periods. On several occasions, the marine mammals swam directly under or were immediately adjacent to the deployed equipment, but displayed no apparent negative behaviors or effects.

In summary, the animals observed during the transit and survey periods are considered relatively common within the Santa Barbara Channel and no unusual marine mammal behavior was recorded. Based on the observations of Padre's marine wildlife monitors, and with the cooperative efforts of the Fugro survey team and vessel crew, no significant negative, survey-related effects to marine wildlife were observed.

Please feel free to contact me should you or your staff have any questions or should you require additional information.

Sincerely,
PADRE ASSOCIATES, INC.

Jennifer Klaib
Staff Marine Biologist

Attachments: Appendix A. Table A1 - Marine Wildlife Observations During Vessel Transit
Table A2 - Marine Wildlife Observations During Geophysical Survey

cc: S. Poulter (Padre, Goleta)
R. de Wit (Padre, Concord)

APPENDIX A

Marine Wildlife Observations Tables

padre associates, inc.
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Table A1 - Marine Wildlife Observations During Transit

Date	Total Transit Time	Marine Wildlife Observed During Transit	Action Taken/Notes
Shallow Water Survey			
September 8, 2011	4 hours (hrs) 55 minutes (mins)	10 California sea lions 25-30 Common dolphins	Transited from Port Hueneme to Santa Barbara Harbor
September 9, 2011	4 hrs	1 Harbor seal 11 California sea lions 40-50 Common dolphins	• A group of 30 to 40 common dolphins and five California sea lions were observed feeding approximately 100 meters (m) off the bow of the vessel. The vessel captain was requested to maintain a 100 m distance. The captain altered the course of the vessel and maintained a 100 m. No disturbance was observed • A group of five common dolphins were riding the bow of the vessel. Vessel was requested to reduce speed. The vessel stopped and the animals moved away.
September 10, 2011	3 hrs 35 mins	16 California sea lions 1 Southern sea otter	
September 11, 2011	3 hrs 55 mins	8 California sea lions	Transited from Santa Barbara Harbor to Port Hueneme
Deep Water Survey			
September 15, 2011	5 hrs 20 mins	9 California sea lions 20-30 Common dolphins	
September 16, 2011	3 hrs 37 mins	11 California sea lions 100 Common dolphins	
September 17, 2011	1 hr 21 mins	6 California Sea lions 5 Common dolphins	
September 18, 2011	1 hr 14 mins	None	
September 19, 2011	58 mins	6 California sea lions	
September 20, 2011	29 mins	12 California sea lions	
September 21, 2011	3 hrs 34 mins	100 Common dolphins	
September 22, 2011	1 hr 37 mins	None	On return transit approximately 30 minutes of the transit was at night and marine mammal observations were not possible
September 23, 2011	45 mins	None	On return transit approximately 40 minutes of the transit was at night and marine mammal observations were not possible
September 24, 2011	1 hr 16 mins	17 California sea lions	
September 25, 2011	51 mins	None	

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Date	Total Transit Time	Marine Wildlife Observed During Transit	Action Taken/Notes
September 26, 2011	1 hr 19 mins	None	
September 27, 2011	1 hr 25 mins	1 California sea lion	
September 28, 2011	2 hrs 51mins	1 California sea lion 1 Pacific harbor seal	On return transit approximately 25 minutes of the transit was at night and marine mammal observations were not possible
September 29, 2011	5 hrs 55 mins	2 California sea lions 180 Common dolphins	

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Table A2 - Marine Wildlife Observations During Geophysical Survey

Date	Total Survey Time	Marine Wildlife observed in Safety Zone	Action Taken/Notes
Shallow Water Survey			
September 8, 2011	27 mins	None	Conducting sea trial of new equipment approximately 1 mile South of the Port Hueneme Harbor entrance.
September 9, 2011	3 hrs 34 mins	3 California sea lions 5 Common Dolphins	No distress observed.
September 10, 2011	2 hrs 57 mins	4 California sea lions 6 Bottlenose Dolphins	
September 11, 2011	N/A	N/A	Transited from Santa Barbara Harbor to Port Hueneme
Deep Water Survey			
September 15, 2011	1 hr 27 mins	1 California sea lion	Conducting equipment calibrations approximately 3 miles northeast of platform Hondo.
September 16, 2011	4 hrs 49 mins	40 California sea lions	No distress observed
September 17, 2011	3 hrs 39 mins	10 California sea lions	No distress observed
September 18, 2011	9 hrs 14 mins	26 California sea lions	No distress observed
September 19, 2011	10 hrs 29 mins	17 California sea lions 10 Unidentified dolphins	Arrived at the project site at 7:15 a.m. and deployed equipment. Fog reduced visibility to approximately 50 m (165 ft). Clearance was not given to start equipment. After a half hour of observations fog still reduced the visibility to 50 m (165 ft), however no marine mammals were recorded in the area during this time. In addition, observances of marine mammals with in this area during the last few days of survey activity were minimal. A request was made to slowly ramp-up the equipment and survey commenced at 7:50 a.m.
September 20, 2011	9 hrs 40 mins	16 California sea lions	No distress observed
September 21, 2011	8 hrs 30 mins	25 Common dolphins 12 California sea lions	• A group of 25 common dolphins were entering safety zone prior to equipment start up. Equipment start up was delayed until animals were outside of safety zone. The group showed no signs of distress. • A sea lion was observed inside the safety zone prior to equipment start up. Marine mammal observer watched the sea lion leave the safety zone. A request was made to ramp-up equipment as a precaution.
September 22, 2011	10 hrs 32 mins	13 California sea lions	No distress observed
September 23, 2011	10 hrs 59 mins	9 California sea lions	No distress observed
September 24, 2011	10 hrs 27 mins	10 California sea lions	No distress observed
September 25, 2011	11 hrs 34 mins	20 Common dolphins 4 California sea lions	No distress observed
September 26, 2011	10 hrs 32 mins	46 California sea lions	No distress observed

Date	Total Survey Time	Marine Wildlife observed in Safety Zone	Action Taken/Notes
		4-5 Killer whales	
September 27, 2011	10 hrs 41 mins	12 California sea lions	One sea lion jumped on to the back deck of the vessel while in transit. The marine mammal monitor requested no one approach the animal. Sea lion exited the boat on its own accord. No distress was observed.
September 28, 2011	6 hrs 38 mins	4 California sea lions	No distress observed
September 29, 2011	6 hrs	7 California sea lions	A sea lion was observed inside the safety zone prior to equipment start up. Marine mammal observer watched the sea lion leave the safety zone. A request was made to ramp-up equipment as a precaution.

APPENDIX F - DIGITAL FILES

DIGITAL FILES

Description	File Name	Format
Final Report	**\Draft_FinalReport**	
Geohazards Report	04.64110024_12-13-11.Pdf	Adobe
Side Scan Sonar Mosaic	**\SideScanSonar_Mosaic**	
Zip File Containing Side Scan Sonar Mosaics for Deep Survey	DeepArea_SSSMosaics.zip	Geotiff
Zip File Containing Side Scan Sonar Mosaic for Shallow Survey	ShallowArea_SSSMosaics.zip	Geotiff
Zip File Containing Side Scan Sonar Mosaics for Platform Landing Survey	PlatformLanding_SSSMosaics.zip	Geotiff
ESRI Files	**\ArcGIS_Files**	
Bathymetric Contour Labels	BathyAnno.gdb	ESRI
MBARI Bathymetric Contour shape file	sb_a_cnt_ft_10.shp	ESRI
NOAA Bathymetric Contour Shapefile	noaa contours.shp	ESRI
Proposed Cables shape file	ProposedCableRoute.shp	ESRI
Stations data file	Stations.gdb	ESRI
650 Foot Buffer around the Proposed Cable Route	ProposedCableRoute_650Buffer.shp	ESRI
3 Mile Limit	3Mile_Limit.shp	ESRI
Buried and Exposed Pipeline	Existing_Cables_Pipelines.shp	ESRI
Interpreted Features from Side Scan Sonar Data	2011_Features.shp	ESRI
Interpreted Rock Outcrops and Area of Scattered Rock	2011_Rock_Areas.shp	ESRI
Intepreted Areas of Vegetation	Vegetation.shp	ESRI
Vessel Tracklines based on CRP	Tracklines.shp	ESRI
Shotpoints Every 100 Meters	ShotPoints.shp	ESRI
Interpreted Magnetic Anomalies	Mag_Anomaly.shp	ESRI
Intepreted Side Scan Sonar Targets from the Deep Area	Deep_SSS_Targets.shp	ESRI
Intepreted Side Scan Sonar Targets from the Shallow Area	Shallow_SSS_Targets.shp	ESRI
Platform shapefile	Platforms.shp	ESRI
	MooringComponents.shp	ESRI
	MooringSystem.shp	ESRI
Map Extents used to create each Alignment Chart	Chart_Map_Extents.shp	ESRI
Subbottom Isopach Annotation	Isopach_Anno.gdb	ESRI
Subbottom Isopach Contours	Isopach_Cntrs.shp	ESRI
Seabed/Subbottom Profile of Proposed Cable A2	All_A2_Interp.dwg	AutoCAD
Seabed/Subbottom Profile of Proposed Cable A2-Alt	All_A2-Alt_Interp.dwg	AutoCAD
Seabed/Subbottom Profile of Proposed Cable F2	All_F2_Interp.dwg	AutoCAD
Seabed/Subbottom Profile of Proposed Cable F2-Alt	All_F2-Alt_Interp.dwg	AutoCAD

Description	File Name	Format
Seabed/Subbottom Profile of Proposed Cable G2	All_G2_Interp.dwg	AutoCAD
Seabed/Subbottom Profile of Proposed Cable G2-Alt	All_G2-Alt_Interp.dwg	AutoCAD
Survey Charts	**\Charts**	
Alignment Chart - Proposed Cable Route G2 and G2-Alt	Chart01_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route G2 and G2-Alt	Chart02_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route G2 and G2-Alt	Chart03_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route F2 and F2-Alt	Chart04_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route F2 and F2-Alt	Chart05_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route A2, F2 and F2-Alt	Chart06_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route A2, F2 and F2-Alt	Chart07_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route A2	Chart08A_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route F2	Chart08B_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route A2	Chart09A_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route F2	Chart09B_Alignment_Sheets.pdf	Adobe
Alignment Chart - Proposed Cable Route A2	Chart10_Alignment_Sheets.pdf	Adobe
Platform Landing Chart - Heritage	Chart2-1A_PlatformLanding_Heritage.pdf	Adobe
Platform Landing Chart - Heritage	Chart2-1B_PlatformLanding_Heritage.pdf	Adobe
Platform Landing Chart - Harmony	Chart2-2A_PltLanding_Harmony.pdf	Adobe
Platform Landing Chart - Harmony	Chart2-2B_PltLanding_Harmony.pdf	Adobe
Raw Data Sets	**\Raw_Data**	
Side Scan Sonar Data for Shallow Survey Area	ShallowSSSViewer.zip	HTML
Side Scan Sonar Data for Deep Survey Area	DeepSSSViewer.zip	HTML
Instructions for how to View SSS Data in Zip Files	Instructions_SSViewer.pdf	Adobe
Final SEGY Data	Final_SEGY.zip	Seg-Y
Readme Text explaining SEGY Headers	Final_SEGY_ReadMe.txt	txt

APPENDIX G - SURVEY EQUIPMENT SYSTEMS SPECIFICATIONS

Starfix.Seis Update

Starfix.Seis is an advanced vessel positioning software system developed from the proven PCNav, PCSeis, and PCBarge products. It has been developed to address the specific requirements of Fugro's seismic acquisition vessels, general hydrographic, and construction survey needs.

Starfix.Seis can be integrated with any of the modules in the **Starfix Realtime Suite** such as; **Starfix.Anchors** / PCTug for remote barge, anchor handling operations; **Starfix.WOMBAT** for monitoring and control of other vessels external to the local system; **Starfix.CMap** for object position displays on electronic charts; **Starfix.CadNav** utilising MicroStation in realtime; and **Starfix.USBL** for USBL operations and Calibration.

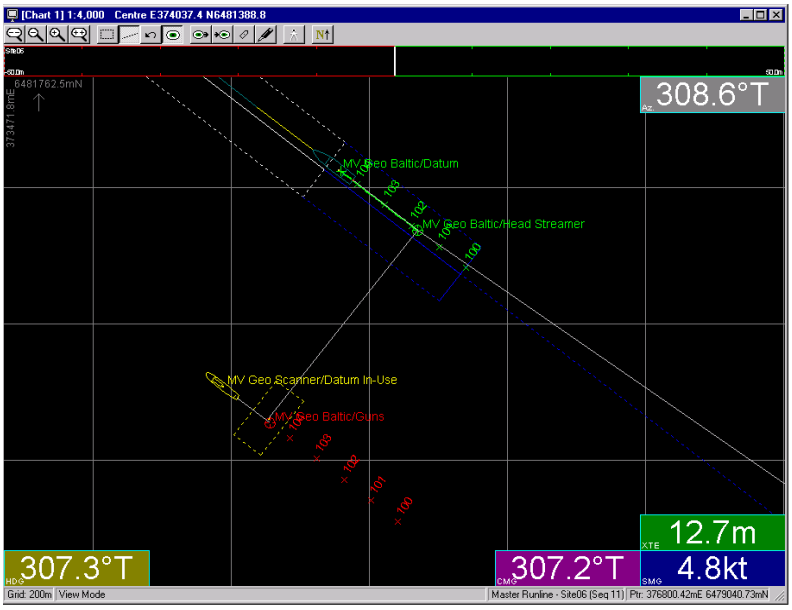
The **Starfix.Seis** application enables the navigation systems to be configured and modified in realtime. All other applications operating over the LAN are notified of any changes in configuration and update accordingly. The calculation engine computes and corrects in 3 dimensions.

Sensor input and output data strings to devices such as autopilots, are handled via **IOWIN** drivers, and are user selectable.

Starfix.Seis can make use of high accuracy external time sources, such as GPS timer cards, or timerboards connected to GPS (1 PPS), to provide microsecond precision and synchronisation of all data on local and remote LANs.

Features:

- Configuration for:
  - Project Information.
  - Geodesy with 8 projections.
  - Selection of calculations mode from Grid, Spheroidal, or Rhumbline.
- System inputs per vessel (10 vessels):
  - Vessel file containing name, colours, fixed offsets, and fairlead information.
  - 7 positioning systems + 1 dead reckoning system.
  - 5 heading sensors.
  - 5 motion sensors.
  - 3 speed sensors.
  - 2 range/bearing systems.
  - 5 echosounder channels.
- Provision for 10 variable offsets
- Provision for 30 O/Ts (positions to be worked with), which can be:
  - Logged and printed.
  - Information relative to line or target calculated.
  - Selected as steer point or shot firing point, or offset fix point.
  - Set it's own Kalman filter.
  - Create O/T as mean of a selection of O/Ts.
- Navigation can be to runline, waypoint (target), or pipeline.
- Separate files are maintained for runlines, waypoints, pipelines, anchor patterns, and database features (items that need to be displayed but not navigated to). Multiple pipelines can be contained in a single file.
- Line running features include:
  - Provision for line extensions.
  - Input of automatic start and end fixing distances.
  - Line corridor width.
  - Turning circle at start of line runin.
  - Reverse line heading.
- Shot firing features include:
  - Fixing by time, distance, KP, or External.
  - Fix increment or decrement by user selectable number.
  - Provision of Fiducial Fix Identification number (FFID) counter.
  - Manual fix counter is independent of shot counter.
  - Offset and Man Overboard fixing.
- Online geodetic conversions and position to line calculator.
- Sound card support.



Display showing slave seismic vessel trying to keep its gun array on station

Starfix.Display provides a graphical presentation of vessels and O/Ts against a database and navigation information in relation to centrelines, runlines, and waypoints. Full control of the graphical display is available and any number of graphical display and text displays can be shown simultaneously.

Features:

- One instance of Display per machine but multiple instances across a LAN. Each instance of

Starfix.Seis Update

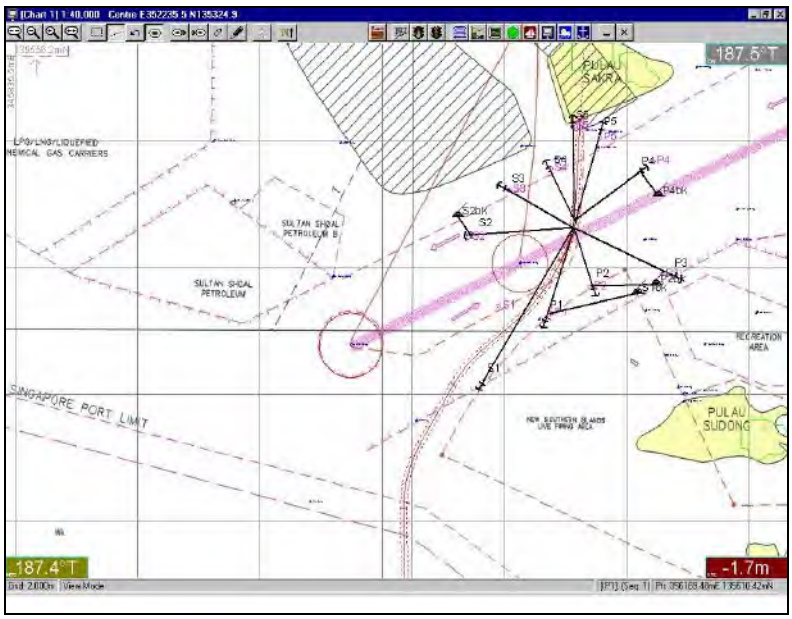
Display can provide multiple chart and /or text displays.

- All displays are individually configurable.
- Text displays are available for:
  - Display of information between O/Ts.
  - Configurable general information.
  - Line running information including selection of alternate line.
  - Running to target information including selection of alternate target.
- Graphical screen features are:
  - Fully configurable for colours, project file information, O/T information, O/T symbols.
  - Automatic plotting of WOMBAT position object.
  - Can be centred to an O/T or a selected point.
  - Tiling of graphics images for backdrops.
  - Display of DXF, DWG, and DGN CAD files as chart backdrops.
  - Full pan/zoom capabilities.
  - Range/bearing calculator and position import / export to other applications.
  - Plot range rings.
  - Definition of Rubberband lines between selected O/Ts.
  - Enable/disable of default or configurable text overlays.
  - Enable/disable of coverage and/or swath plots.
  - Ghost vessel shapes.
- Display settings on one PC can be locked to a surveyor's display on another PC for helmsmen.
- Displays plan view of catenary module.
- Displays streamer model from MiniStreamer module.

Starfix.Anchors is a Barge Management System providing control of up to 10 Anchor Handling Vessels.

Features:

- One instance of Anchors per LAN but can be linked across a



Display showing barge move with piggybacked buoys

WOMBAT for remote anchor handling operations.

- Up to 24 fairleads per vessel.
- Rebroadcast of RTCM.
- Provision of holdback anchors.
- Provision for Yokohama buoys.
- Definition of Anchor cable lengths permit Display of scope of position of Barge/Rig.
- On the fly editing or design of anchor patterns.
- AHVs can also be navigated to line for approach routes.

Starfix.WOMBAT provides means of linking **Starfix.Seis Barge Management Systems** to share vessel and anchor positions. **Starfix.Anchors** can also be operated in remote mode across a WOMBAT link. It is an acronym for Wireless Oilfield Management of Barges and Tugs.

Features:

- A WOMBAT node using a VHF RF modem at 19200 baud will cover a radius of >35 km.
- Linking of WOMBAT nodes would normally utilise a 10 Mbit LAN. This node LAN can also have a RF WAN extension to provide coverage of up to 2-3 km for vessels similarly equipped to approach and become part of the WOMBAT Node LAN. This could provide file transfer, email, usual LAN traffic.
- WOMBAT remotes can be single vessels with a preset transmit of position time. These vessels still receive the node broadcasts of other WOMBAT object positions.
- Each WOMBAT instance – node or remote – provides the user with a list of known vessels, which can be interacted with to provide range/bearing /ETA to a user defined set of objects.
- There is small message capability between WOMBAT instances.
- Other AVT systems can be easily interfaced in to the system to extend tracking capability.
- Alarms can be generated if objects stray into predefined areas.
- All data can be exported in realtime to a standard database logging format.
- Vessels outside a node area can have their positions relayed to the node if another WOMBAT object can hear it.
- Mostly self configuring.

Trimble SPS551 GPS Receivers
Positioning System

KEY FEATURES

- Rugged, weatherproof modular receiver design
- GPS L1/L2, SBAS and OmniSTAR VBS/XP/HP capable
- Keypad and display for easy configuration and status monitoring
- Bluetooth®, Ethernet, Serial, and USB communications
- Integrated battery that also acts as a UPS power supply
- Optional integrated 450M Hz UHF or 900 MHz radios for easy configuration
- Industry standard NMEA, RTCM, and CMR™ inputs and outputs
- 1 PPS output for time synchronization with other devices
- Upgrades available to track GPS L2C and GLONASS

SPS551H HEADING ADD-ON RECEIVER FEATURES

- Provides precise heading capability when combined with any SPSx51 receiver
- Upgrade available to track L2C and GLONASS

FLEXIBLE GPS RECEIVERS FOR LOCATION GPS POSITIONING IN LAND AND MARINE ENVIRONMENTS

The Trimble® SPS551 Modular GPS receiver provides a range of Location GPS[1] positioning techniques ideal for system integrators, OEMs, and land or marine contractors who require real-time positions. The Trimble SPS551 receiver can also be combined with either the Trimble SCS900 Site Controller Software for land-based rover applications or Trimble HYDROpro™ software for marine positioning solutions.

The SPS551 receiver can operate in all Location GPS modes, including operation with Satellite Based Augmentation Systems (SBAS), Differential GPS (DGPS), OmniSTAR (VBS, XP, and HP services), and Location RTK mode for decimeter level positioning. When combined with the Trimble SPS551H Heading Add-on receiver, the SPS551 receiver delivers both Location GPS position and precise GPS heading capabilities suitable for rapid real time positioning and orientation of vessels, barges and vehicles.

Location RTK Accuracy to 10 Centimeters

Location RTK mode delivers a horizontal and vertical positioning accuracy of 10 cm. Location RTK operations can be accomplished using CMR+™ correction outputs from any available Trimble RTK (Real-time Kinematic) base, CORS station or Trimble VRS™ network through radio, cell phone, or an Internet connection.

For DGPS and Location RTK operations, the receiver can be used with an external radio modem, or be equipped with either a 450 MHz (UHF) or 900 MHz internal radio capable of both transmit and receive operations.

Flexible Options to Suit Changing Job Site Requirements

Modularity provides the flexibility to mount the receiver and GPS antenna in a variety of ways, allowing for operation on a pole, backpack, site vehicle, on light machinery, or on a marine vessel. The receiver can be mounted in an accessible location where it is easy to configure and is secure from theft and from the weather, while the antennas can be mounted in a location that provides clear line of sight to the sky and reduces the potential for multipath.

The SPS551 receiver provides reliable real-time GPS positioning for offshore, near shore and land-based applications including: Offshore drilling platforms, barges, ports, marine channels, and land reclamation.

The Trimble SPS551 receiver can be upgraded with GLONASS and GPS L2C signals to provide better positioning solutions in harsh GPS conditions such as areas where job site obstructions create sky visibility issues or during times of limited GPS-only availability.

1 *Location GPS receivers provide GPS positioning techniques including Satellite Based Augmentation Systems (SBAS), DGPS, OmniSTAR (VBS, XP and HP services), and Location RTK (decimeter-level RTK positioning) for up to decimeter-level (0.3-ft) positions.*

Trimble SPS551 GPS Receivers
Positioning System

TRIMBLE SPS551 AND SPS551H LOCATION GPS RECEIVERS

GENERAL

Keyboard and display . . . . VFD display 16 characters by 2 rows
On/Off key for one button start up
Escape and Enter key for menu navigation
4 arrow keys (up, down, left, right) for option scrolls and data entry

Dimensions (L x W x D) . . . . . 24 cm x 12 cm x 5 cm (9.4 in x 4.7 in x 1.9 in) including connectors

Weight . . . . . 1.65 kg (3.64 lb) receiver with internal battery and radio
1.55 kg (3.42 lb) receiver with internal battery and no radio

Antenna options

L1/L2/L2C GPS operation . . . GA510* or Zephyr™ Model 2**
GLONASS operation . . . . . Zephyr Model 2**
DGPS Base Station . . . . . Zephyr Geodetic™ Model 2**
OmniSTAR operation . . . . . GA510* or Zephyr Model 2**

* GA510 is included in the SPS551H receiver kits and provides superior OmniSTAR tracking.

** Zephyr Model 2 antenna is included in the SPS551H GLN receiver kit

Supports legacy Trimble antennas. . . Single frequency antenna for DGPS use
Dual frequency antenna such as Z+, Zephyr, Zephyr Geodetic, and Micro-Centered™ for heading applications

Temperature[1]

Operating . . . . . –40 °C to +65 °C (–40 °F to +149 °F)
Storage . . . . . –40 °C to +80 °C (–40 °F to +176 °F)
Humidity . . . . . MIL-STD 810F, Method 507.4
Waterproof . . . . . IP67 for submersion to depth of 1 m (3.3 ft), dustproof

Shock and vibration

Designed to survive a 1 m (3.3 ft) pole drop onto a hard surface

Shock: non-operating . . . . . To 75 g, 6 ms
Shock: operating . . . . . To 40 g, 10 ms, saw-tooth
Vibration . . . . . Tested to Trimble ATV profile (4.5 gRMS): 10 Hz–300 Hz: 0.04 g^2/Hz; 300 Hz–1,000 Hz; –6 dB/octave

Measurements

- Advanced Trimble Maxwell™ 5 Custom GPS chip
- High-precision multiple correlator for L1/L2 pseudo-range measurements
- Unfiltered, unsmoothed pseudo-range measurements data for low noise, low multipath error, low time domain correlation, and high dynamic response
- Very low noise carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- L1/L2 signal-to-noise ratios reported in dB-Hz
- Proven Trimble low elevation tracking technology
- 72-channel L1 C/A code, L1/L2 Full Cycle Carrier. Upgradable to L2C and GLONASS L1/L2 Full Cycle Carrier.
- Trimble EVEREST™ multipath signal rejection
- 4-channel SBAS (WAAS/EGNOS/MSAS)

Code differential GPS positioning[2]

Horizontal accuracy . . . . . 0.25 m + 1 ppm RMS (0.8 ft + 1 ppm RMS)
Vertical accuracy . . . . . 0.50 m + 1 ppm RMS (1.6 ft + 1 ppm RMS)

SBAS (WAAS/EGNOS/MSAS)[3] positioning

Horizontal accuracy . . . . . Typically <1 m (3.3 ft)
Vertical accuracy . . . . . Typically <5 m (16.4 ft)

OmniSTAR positioning

VBS service accuracy . . . . . Horizontal <1 m (3.3 ft)
XP service accuracy . . . . . Horizontal 0.2 m (0.66 ft), Vertical 0.3 m (1.0 ft)
HP service accuracy . . . . . Horizontal 0.1 m (0.33 ft), Vertical 0.15 m (0.5 ft)

Location RTK positioning[2]

Horizontal accuracy . . . . . 0.07 m + 1 ppm RMS (0.23 ft + 1 ppm) RMS
Vertical accuracy . . . . . 0.07 m + 1 ppm RMS (0.23 ft + 1 ppm) RMS

Heading accuracy with SPS551H or additional SPSx5x . . . . . .0.05° RMS (10 m antenna separation)
Does not require shore-based corrections for heading solution

POWER

Internal

- Integrated internal battery 7.2 V, 7800 mA-hr, Lithium-ion
- Internal battery operates as a UPS in the event of external power source failure
- Internal battery will charge from external power source when input voltage is >15 V
- Integrated charging circuitry

External

- Power input on 7-pin 0-shell Lemo connector is optimized for lead acid batteries with a cut-off threshold of 10.5 V
- Power input on the 26-pin D-sub connector is optimized for Trimble Lithium-ion battery input with a cut-off threshold of 9.5 V
- Power source supply (Internal/External) is hot-swap capable in the event of power source removal or cut off
- 9.5 V to 28 V DC external power input with over-voltage protection
- Receiver will automatically turn on when connected to external power

Power consumption . . . . . 6.0 W in rover mode with internal receive radio
8.0 W in base mode with internal transmit radio

Base station operation times on internal battery

External radio . . . . . 15 hours; varies with temperature
Internal radio (450 MHz, 0.5 W) . . . . . 11 hours; varies with temperature

Trimble SPS551 GPS Receivers
Positioning System

SPECIFICATIONS

Rover operation times on internal battery

450 MHz systems . . . . . 13 hours; varies with temperature
900 MHz systems . . . . . 13 hours; varies with temperature

Regulatory approvals

- FCC: Part 15 Subpart B (Class B Device) and Subpart C, Part 90
- Industry Canada: ICES-003 (Class B Device), RSS-210, RSS-Gen, RSS-310, RSS-119
- R&TTE Directive: EN 301 489-1/-5/-17, EN 300 440, EN 300 328, EN 300 113, EN 60950, EN 50371
- ACMA: AS/NZS 4295 approval
- CE mark compliance;
- C-tick mark compliance
- UN ST/SG/AC.10.11/Rev. 3, Amend. 1 (Lithium-ion Battery)
- UN ST/SG/AC. 10/27/Add. 2 (Lithium-ion Battery)
- RoHS compliant (excludes those with an internal 900 MHz radio)
- WEEE compliant

Communications

Port 1 (7 pin OS Lemo)
Serial 1 . . . . . 3 wire RS232
Port 2 (26 pin D-sub)
Serial 2 . . . . . Full 9 wire RS-232
Serial 3 . . . . . 3 wire RS232
1PPS (pulse per second) . . . . . via adapter cable
USB (On the Go) . . . . . via multi-port adapter
Ethernet . . . . . via multi-port adapter
Bluetooth . . . . . Fully-integrated, fully-sealed 2.4 GHz Bluetooth[5] module

Integrated radios (optional) . . . . Fully integrated, fully sealed internal 450 MHz (UHF) Tx/Rx; Internal 900 MHz Tx/Rx
Channel spacing (450 MHz) . . . . . 12.5 KHz or 25 KHz spacing available End-user configurable
450 MHz output power . . . . . 0.5 W, 2.0 W (2.0 W available only in certain countries)
Frequency approvals (900 MHz). . . . . USA/Canada (-10) New Zealand/Australia (-20) Australia (-30)
Receiver position update rate . . . . . 1 Hz, 2 Hz, 5 Hz, and 10 Hz positioning
Correction data input (SPS551) . . . . . CMR, CMR+, RTCM 3, RTCM 2.x
Correction data output (SPS551) . . . . . CMR/CMR+ (for Moving Baseline), RTCM 2.x (DGPS only)
Data outputs . . . . . NMEA, GSOF, 1PPS Time Tags

Receiver options and upgrades

SPS551 GLONASS . . . . . Uses GLONASS L1/L2 satellite signals
450 MHz Radio 2.0 W. . . . . Available only in certain countries
SPS551 L2C (upgrade only). . . . . Uses GPS L2C satellite signals

Receiver operations capability

SPS551 . . . . . SBAS, OmniSTAR services, DGPS Base or Rover, Moving Base or Heading, Location RTK Rover
SPS551H . . . . . Heading add-on only

1 Receiver will operate normally to –40°C. Bluetooth module and internal batteries are rated to –20°C.
2 Accuracy and reliability may be subject to anomalies such as multipath, obstructions, satellite geometry and atmospheric conditions. Always follow recommended practices.
3 Depends on SBAS system performance.
4 If your receiver has the 2.0 W upgrade, you will experience reduced battery performance compared to the 0.5 W option.
5 Bluetooth type approvals are country-specific. For more information, contact your local Trimble office or representative.

Specifications subject to change without notice.

Bluetooth CE

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Trimble.
www.trimble.com

ECHOTRAC™ CVM

MOBILE HYDROGRAPHIC SYSTEM

- Portable carry-on case style supports a dual frequency echo sounder with optional DGPS receiver, notebook PC and bundled data acquisition software.
- Features include Ethernet LAN interface, frequency agile configurable transceivers, standard serial interfaces for data acquisition systems, motion sensors and DGPS receivers.

TELEDYNE ODOM HYDROGRAPHIC
A Teledyne Technologies Company

ECHOTRAC™ CVM

The rugged and weatherproof Echotrac CVM outperforms other echo sounders in its class, offering the utmost in portability without sacrificing Teledyne Odom performance standards.

With a choice of dual or single frequency operation, optional built-in DGPS and notebook PC bundled with your choice of data acquisition software, the CVM has everything you need in an echo sounder – even when portability isn't an issue.

GENERAL SPECIFICATIONS

Frequency
- High band: 100 kHz – 340 kHz
- Low band: 24 kHz – 50 kHz

Output Power
- High: 200 kHz – 350 W RMS max
- Low: 24 kHz – 420 W RMS max

Input Power
- 24 V DC (nominal) 15 watts
- 110 or 220 V AC

Resolution
- 0.01 m/0.1 ft

Accuracy
- 0.01 m/0.10 ft +/- 0.1% of depth @ 200 kHz
- 0.10 m/0.30 ft +/- 0.1% of depth @ 33 kHz

Depth Range
- 0.2 – 200 m/0.5 – 600 ft. @ 200 kHz
- 0.5 – 600 m/1.5 – 1968 ft. @ 200 kHz

Phasing
- Automatic scale change, 10%, 20%, 30% overlap or manual

Sound Velocity
- 1370 – 1700 m/s
- Resolution 1 m/s

Transducer Draft Setting
- 0 – 15 m (0 – 50 ft)

Depth Display
- On control PC

Clock
- Internal battery backed time, elapsed time and date clock

Annotation
- Internal – date, time, GPS position
- External – from RS232 or Ethernet

Interfaces
- 2 x RS232
- Inputs from external computer, motion sensor
- Outputs to external computer
- Ethernet interface
- Heave – TSS and sounder sentence

Blanking
- 0 to full scale

Software
- E-Chart display, control, and logging software

Help
- The function of each parameter and its minimum and maximum values can be displayed.

Environmental Operating Conditions
- 0° – 50° C, 5 – 90% relative humidity, non-condensing

Dimensions
- 55 cm W x 41.5 cm D x 21.5 cm H

Weight
- 14 kg (31 lbs)

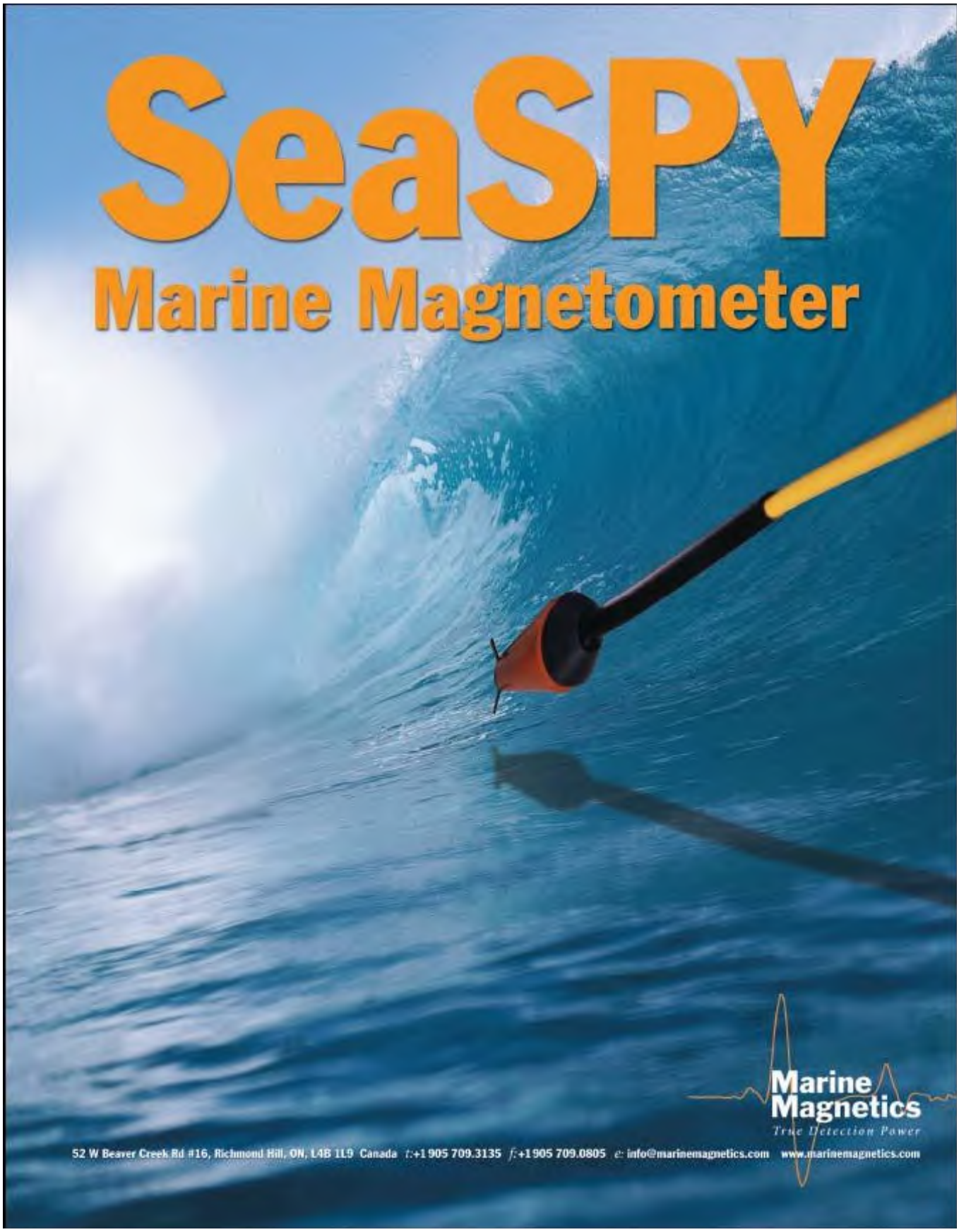
Options
- Single or dual frequency operation
- Side scan transducer – single or dual channel side looking 200 kHz or 340 kHz for search and reconnaissance
- Built-in DGPS
- Ruggedized notebook PC bundled with data aquisition software

TELEDYNE ODOM HYDROGRAPHIC
A Teledyne Technologies Company

▶ See our entire product line at: odomhydrographic.com

1450 Seaboard Avenue ▶ Baton Rouge, Louisiana 70810-6261 USA ▶ (225) 769-3051 ▶ (225) 766-5122 FAX

Marine Magnetic Corporation SeaSPY Marine Magnetometer



SeaSPY Overhauser Sensor

The SeaSPY Advantage

Marine Magnetics takes pride in designing and manufacturing magnetic exploration equipment that meets scientific observatory specifications. The SeaSPY magnetometer product eliminates many of the inherent problems associated with other marine magnetometers such as orientation restrictions, sensor realignment, time and temperature drift and poor absolute accuracy.

The Overhauser Effect

Marine Magnetics is the only marine magnetometer company in the world that can produce stable Overhauser sensors that do not degrade with time. Marine Magnetics' SeaSPY magnetometer measures the ambient magnetic field using a specialized branch of nuclear Magnetic Resonance technology, applied specifically to hydrogen nuclei.

Worldwide Operation With No Restrictions

The SeaSPY sensor is unique in that it is entirely omnidirectional. The amount of signal produced by the sensor is completely independent of magnetic field direction. You never have to orient your sensor, because it is already optimized to work around the World.

As a result, regardless of where you are in the World and no matter what the magnetic field strength is, your SeaSPY sensor will continue to provide a strong signal and accurate data.

Highest Absolute Accuracy

SeaSPY Overhauser sensors have the highest absolute accuracy of any magnetometer: 0.2nT
The repeatability between SeaSPY sensors is also unmatched at better than 0.01nT. This makes them ideal for gradiometer configurations, where the output of two independent sensors is compared to measure the value of magnetic gradient between them.

High Sensitivity

SeaSPY Overhauser sensors deliver high-resolution output with a noise level of 0.01nT/√Hz; counter sensitivity is 0.001nT

Maintenance Free Sensors, No Realignment and No Consumable Parts

SeaSPY Overhauser sensors are entirely maintenance free and most importantly, SeaSPY's specifications do not degrade over time. As a result, the SeaSPY sensor never has to be realigned, or recalibrated in order to meet the manufacturer's specifications at the time of shipping.

In addition, the SeaSPY sensor does not contain any parts that wear out and need to be replaced.

No Sensor Warm-Up Time

SeaSPY Overhauser sensors do not require temperature stabilization. Therefore SeaSPY will work equally as well in cold, deep water as in warm, tropical water, instantly on power-up.

Scientific Quality Instruments

Stable time: The clock used in the SeaSPY electronics module is accurate to 1ppm throughout the entire temperature range, as opposed to 100ppm found in competing magnetometer systems. As a result, no matter how much the temperature changes during a survey, the data will always be accurately time stamped, ensuring that it will always match up perfectly with diurnal correction (base station) information.

No temperature effect on accuracy: Data collected at –40°C will be identical to data recorded at +60°C

No heading error: Heading error is a detectable offset in the magnetometer output caused by changing the heading of the magnetometer within the Earth's magnetic field.

Marine Magnetics' SeaSPY magnetometer is constructed of the most nonmagnetic materials possible. As a result, the SeaSPY Overhauser sensor does not display heading error.

Therefore, no matter how the SeaSPY sensor is oriented in the Earth's magnetic field, successive survey lines taken in opposite directions will match up perfectly.

The benefits to the user are four-fold:

1. Targets will not be missed because they fall between mismatched survey lines.

2. Eliminates post processing. Competing technologies require the user to collect tie lines in order to level the data set (match-up inaccurate survey lines). This is not necessary with an accurate magnetometer like SeaSPY.

3. There will be no variation introduced in the data by slight course changes during a survey line.

4. A magnetic map of an area will look the same, regardless of in which direction the survey lines were conducted.

Digital System

SeaSPY is entirely digital. The magnetometer signal is measured inside the towfish where the signal is strongest and most immune to outside noise.

Ultra Low Power Consumption

A SeaSPY system only requires 1W standby and 3W maximum. As a result, SeaSPY can run for days directly from a 24V vehicle battery.

Marine Magnetic Corporation SeaSPY Marine Magnetometer

SeaSPY Towfish

Includes:

- High sensitivity omnidirectional Overhauser sensor
- Electronics module containing all of the driving electronics, including the Larmour counter
- Depth sensor
- Leak detector
- 4 lead weights
- Custom foam lined shipping case
- SeaLINK Software for windows

Standard SeaSPY Hardware

Communication Transceiver

The Communication Transceiver provides the complete interface between the customers PC and the SeaSPY towfish. One side connects to a PC serial port using an RS-232 cable, and the other plugs into one end of the deck leader cable, which in turn connects to the tow cable and towfish. In addition to conditioning the towfish power supply, the transceiver functions like a modem, providing two-way communication along the same conductors that provide power to the SeaSPY towfish.

Dimensions: 11 x 6 x 3 cm (4 x 2 x 1 inches)

Weight: 130g (0.28 lbs)

30m Deck Cable

Tow Cable

The SeaSPY tow cable is incredibly tough yet light in weight. The cable consists of one twisted pair of conductors, a Vectran strength member that is specifically woven to prevent rotational preference, water blocking and a yellow polyurethane jacket. Length to be determined by customer.

Metal Cable Reel

Included with up to 200m of cable. A wooden spool is included with cable amounts exceeding 200m.

SeaSPY Accessories Package

Includes: RS232 Cable, 24V AC power supply and battery clip cable.

SeaSPY OPTIONS

Drive up to 10,000m of cable with the SeaSPY Smart Transceiver

An enhanced version of the communication transceiver, the Smart Transceiver's adaptive design adjusts to suit a broad range of cable parameters, enabling it to drive up to 10,000m of cable.

Additional advantages include:

- Boosts and regulates the towfish supply voltage, to minimize voltage drop over long cables.
- Digital auto-tuning of transmission/reception frequencies.
- Diagnostic features include digital voltage and current monitoring.
- Keeps time after power off, and automatically sets the towfish time when needed.

No additional hardware has to be purchased. The Smart Transceiver is compatible with the AC power supply provided with all SeaSPY Marine Magnetometer Systems.

Dimensions: 12 x 6.5 x 8 cm (4.7 x 2.5 x 3 inches)

Weight: 300g (0.66 lbs)

Deep Tow Options

Marine Magnetics offers three deep tow options:

1000m SeaSPY towfish tested to 1,500psi

3000m SeaSPY towfish tested to 4,500psi

6000m SeaSPY towfish tested to 9,000psi

Side Scan Sonar Integrations

SeaSPY is compatible with a variety of industry standard Side Scan Sonar systems. The integration maintains the basic system integrity of the SeaSPY towfish and the Side Scan Sonar towfish. Each system can be run independently as well as together. For more information please see our ***SeaSPY Side Scan Sonar Integration brochure***

Altimeter

An integrated, nonmagnetic 200kHz altimeter is available for all depth options. The altimeter provides an accurate and precise (to 0.1m) towfish altitude measurement with every magnetometer reading.

SeaLINK Analogue Output

Enables SeaLINK to generate two user programmable analogue signals for output to any analogue chart recorder.

This option includes analogue output hardware for a PC, and the customer can select between a PCMCIA card, or an ISA-bus card.

Marine Magnetic Corporation SeaSPY Marine Magnetometer

OEM SeaSPY Electronics Module

SeaSPY electronics modules contain all of the driving electronics, including the Larmour counter. The module is a completely sealed, self-contained unit that is safe to handle even in dirty, or wet conditions.

All SeaSPY electronics modules are completely interchangeable, enabling a customer to swap between modules on demand. This makes them ideal for applications where multiple electronics modules are required as gradiometers or simply as spares.

SeaSPY electronics module

OEM SeaSPY Overhauser Sensor

All SeaSPY sensors are omnidirectional, maintenance free, and do not require realignment, or recalibration, and they do not contain any consumable parts, or toxic chemicals.

In addition, all SeaSPY sensors are interchangeable, and with a repeatability of 0.01nT between the sensors, they are ideal for multi-sensor applications.

Floatation Cable

SeaSPY floatation cable consists of one twisted pair of conductors, a Vectran strength member, water blocking and the addition of an extra layer of syntactic foam, coated with an orange polyurethane jacket.

Extension Cables

Marine Magnetics provides extension cables for both our standard Vectran and floatation cables.

Each extension consists of a male and female brass connector. Both connectors have the capability of bearing the full working load of the cable.

This configuration allows multiple extension cables to be connected together in series up to 1000m.

Connector –Tow cable termination kit

Marine Magnetics' proprietary screw-on underwater connector, for interface to the SeaSPY towfish, is made of a brass alloy that is entirely non-magnetic. The connector is extremely tough and can support more than one tonne of towing force. A PVC nose cone fits over the connector to protect it from side impact and to create a streamlined tow body.

This connector is used with all of the SeaSPY options, allowing the customer to swap between cables at will.

Best of all, the connector is field-serviceable with a Marine Magnetics field re-termination kit.

Tow Cable Weights

Marine Magnetics brass cable weights are an effective, yet inexpensive way of getting our SeaSPY towfish to deep depths. Placing the cable weights periodically along the length of the cable effectively counters the lift produced by tow cable drag, it also produces a very sharp drop rate that can be sustained for long cable lengths. In recent trials it has proved to be more effective than depressor wings that are costly, awkward, and large.

Each weight weighs about 6lbs in water and can be installed or removed with a screwdriver, enabling the user to remove or add weights at will.

Lead Weights

The towfish can be made buoyant in the field by removing two of the internal stabilizing lead weights.

For added versatility, the towfish can also be made heavier in the field by adding up to 4 more stabilizing lead weights inside the towfish.

Brass tow cable weight attached to MMC's cable

Marine Magnetic Corporation SeaSPY Marine Magnetometer

Performance

Operating Zones	NO RESTRICTIONS. SeaSPY will perform exactly according to spec throughout the entire range.
Absolute Accuracy	0.2nT
Sensor Sensitivity	0.01nT
Counter Sensitivity	0.001nT
Resolution	0.001nT
Dead Zone	NONE
Heading Error	NONE
Temperature Drift	NONE
Power Consumption	1W standby, 3W maximum
Timebase stability	1ppm, -45°C to +60°C
Range	18,000nT to 120,000nT
Gradient Tolerance	Over 10,000nT/m
Sampling Range	4Hz - 0.1Hz
External Trigger	By RS-232
Communications	RS-232, 9600bps
Power Supply	15VDC-35VDC or 100-240VAC
Operating Temperature	-45°C to +60°C
Temperature Sensor	-45°C to +60°C, 0.1 step

Towfish Dimensions

Towfish Length	124 cm (49 inches)
Towfish Diameter	12.7 cm (5 inches)
Towfish Weight in Air	16 kg (35 lbs)
Towfish Weight in Water	2 kg (4.4 lbs)

Tow Cable Dimensions

Conductors	Twisted pair
Strength Member	Vectran
Breaking Strength	2,500 kg (5,500 lbs)
Outer Diameter	1 cm (0.4 inches)
Bending Diameter	16.5 cm (6.5 inches)
Weight in Air	125 g/m (84 lb/1000 ft)
Weight in Water	44 g/m (29.5 lb/1000 ft)
Outer Jacket	Yellow Polyurethane
Cable Termination	Field Replaceable

Floatation Cable

Conductors	Twisted pair
Strength Member	Vectran
Max Working Load	2,500 kg (5,500 lbs)
Outer Diameter	1.9 cm (0.74 inches)
Bending Diameter	25 cm (10 inches)
Weight in Air	272 g/m 183 lbs/1000 ft)
Weight in Water	-20 g/m (-13.5 lbs/1000 ft)
Outer Jacket	Orange Polyurethane
Cable Termination	Field Replaceable

Other Sensors

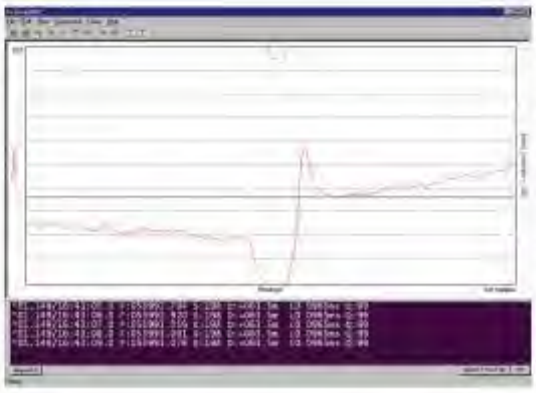
Pressure/depth sensor:
A pressure sensor is included with every SeaSPY towfish.

Altimeter:
200kHz altimeter 0-100m range, 0.1 resolution integrated into the nose of the SeaSPY towfish. Altitude is available with every mag reading.

SeaLINK Software

SeaLINK, a 32 bit application that runs under Windows 95/98/ME/NT/2000/XP is supplied as standard equipment with all SeaSPY magnetometer systems. SeaLINK provides an interactive text interface as well as a real-time plot view of data that is being collected from the magnetometer. Features include:

- real-time graphing of magnetic field trace
- display of depth trace
- bathymetry is displayed with the altimeter option
- event markers from user or serial port signal
- graph zooming and scaling
- review of stored data
- real-time graphical printing to a dot matrix printer
- audible alarms for signal quality flags



SeaLINK NMEA capability

- The ability to accept GPS NMEA data through any free COM port on the PC.
- The user will generally set the magnetometer up on COM1, and the GPS data onto COM2.
- The ability to synchronize the magnetometer clock to GPS time at the click of a button, or automatically at a periodic interval. The synchronization can be done either directly on receipt of a particular NMEA string, or very accurately via receipt of a 1PPS signal through the Ring Indicator pin of the COM port.
- The ability to tag every mag reading with a GPS coordinate, corrected for towfish layback. If the GPS data frequency is less than the magnetometer sampling rate, a coordinate will be interpolated for interim mag readings.
- GPS data can also be stored completely independently from the mag data stream
- All GPS information can be shown on-screen in real time in latitude/longitude format, or as UTM projection with user-selectable datum.

Edgetech X-Star

Full Spectrum Digital Sub-Bottom Profiler

The X-Star is a wideband FM high-resolution Sub-Bottom Profiler which generates cross-sectional images of the seabed and collects digital normal incidence reflection data over many frequency ranges. X-Star transmits an FM pulse that is linearly swept over a full spectrum range (also called a “chirp pulse”) for example, 2-16 kHz over 20 milliseconds. Acoustic returns received at the hydrophone are match filtered with the outgoing FM pulse, producing a high-resolution image of sub-bottom stratigraphy. As sediment classification and navigation maps are generated in real time, hard-copy of bottom type and vessel track may be generated during, or shortly after, a survey.

Because the FM pulse is generated by a digital-to-analogue converter with a wide dynamic range and a transmitter with linear components, the energy, amplitude and phase characteristics of the acoustic pulse can be precisely controlled. This precision produces the high repeatability and signal definition required for sediment classification.

X-Star combines a precision wide-band, low noise, low distortion analogue sonar front end with a powerful RISC workstation & Digital Signal Processing (DSP) pipeline array co-processor.

The resulting sub-bottom sonar data may be processed to build maps of the horizontal and vertical distribution of sediment properties. These include acoustic impedance, acoustic attenuation, grain size, bulk density and sound speed.

Full Spectrum™ Pulse technology has several distinct advantages over conventional SBP systems, including increased penetration with high-resolution through the use of matched filter correlation and waveform weighting techniques. The tapered waveform spectrum results in images that have virtually constant resolution with depth. System linearity allows quantitative measurement of reflection coefficient, a key requirement for sediment classification. In addition to resolution improvement, X-Star’s correlation processing achieves a considerable signal processing gain over background noise. The gain of the filter is approximately 25 dB. To equal the typical performance of the X-Star Full Spectrum™ Pulse, a conventional sub-bottom profiler would need to operate at peak pulse power of 100 times larger than the X-Star FM pulse.

Another advantage is the reduction in side-lobes in the effective transducer aperture. The wide bandwidth of the sweep frequency has an effect of smearing the side-lobes of the transducer, resulting in a beam pattern with almost no side-lobes. X-Star may therefore be towed very near the seabed, minimising signal scattering caused by sediment.

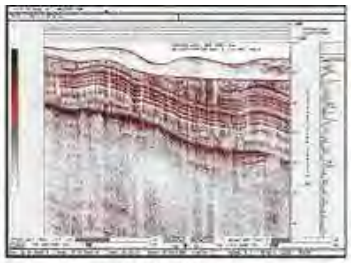
Applications :

- Oil & Gas drilling hazard surveys
- Buried pipeline & cable location
- Geophysical/geological surveys
- Mining & Dredging surveys
- EEZ resource mapping
- Sediment classification
- Search & Recovery
- Seabed structure scour surveys
- Bridge erosion surveys
- Buried target location
- Archaeological & natural resource surveys

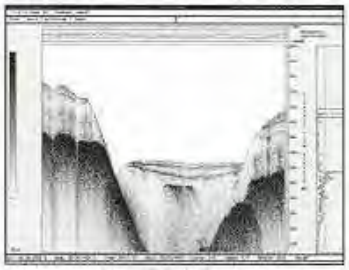
Features :

- 6 cm or better resolution
- Matched filter correlation
- Realtime sediment classification/ navigation maps
- 20 dB improved SNR using swept FM pulse
- Direct path deconvolution improves SNR 40dB
- No spatial side-lobes
- Close seabed operating envelope

X-Star operates with several stable, low drag, tow vehicles that contain wide-band transmitter arrays and line array receivers (see overleaf). Selection of tow vehicle depends upon the sub-bottom conditions on site, the type of features to be imaged and penetration required. The X-Star is also available in a hull-mounted configuration.



SB-216 Data



SB-0512 Data

Sediment Classification Map

Edgetech X-Star

Full Spectrum Digital Sub-Bottom Profiler - Specifications

X-STAR TOWFISH MODELS :

Pulse Types :
FM with amplitude & phase weighting

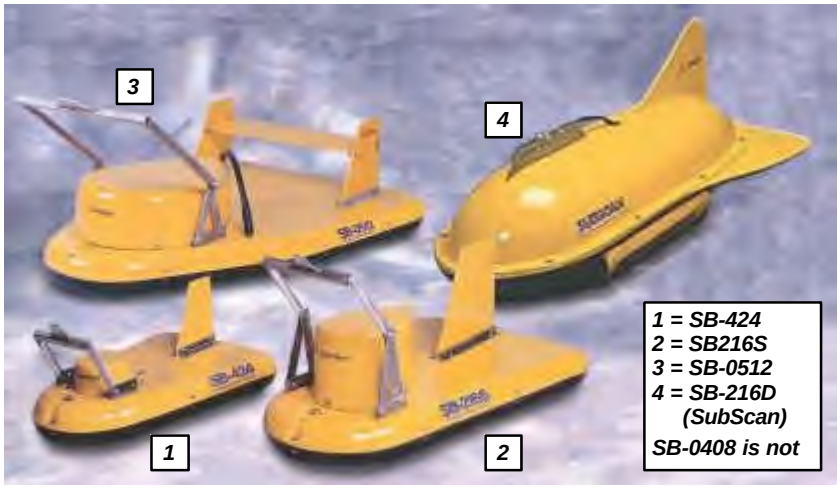
Maximum Operating Depth :
Standard : 300 m (985 ft.)
Option : 6,000m (20,000') full ocean

Tow Speed :
3-4 knots optimal, 6 knots maximum safe operational

Pulse Length :
20, 40 msec. standard (others optional)

Output Power : 2 KW

Data Cable : 3 shielded twisted pairs, 5 conducters used (all in SB-0408)



Towfish Model :	SB-424	SB-216S	SB-216D	SB-0512	SB-0408
Frequency Range :	4-24 kHz	2-16 kHz	2-16 kHz	0.5-12 kHz	0.4-8 kHz
Pulse Bandwidth & Vertical Resolution :	4-16 kHz / 8cm 4-20 kHz / 6cm 4-24 kHz / 4cm	2-10 kHz / 10cm 2-12 kHz / 8cm 2-16 kHz / 6cm	2-10 kHz / 10cm 2-12 kHz / 8cm 2-16 kHz / 6cm	0.5-5 kHz / 40 cm 1-6 kHz (40ms) / 30cm 1.5-7.5kHz (40ms)/12cm 2-8 kHz (40ms) / 8cm 2-12 kHz (20ms) / 8cm	0.4-2.4 kHz / 80cm 0.5-3.5 kHz / 60cm 0.75-4.5 kHz /40cm 1-6 kHz / 30 cm 2-8 kHz / 20 cm
Penetration (typical) :					
Coarse calcareous sand :	3 metre	8 metre	8 metre	20 metre	40 metre
Clay & soft sediment :	40 metre	100 metre	100 metre	200 metre	300 metre
Beam width :	15º-20º	15º-20º	15º-20º	10º-30º	10º-30º
Transmitters :	1	1	2	4	2
Receive Arrays :	2	2	1	4	8
Dimensions (cms) :	77L x 50W x 34H	105L x 67W x 46H	145L x 74W x 61H	210L x 134W x 46H	249L x 214W x 91H
Weight :	22 kgs (48 lbs)	44 kgs (97 lbs)	102 kgs (225 lbs)	186 kgs (410 lbs)	364 kgs (803 lbs)

X-STAR SIGNAL PROCESSING UNIT

Pulse Repetition Rate :
0.5 to 8 6 pulses /sec. for full data acquisition window of 120 msec. (12 pulses/sec. 90 msec.)

Pulse Trigger : External or set internal
Pulse Power : 2,000 W peak

A/D Delay :
Adjustable. For deep water, A/D delay is used to delay start of data acquisition following transmission

A/D Sample Rate :
16, 32, 48 kHz depending on pulse frequency and record length

A/D Convertor :
16-bit sigma-delta A/D and 20-bit over sampling D/A convertors with less than 1-bit of sampling noise

Main/DSP Processors :
Sparc Workstation, UNIX Oper. System 17" high resolution colour monitor, AT&T DSP32C Digital Signal Processor

Range :
0-6,000 metre (19,700 ft.) using continuous match filter processing

Annotation :
Via keyboard or RS-232C port input

Main Display :
Bottom tracking, Hardness & Navigation maps, Bottom classification, Colour versus Echo strength, Scale lines

Operator Controls :
A/D gain, Two-stage TVG, Bottom tracking, Digital gain, Preamplifier gain, Horizontal & vertical zoom, Waveform display, Direct path supression, Swell filter, Annotation

Event Mark :
Via keyboard, switch closure or RS-232C port input

Printer Driver Options (built-in) :
EPC, Ultra, Alden, Raytheon, HP ColorJet

Data Storage Options (built-in) :
8mm Exabyte, 4mm DAT, Iomega Jaz
Data storage format : SEG-Y

I/O Ports :
Ethernet, Serial, SCSI, Parallel, Fix Mark, Keyboard, Trackball, Trigger-In, Trigger-Out, 12 VDC out, Heave Compensator input

RS-232 Port Message Inputs :
Navigation, Fix mark, Annotation

Navigation Input :
NMEA 0183 i/f, Pre-planned tracklines, Classification colour, Event/fix marks, Sonar position, Navigation setup facility

Power Input :
105-125 or 210-250 VAC, user selectable, 47-63 Hz at 900 W max.

Environmental :
Temp. : Oper.: 5º-40º C
Storage : -40º-45º C
Humidity : Oper.: 20-80% rel.humidity non-condensing
Storage : 5-95% rel.humidity

Dimensions & Weight :

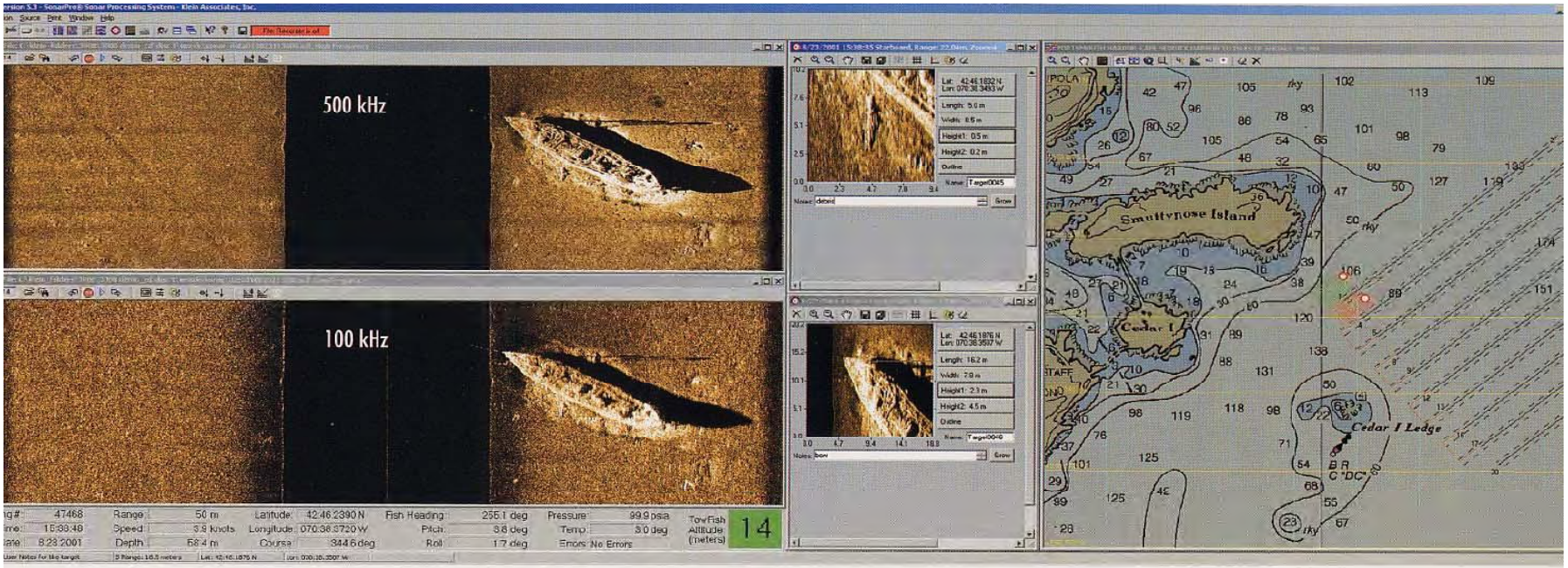
	MIDAS	Power Amp.
Width :	480mm (19.0")	480mm (19.0")
Height :	225mm (8.9")	135mm (5.3")
Depth :	435mm (17.1")	355mm (14.0")
Weight :	20kg. (44 lbs.)	18kg. (40 lbs.)

(units in portable 19" rack-mount cases)

Options :
- Conventional short pulse sound source input, incl. high/low digital bandpass filters
- Navigation & reflection coefficient s/w
- Isopach mapping software
- Replay software for UNIX Workstation

Klein System 3000

Klein System 3000



SPECIFICATIONS

Towfish

Frequencies	100 kHz (125 kHz +/- 1% act.), 500 kHz (445 kHz, +/- 1% act.)
Transmission Pulse	Tone Burst, operator selectable from 25 to 400 µsecs. **Independent pulses for each frequency**
Beams	Horizontal - 1 deg. @ 100 kHz, 0.2 deg. @ 500 kHz Vertical - 40 deg.
Beam Tilt	5, 10,15, 20, 25 degrees down, adjustable
Maximum Range	600 meters @ 100 kHz; 150 meters @ 500 kHz
Depth Rating	1,500 meters standard, options to 3km & 6km depths
Construction	Stainless Steel
Size	122 cm long, 8.9 cm diameter
Weight	29 kg in air
Standard Sensors	Roll, pitch, heading
Options	Magnetometer Interface, pressure, Acoustic Positioning Responder, and Responder Interface Kits

Transceiver Processor Unit (TPU)

Operating System	vxWorks® with custom application
Basic Hardware	19-inch rack or table mount, VME bus structure
Outputs	100 Base-Tx, Ethernet LAN
Navigation Input	NMEA 0183
Power	120 watts @ 120/240 VAC, 50/60 Hz

Klein Sonar Workstation

Basic Operating System	Windows NT® & 2000® or equiv.
Sonar Software	SonarPro®
Data Storage	Internal hard drive, optional devices available
Hardware	Industrial PC with technically advanced components

Tow Cables

Klein offers a selection of coaxial, Kevlar® reinforced, lightweight cables, double armored steel cables, and interfaces to fiber optic cables. All cables come fully terminated at the towfish end.

KLEIN

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web site: www.kleinsonar.com

SonarPro® Software

Custom developed software by users and for users of Klein side scan sonar systems operating on Windows NT® & 2000®. Field proven for many years on Klein's Multi-Beam Focused Sonar Series 5000 Systems and adapted to the System 3000 single-beam system. SonarPro® is a modular package combining ease of use with advanced sonar features.

Basic Modules	Main Program, Data Display, Information, Target Management, Navigation, Data Recording & Playing, and Sensor Display.
Multiple Display Windows	Permits multiple windows to view different features as well as targets in real time or in playback modes. Multi-Windows for sonar channels, navigation, sensors, status monitors, targets, etc.
Survey Design	Quick & easy survey set up with ability to change parameters, set tolerances, monitor actual coverage, and store settings.
Target Management	Independent windows permitting mensuration, logging, comparisons, filing, classification, positioning, time & survey target layers, and feature enhancements. Locates target in navigation window.
Sensor Window	Displays all sensors in several formats (includes some alarms) and responder set up to suit many frequencies and ping rates.
Networking	Permits multiple, real time processing workstations via a LAN including "master and slave" configurations.
"Wizards"	To help operator set up various manual and default parameters.

EdgeTech
An Affiliate of ORE Offshore

2000 SERIES

COMBINED SIDE SCAN SONAR & SUB-BOTTOM PROFILING SYSTEM

FEATURES

- Fully integrated turnkey system
- Digital telemetry over single coaxial tow cable up to 6,000m
- Choice of side scan and sub-bottom frequencies
- Built-in heading, pitch and roll sensors

APPLICATIONS

- Archeological Surveys
- Geological/Geophysical Surveys
- Sediment Classification
- Cable and Pipeline Surveys
- Pre/Post Dredging Surveys
- Scour/Erosion Investigation
- Marine Construction Surveys

2000-CSS

The 2000 Series combines EdgeTech's highly successful line of side scan sonars and sub-bottom profilers into one fully integrated system.

The system comes with a choice of two different towfish; either the 2000-CSS or 2000-DSS. The CSS comes with a low frequency 500 Hz – 12 kHz sub-bottom profiler and is designed for applications that require greater sub-bottom penetration in depths of up to 300m. The DSS comes with a higher frequency 2 – 16 kHz sub-bottom profiler and is designed for applications that require higher resolution sub-bottom imagery in depths of up to 2,000m. Both towfish come with the choice of either a 100/400 kHz or 300/600 kHz dual simultaneous frequency CHIRP side scan sonar which will provide an excellent combination of range and resolution.

A standard 2000 Series System comes complete with a combined towfish, digital telemetry that runs over a single coaxial cable up to 6,000 meters long and a 19 inch rack mount topside processor running EdgeTech's DISCOVER acquisition software. Additionally, the 2000 Series System can be integrated with a number of auxiliary sensors such as magnetometer, depth, altitude and USBL responder.

For more information please visit EdgeTech.com

info@EdgeTech.com | USA 1.508.291.0057

EdgeTech
An Affiliate of ORE Offshore

2000 SERIES

COMBINED SIDE SCAN SONAR & SUB-BOTTOM PROFILING SYSTEM

KEY SPECIFICATIONS

SIDE SCAN SONAR		
Frequency (dual simultaneous CHIRP)	100/400 kHz	300/600 kHz
Operating Range	100 kHz: 500 meters/side 400 kHz: 150 meters/side	300 kHz: 230 meters/side 600 kHz: 120 meters/side
Beam Width (2-way) & Along Track Resolution	100 kHz: 1.08 deg or 1.90 m @ 100 m 400 kHz: 0.56 deg or 0.96 m @100 m	300 kHz: 0.6 deg or 1.0 m @ 100 m 600 kHz: 0.26 deg 0.45 m @ 100 m
Across Track Resolution	100 kHz: 6.3 cm 400 kHz: 1.8 cm	300 kHz: 2.8 cm 600 kHz: 1.4 cm
SUB-BOTTOM PROFILER	**2000-CSS**	**2000-DSS**
Frequency Band	500 Hz – 12 kHz	2-16 kHz
Resolution	8-20 cm	6-10 cm
Penetration in coarse sand	20m	6m
Penetration in clay	200m	80m
TOWFISH	**2000-CSS**	**2000-DSS**
Length	160 cm	145 cm
Width	124 cm	74 cm
Height	47 cm	84 cm
Weight	210 kg	145 kg
Maximum Water Depth	300m	2,000m
TOPSIDE PROCESSOR		
Hardware	Standard 19" rack	
Operating System	Windows XP	
Display	Dual 22" high resolution flat panel monitors	
Archive	DVD-R/W and/or LAN connection	
File Format	Native JSF or XTF for side scan, SEG-Y for sub-bottom	
Output	Ethernet	
Power Input	90 to 132 VAC and 180 to 260 VAC, Auto voltage detect and switching, 47-63 Hz	
Tow Cable		
	Double-armored coaxial, customer specified length	

For more information please visit EdgeTech.com

info@EdgeTech.com | USA 1.508.291.0057

ORE Offshore
An Affiliate of EdgeTech

BATS

BROADBAND ACOUSTIC TRACKING SYSTEM

FEATURES

- Ultra Short Base Line Tracking System
- Broadband Spread Spectrum and Continuous Wave Acoustic Technology
- 17 to 30 kHz Frequency for Extended Range
- Compatible with Windows 98, NT, 2000, XP, and Vista

The new BATS System consists of a Signal Interface Module housed in a standard (3.5") rack mount chassis (19"). It can be configured for a desk top application with a PC or laptop running the ORE Trackman Windows® software or coupled with a standard (3.5") rack mount PC and standard (3.5") rack mount Keyboard/Display. Alternately, BATS is available in a splash-proof portable unit.

The use of Broadband Acoustic Technology provides exceptional range and tracking performance. The software is user friendly and intuitive. The system interface is Ethernet TCP/IP to a PC running a compatible Windows® operating system.

For more information please visit ORE.com

sales@ORE.com | USA 1.508.291.0960

ORE Offshore
An Affiliate of EdgeTech

BATS

BROADBAND ACOUSTIC TRACKING SYSTEM

KEY SPECIFICATIONS

SYSTEM PERFORMANCE	
Transponder/Responder Absolute accuracy in horizontal position (over entire hemisphere) (does not include motion)	± 0.5% RMS of slant range
Repeatability accuracy (does not include motion)	± 0.3% RMS of slant range
Azimuth resolution	0.08 degree
Slant range accuracy	± 0.3 meters RMS (with correct sound speed)
Slant range resolution	0.05 meters
Acoustic coverage	± 90 degrees below hydrophone/projector
Signal to noise ratio	20 dB @ hydrophone (in 17-30 kHz band)
Receive frequency	17 to 30 kHz Spread Spectrum, Also, REMUS codes 1 - 4
Transmit frequency	16 to 21 kHz in 500Hz increments (400 Watt transmit output) (Plus, REMUS xmit codes 1 - 4)
Receive pulse width	Various coding schemes available
Transmit pulse width	1 to 15 milliseconds
OPERATIONAL CONTROLS VIA SUPPLIED SOFTWARE	
Up to 4 Target selection	Interrogation rate (0.6 to 20 seconds)
Tracking On/Off	Scaling (feet, meters, yards)
Target Type	Filtering Levels
Receive Threshold	Various coded waveforms
WEIGHTS AND DIMENSIONS	
Signal Interface Module (2U rack)	L 18.9 in (48.0 cm) x H 3.46 in (8.8 cm) x D 20 in (50.8 cm) 21 lbs (9.5 kg)
Hydrophone	L 20 in (50.8 cm) Dia 2.9 in (7.4 cm) 10 lbs (4.5 kg)
Cable	L 50 ft (15 meters) Dia* 0.5 in (1.3 cm) 8 lbs (3.6 kg)

For more information please visit ORE.com

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APPLANIX POS/MV 320

POSITION & ORIENTATION SYSTEM FOR MARINE VESSELS

A proven, high accuracy GPS aided Inertial Navigation System

POS/MV is a GPS aided Inertial Navigation System (INS) that delivers full six degrees of freedom (position and orientation) solutions for marine vessels. POS/MV is now available in two specifications: POS/MV320 (accuracy to 0.01°) and 220 (accuracy to 0.05°).
With RTK aiding, POS/MV will provide position accuracy to 0.01° (320) or 0.05° (220) in all dynamics and at all latitudes. The inertial component of POS/MV ensures continuity of all data during GPS dropouts enabling continued operation in high multipath environments and under or around significant obstructions. After power-up the Inertial Measurement Unit (IMU) becomes the primary source of navigation data.

Noise and position errors from the GPS solution are not carried through to the output channel. GPS data is used only to correct the drift of the IMU. When the GPS position environment is good, the blended position from POS/MV will provide a lower noise, higher data rate solution that is available from GPS alone.

The system comprises a compact IMU, rack mountable POS/MV Computer System (PCS) and two GPS antennas. The system is controlled and monitored via a Windows® based software programme.Interfacing to a RTK GPS receiver is easily achieved using standard NMEA messages. As an option POS/MV can be supplied with an internal RTK L1/L2 receiver.

POS/MV has been designed to provide geo-referencing and motion correction data for any marine application. For the survey users, POS/MV eliminates the attitude errors associated with conventional motion sensors and gyrocompass in dynamic environments.

Rapid deployment is achieved by a dynamic self-calibration routine. When commissioned power-up to full online capability takes 3 minutes - there is no gyro spin-up time

System Attributes

- Roll & pitch accuracy to 0.05 - 0.01° in all dynamics
- True heading accuracy to 0.05 - 0.01° independent of latitude and dynamics
- Blended RTK position data to 2cm accuracy
- Complete navigation and attitude solution
- Continuity of all data during GPS dropouts
- No motion artefacts, even under the most severe conditions
- Roll & pitch accuracy to 0.05 - 0.01° in all dynamics
- True heading accuracy to 0.05 - 0.01° independent of latitude and dynamics
- Blended RTK position data to 2cm accuracy
- Complete navigation and attitude solution
- Continuity of all data during GPS dropouts
- No motion artefacts, even under the most severe conditions
- No gyro spin-up time
- Compact and reliable
- Eliminates post-processing for position errors
- Digital, analogue and ethernet interfaces
- Self-calibrating for rapid deployment
- Industry standard

Technical Specifications

PERFORMANCE	**RTK**	**DGPS**
Position	0.02 - 0.10 m CEP	0.5 - 4 m CEP
Velocity	0.03 m/s	0.03 m/s
Roll & Pitch	0.01°	0.02°
True Heading	0.01° (4m baseline) 0.02° (2m baseline)	0.01° (4m baseline) 0.02° (2m baseline)
Heave	5% of Heave Amplitude or 5 cm	
PHYSICAL		
Size	IMU	204 x 204 x 168 mm
	PCS	441 x 111 x 346 mm 2.5U, 19" rack mount
	Antenna	170Ø x 77 mm (2 off)
	Choke Ring	370Ø x 61 mm (2 off)
Weight	IMU	3.5 Kg
	PCS	7 Kg
	Antenna	0.37 Kg (2 off)
	Choke Ring	1.8 Kg (2 off)
Power	120/220 VAC, 60/50 Hz, 60W	
Temperature	IMU	-40° to +60°C
	PCS	0° to +60°C
	Antennas	-40° to +60°C
Humidity	IMU	0 to 100%
	PCS	5 to 95% RH non-condensing
	Antennas	0 to 100%
Cables	IMU	8m (standard)
	Antenna	15m (2 off, standard)
INTERFACES		
Ethernet Interface (10base-T)	Function	Operate POS/MV and record data
	Data	Position, attitude, heading, velocity, track and speed, acceleration, status & performance, raw data. All data has time and distance tags.
	UDP Ports	Display port - low rate (1Hz) data Data port - high rate (1-200Hz) data
	IP Port	Control port - used by POS/MV controller
RS232 Interfaces (D89 males)	NMEA Port	GGA, HDT, VTG, GST, ZDA, PASHR, PRDID (1-50Hz)
	High Rate Attitude Data Port	Roll, pitch, true heading and heave in all multibeam proprietary formats (1-200Hz)
Options	Internal RTK GPS receiver	
	Analogue interface (roll, pitch and heave)	
	Field support kit	