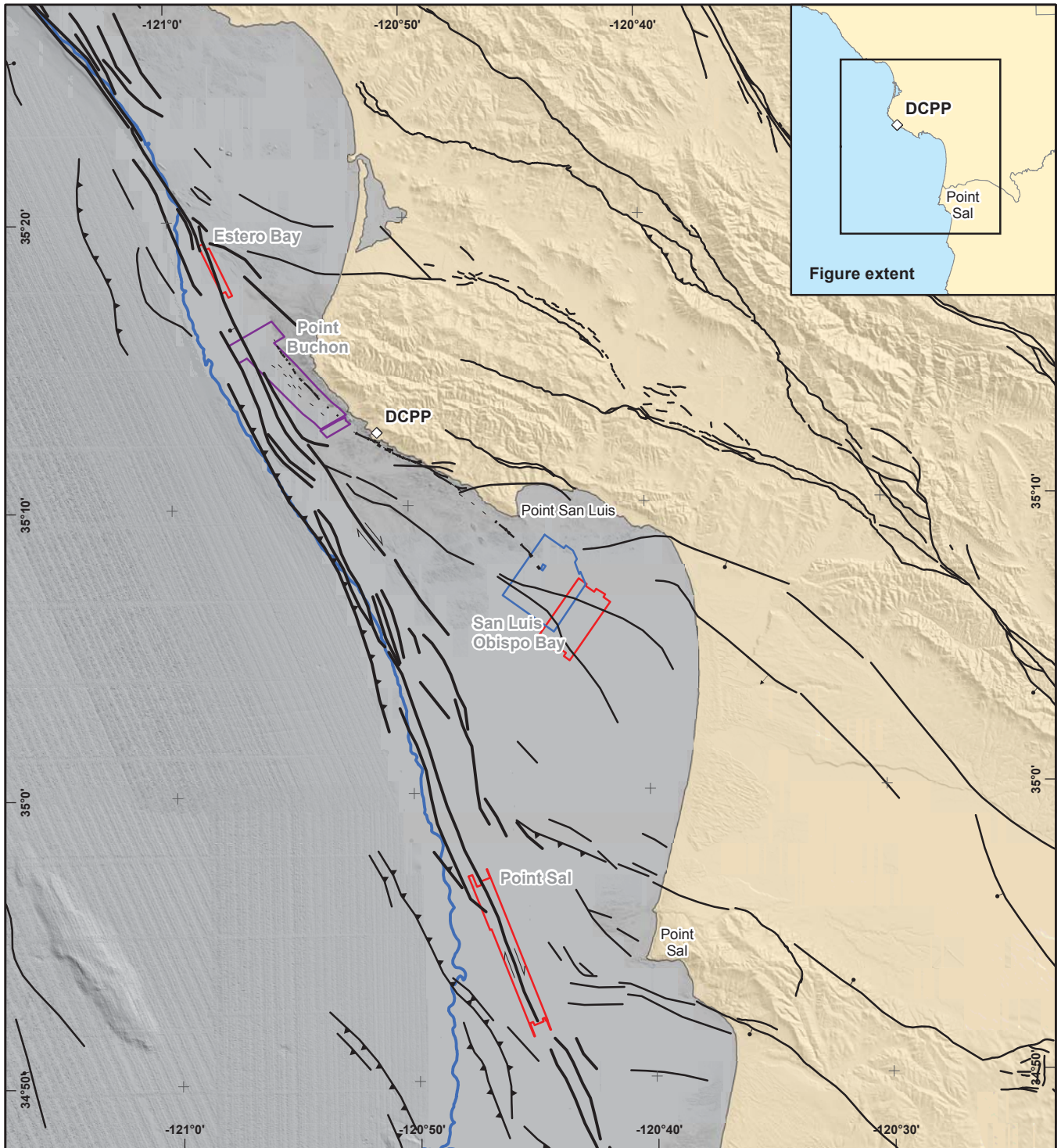


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_1-1\_RegionalMapof3D.mxd; Date: 07/27/2014; User: Ranan Dulberg, Fugro, Rev. 3



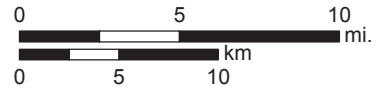
**EXPLANATION**

- Fault well located
- - - Fault approximated
- ..... Fault concealed
- ▾ Thrust fault
- Normal fault
- 120 m isobath
- ▭ 2011 3D high-resolution survey extent
- ▭ 2012 3D high-resolution survey extent
- ▭ 2010/2011 3D high-resolution survey extent

Note: See Plate 1 for details.

Sources:

- Fault locations from Jennings and Bryant (2010) and PG&E (2011).
- PG&E DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:380,160

**Regional Map of 3D LESS Survey Areas**

**OFFSHORE LESS STUDIES**

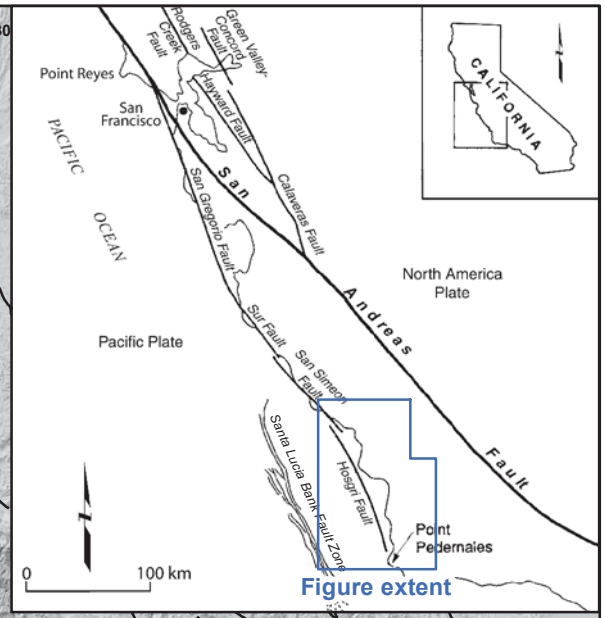
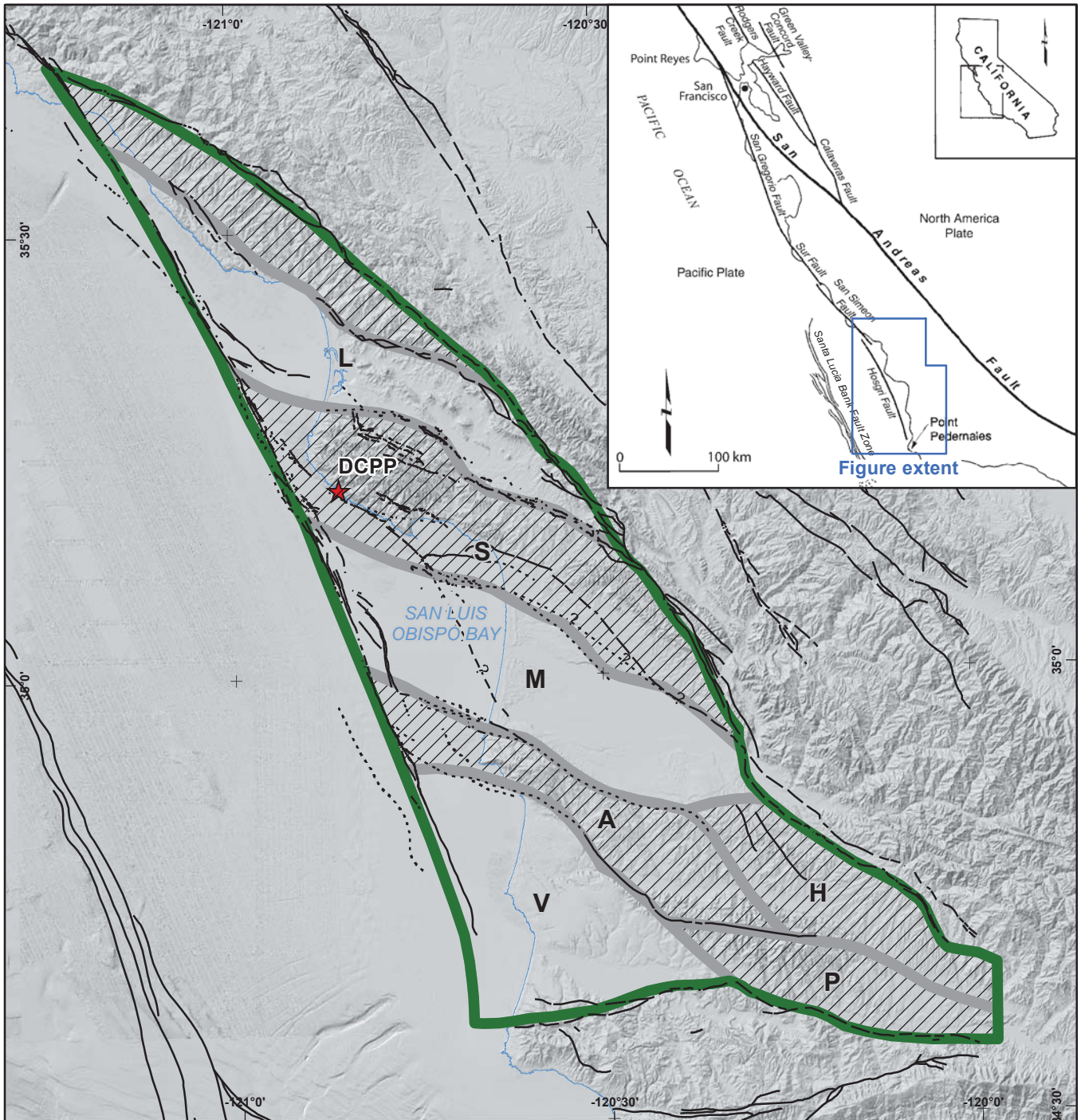


Pacific Gas and Electric Company

Figure 1-1



File path: S:\1005\033\GIS\Figures\Figure\_01-02.mxd; Date: 07/07/2014; User: Jereme Chandler, LCI; Rev. 1



**EXPLANATION**

- · · · Fault: solid where well located, dashed where approximately located, dotted where concealed, short dashed where inferred, queried where existence is uncertain.
- Uplifted structural blocks within the Los Osos domain, outlined by thick gray line
- Boundary outlining Los Osos domain
- Diablo Canyon Power Plant site

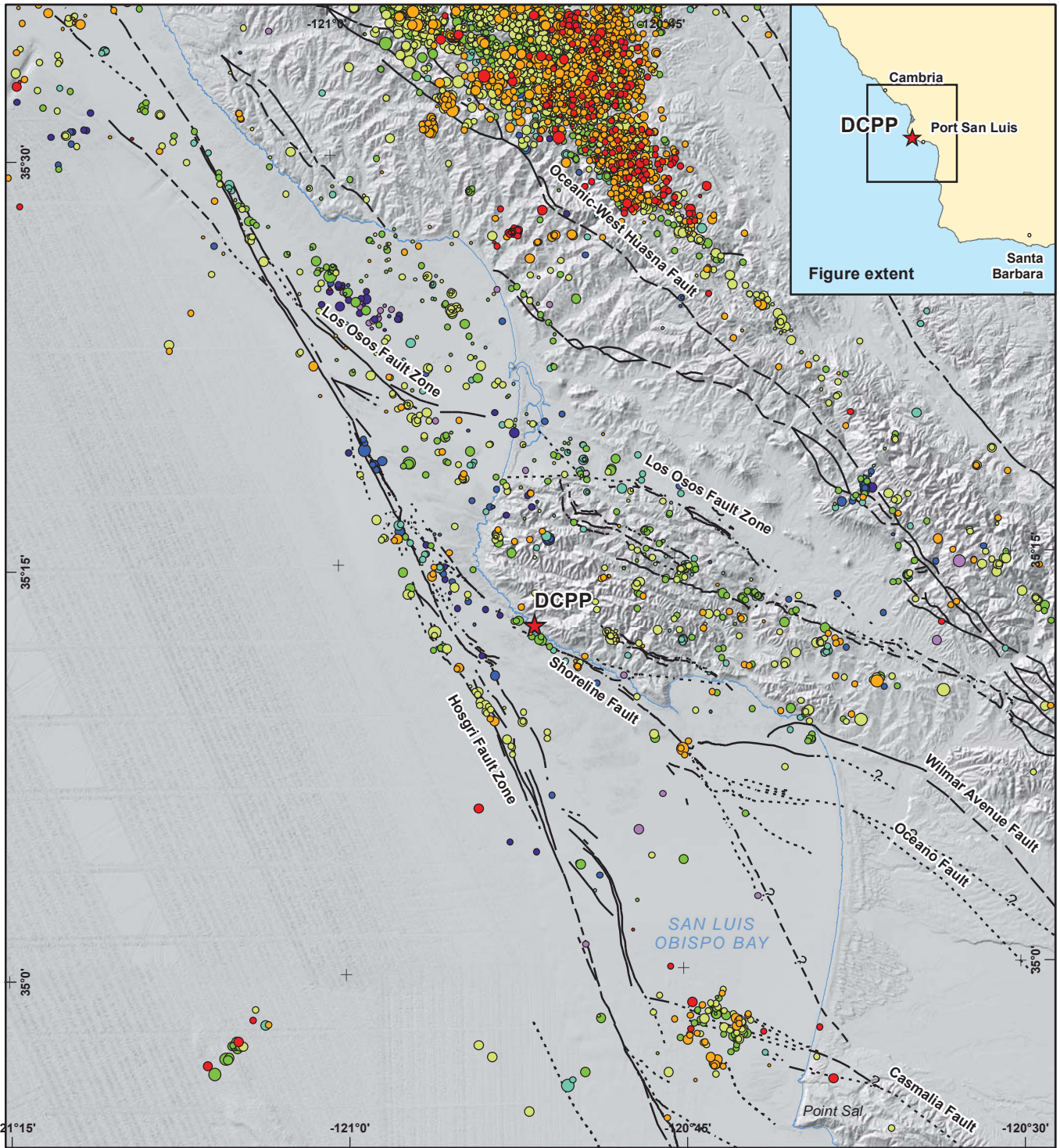
- Structural blocks within the Los Osos domain**
- |                   |                        |
|-------------------|------------------------|
| A = Casmalia      | M = Santa Maria Valley |
| C = Cambria       | P = Purisima           |
| H = Solomon Hills | S = San Luis/Pismo     |
| L = Los Osos      | V = Vandenberg/Lompoc  |

Sources:  
 - PG&E (1988, 2011, 2013)  
 - Regional tectonic sketch map from Hanson et al. (2004)  
 - AMEC (2011)

Map projection and scale: WGS 84 / UTM Zone 10N, 1:750,000

<b>Tectonic Setting</b>	
<b>OFFSHORE LESS STUDIES</b>	
Pacific Gas and Electric Company	Figure <b>1-2</b>





File path: S:\1005\033\GIS\Figures\Figure\_01-03.mxd; Date: 07/07/2014; User: Alex Remar, LC; Rev. 1

**EXPLANATION**

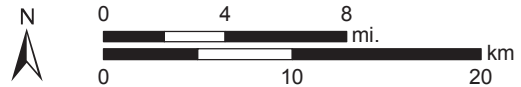
—? . . . Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.

**Earthquake Data**

Depth (km)	Magnitude
<span style="color: red;">■</span> 0.0–1.9 <span style="color: teal;">■</span> 8.0–9.9 <span style="color: orange;">■</span> 2.0–3.9 <span style="color: blue;">■</span> 10.0–11.9 <span style="color: yellow;">■</span> 4.0–5.9 <span style="color: purple;">■</span> 12.0–13.9 <span style="color: green;">■</span> 6.0–7.9 <span style="color: purple;">■</span> 14.0 +	<span style="color: red;">○</span> 0.0–0.9 <span style="color: teal;">○</span> 1.9–2.9 <span style="color: orange;">○</span> 1.0–1.9 <span style="color: blue;">○</span> 2.9–4.1

Note: Quaternary fault traces compiled from Lettis and Hall (1994), Lettis et al. (2004), AMEC (2011), PG&E (2013), and this study.

Sources:  
 - Relocated earthquake data from Hardebeck (2012).  
 - Project DEM compilation v2013.01.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:400,000

**Regional Seismicity**

**OFFSHORE LESS STUDIES**

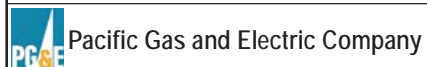


Figure **1-3**



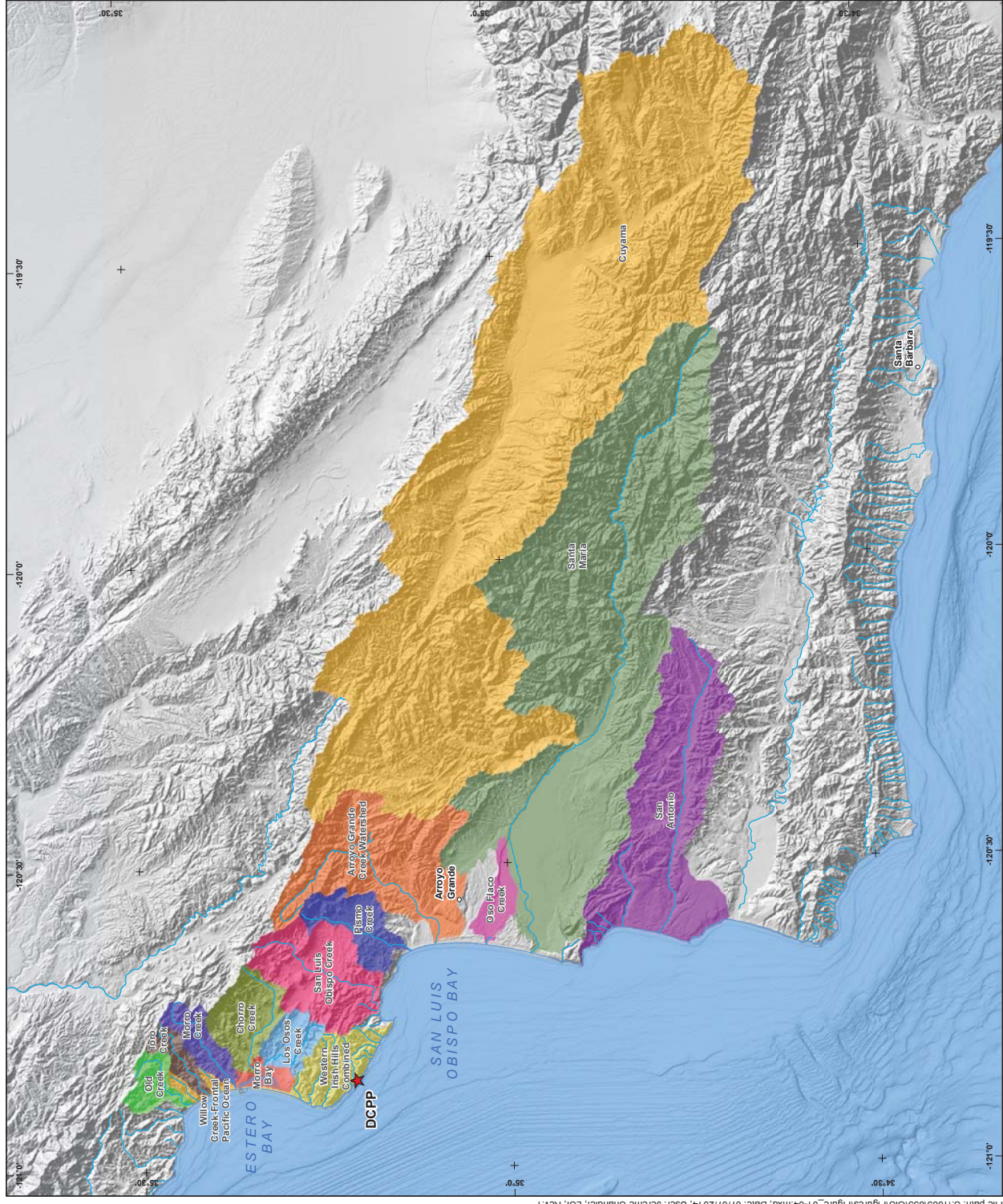
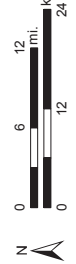


Figure extent

**EXPLANATION**

Watershed	Area (sq. km)
Arroyo Grande Creek	375
Chorro Creek	113
Cuyama	2,962
Western Irish Hills Combined	107
Los Osos Creek	59
Morro Bay	28
Morro Creek	62
Old Creek	53
Oso Flaco Creek	51
Pismo Creek	98
San Antonio	548
San Luis Obispo Creek	220
Santa Maria	1,772
Toro Creek	39
Willow Creek-Frontal Pacific Ocean	20

DEM Source: NGC Coastal Relief Model Vol. 06  
Shaded Relief Images (2003)



Map projection and scale: WGS 84 / UTM Zone 10N, 1:591,000

**Regional Physiography Map Showing Boundaries of Watersheds That Drain into San Luis Obispo and Estero Bays**

OFFSHORE LESS STUDIES

File path: S:\1005\03\GIS\Figures\Figure\_01-04.mxd; Date: 07/07/2014; User: Jereme Chandler; LCI; Rev: 1



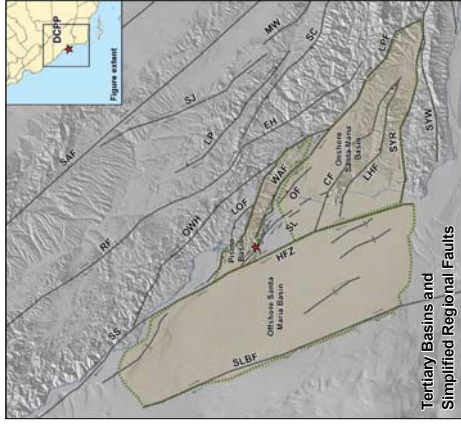
Based on Hall (1973) and PG&E (2011)

Pismo Basin		Rock units	Age	Ma
0-0.0115	Holocene	Dunes and alluvium		
2.5	Pleistocene	Marine terraces and older alluvium		
3.0-3.3	late Pliocene	Squire Member		
4.2	early Pliocene	Bellevue Member Pismo Formation (upper)		
9.0-10.4	late Miocene	Gragg Member Miguelito Member Pismo Formation (lower)		
10.5-11.4	middle Miocene	Edna Member Monterey Formation		
15.3-15.5	early Miocene	Obispo Formation Rincon Formation		
23-34	Oligocene	Vaqueros Formation		
65+	Cretaceous and Jurassic	Franciscan Complex (includes serpentinite)		

Modified from Willingham et al. (2013)

Offshore Santa Maria Basin		Rock units	Age	Ma	Horizons
0-0.0115	Holocene	marine silt and clay			H10 H20 H30 H40 H45 H48 H48 T05
2.5	Pleistocene	unnamed			NTN
2.7-3.5	late Pliocene	unnamed			ELP
5.1-5.5	early Pliocene	Sisquoc Formation (upper part)			TM
6.7	late Miocene	Sisquoc Formation (lower part)			
11.5	middle Miocene	Monterey Formation			
16.8	early Miocene	Point Sal Formation Obispo Formation			
17.5-23.0	early Miocene	remnants of sedimentary and volcanic rocks			nonmarine
34-65	Eocene and Paleocene	primarily Franciscan Complex, with possible remnants of Great Valley Sequence and Coast Range ophiolite reported in a few wells			TPM
65+	Cretaceous and Jurassic	Great Valley Sequence, Coast Range ophiolite, and Franciscan Complex			

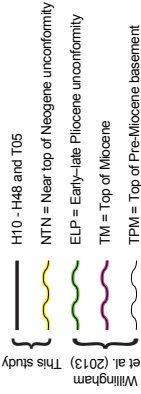
Onshore Santa Maria Basin		Rock units	Age	Ma
0-0.0115	Holocene	Dunes and alluvium		
2.5	Pleistocene	Marine terraces, Orcutt Sand, and older alluvium		
3.5	late Pliocene	Careaga sandstone		
6.0	early and late Pliocene	Foxen Mudstone		
11.5	early Pliocene and late Miocene	Sisquoc Formation		
16.0	late Miocene	Monterey Formation		
23.0	middle Miocene	Point Sal Formation Obispo Formation Lospe Formation Tarquillon Volcanics		
34-65	early Miocene			
65+	Eocene and Paleocene			



**EXPLANATION**

Approximate boundary of Tertiary basin

Unconformities



Notes:

- Fault traces modified from the Uniform California Earthquake Rupture Forecast, version 3 (UCERF3), fault model version 3.1 (Dawson et al. 2012, draft received from author). Generalized trends of active contractional structures in the offshore and the offshore Santa Lucia Bank fault are based on Lettis et al. (2004), plate 1.
- Fault names in sketch map are as follows: SAF, San Andreas Fault; RP, Rhomboid fault; SJ, San Juan fault; MW, Morales fault; LP, La Parra fault; SC, South Cuyamene fault; EH, East Huasina fault; OWH, Oceanic-West Huasina fault; SS, San Simon fault; HPZ, Hugin fault zone; LOP, Los Osos fault; WAF, Wilmar Avenue fault; LPF, Little Pine fault; OF, Oceano fault; SL, Shoreline fault; CF, Casimilla fault; LHF, Lions Head fault; SYR, Santa Ynez River fault; SYW, Santa Ynez (west) fault; SLBF, Santa Lucia Bank fault.
- Time scales in stratigraphic columns are not linear.

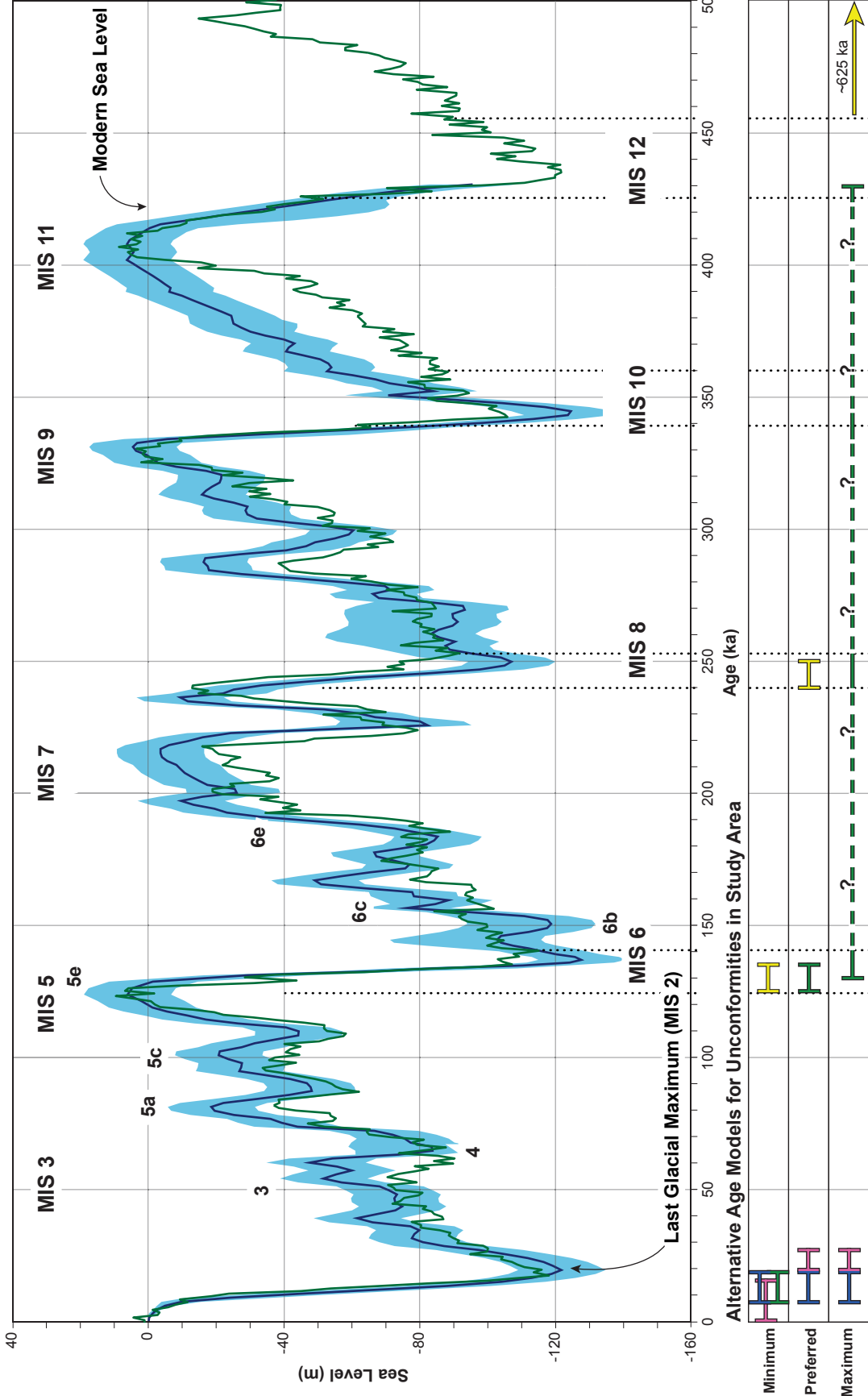
Sources:

- Stratigraphic columns for Santa Maria Basin from Willingham et al. (2013)
- Stratigraphic column for Pismo Basin from PG&E (2011) and Hall (1973).

**Generalized Stratigraphic Columns for the Project Study Areas**

OFFSHORE LESS STUDIES





**EXPLANATION**

- MIS** Marine oxygen isotope stage
- 6c** Marine oxygen isotope substage
- Waelbroeck et al. 1
- Lisiecki and Raymo (2005)<sub>2</sub>

**UNCONFORMITIES**

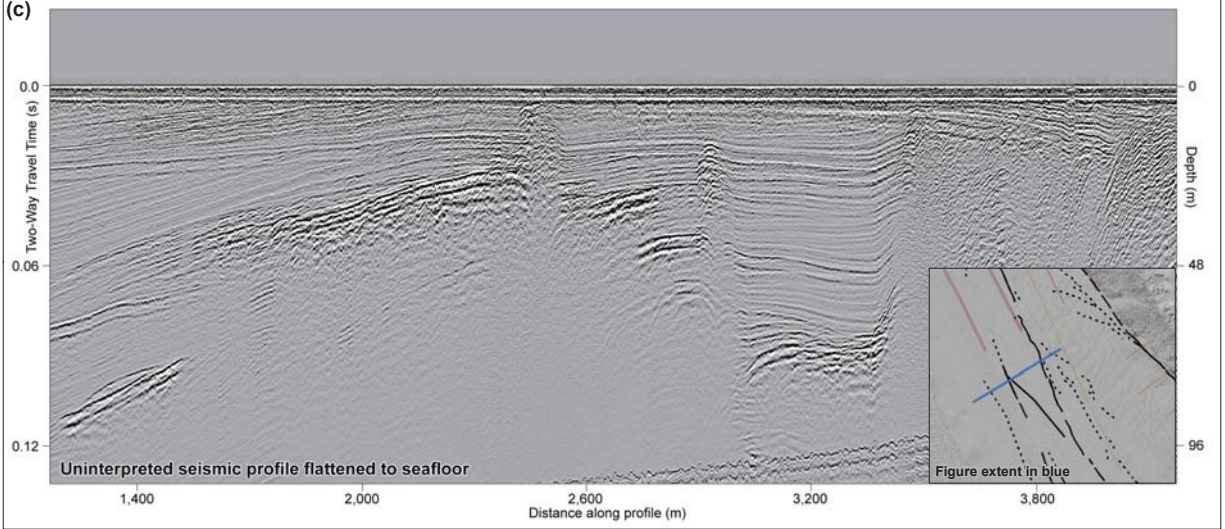
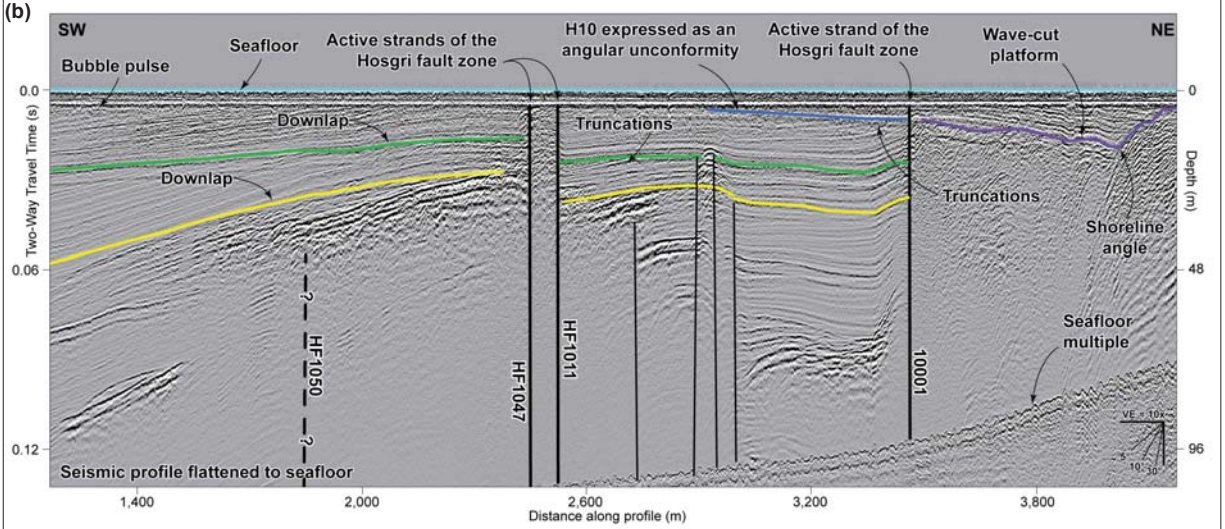
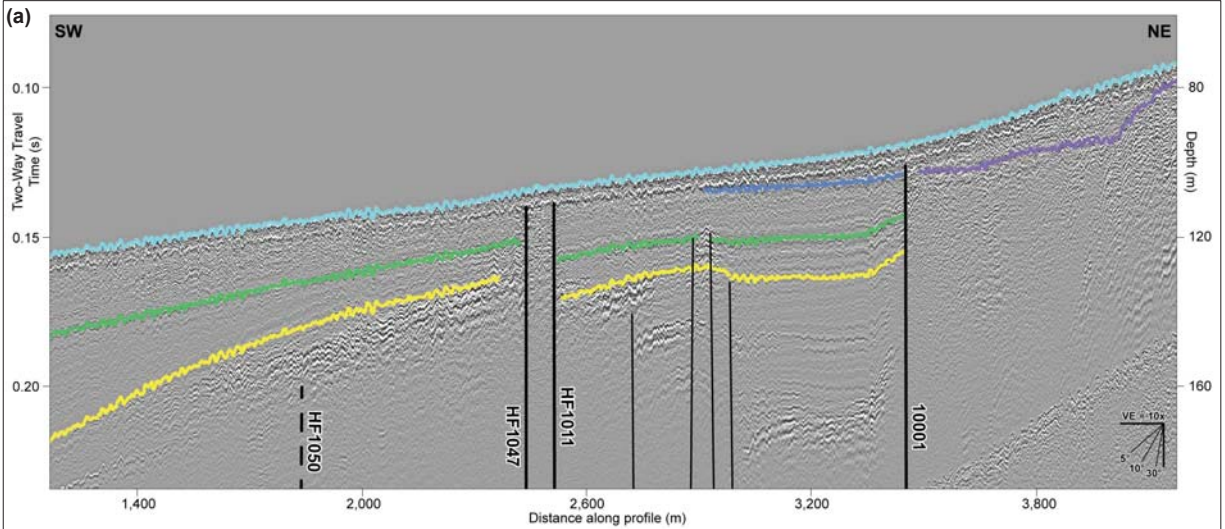
- H10
  - H20
  - H30
  - H40
- Notes:
1. Waelbroeck et al. (2002) use regressions established from relative sea-level (RSL) coral terrace data and benthic foraminifera oxygen isotope data calibrated to sea temperature data from the North Atlantic and equatorial Pacific to create a composite RSL curve for past climatic cycles. Shaded region is confidence interval.
  2. Lisiecki and Raymo (2005) use 57 globally distributed  $\delta^{18}O$  records to compile a 5.3 Myr record. Scaled to sea level by Carlson (2008).

**Age Model for Quaternary Unconformities in Study Areas**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company

Figure 1-6

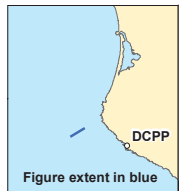


**EXPLANATION**

- Fault: solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
- Seafloor
- Unconformity H10
- Unconformity H30
- Unconformity H40
- Top of pre-Quaternary rock
- Location of seismic profile
- USGS survey trackline
- Fugro 3D survey extent
- Fugro 2D survey trackline

Sources:  
 - USGS seismic-reflection data (Sliter et al., 2009).  
 - Fugro 3D and 2D seismic-reflection data (2012).  
 - Project DEM compilation v2013.01.

- Notes:  
 1. See Figure 1-1 for location of study area.  
 2. Depth values on seismic profile assume a velocity of 1,600 m/s.  
 3. In profiles, thin black lines are unassigned faults, heavy black lines are named faults.  
 4. Faults in location map described on Plate 1a.



**Excerpt of Profile PBS-23 Showing Key Regional Unconformities Offshore of Point Buchon**

OFFSHORE LESS STUDIES

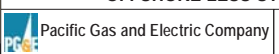
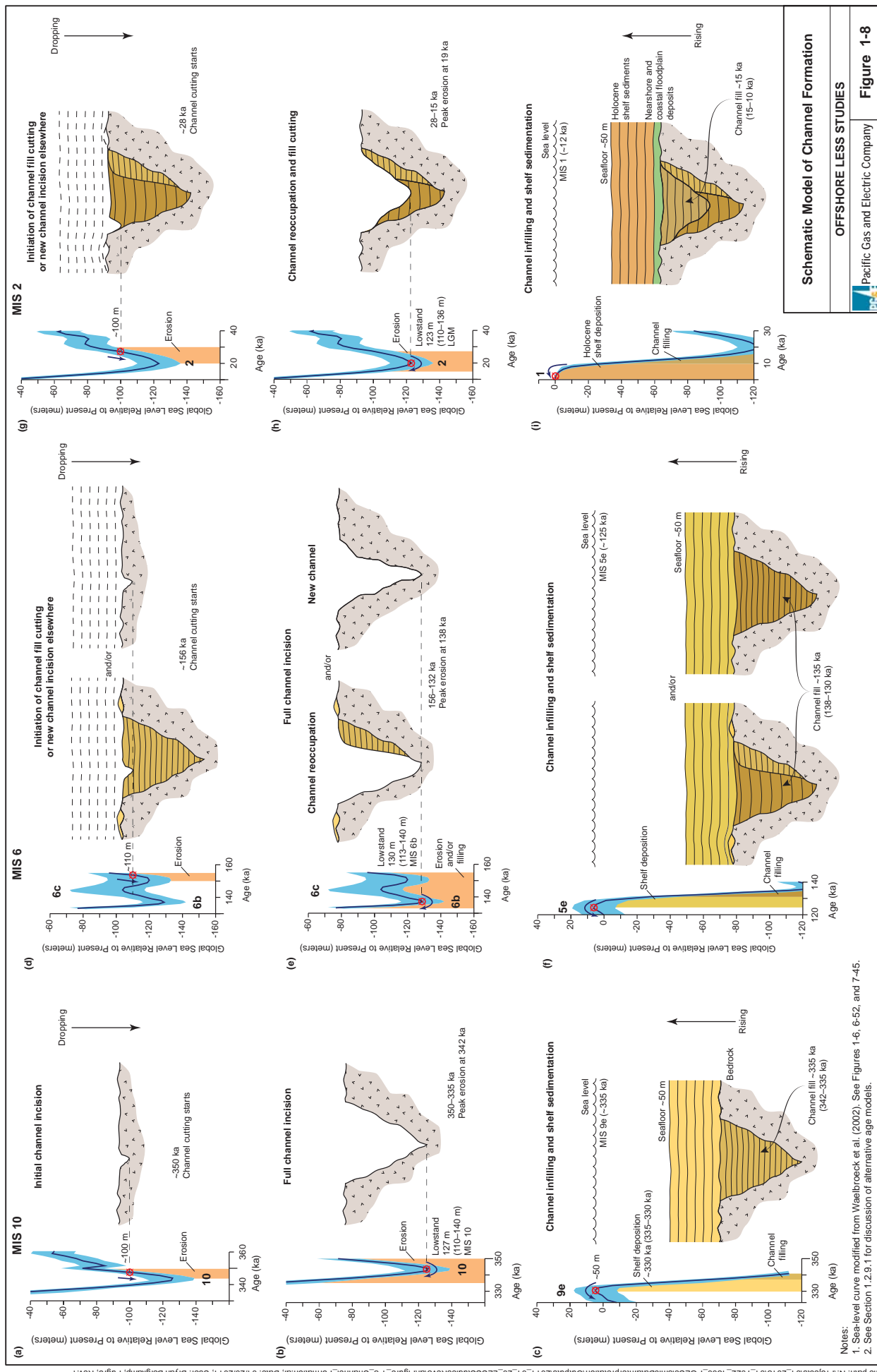


Figure 1-7

File path: S:\1005\03\GIS\Figures\Figure\_01-07.mxd; Date: 07/11/2014; User: Jereme Chandler, LC; Rev: 1



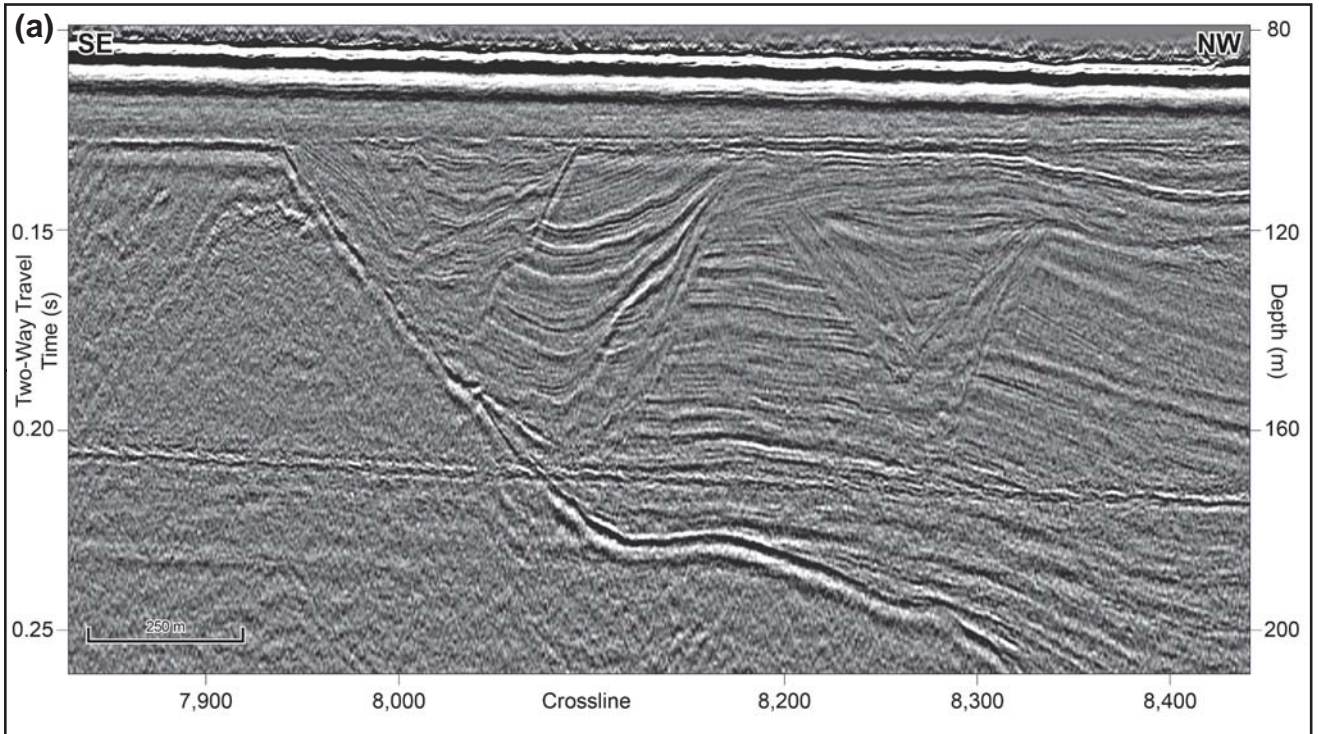


**Schematic Model of Channel Formation**  
**OFFSHORE LESS STUDIES**  
**Figure 1-8**  
 Pacific Gas and Electric Company

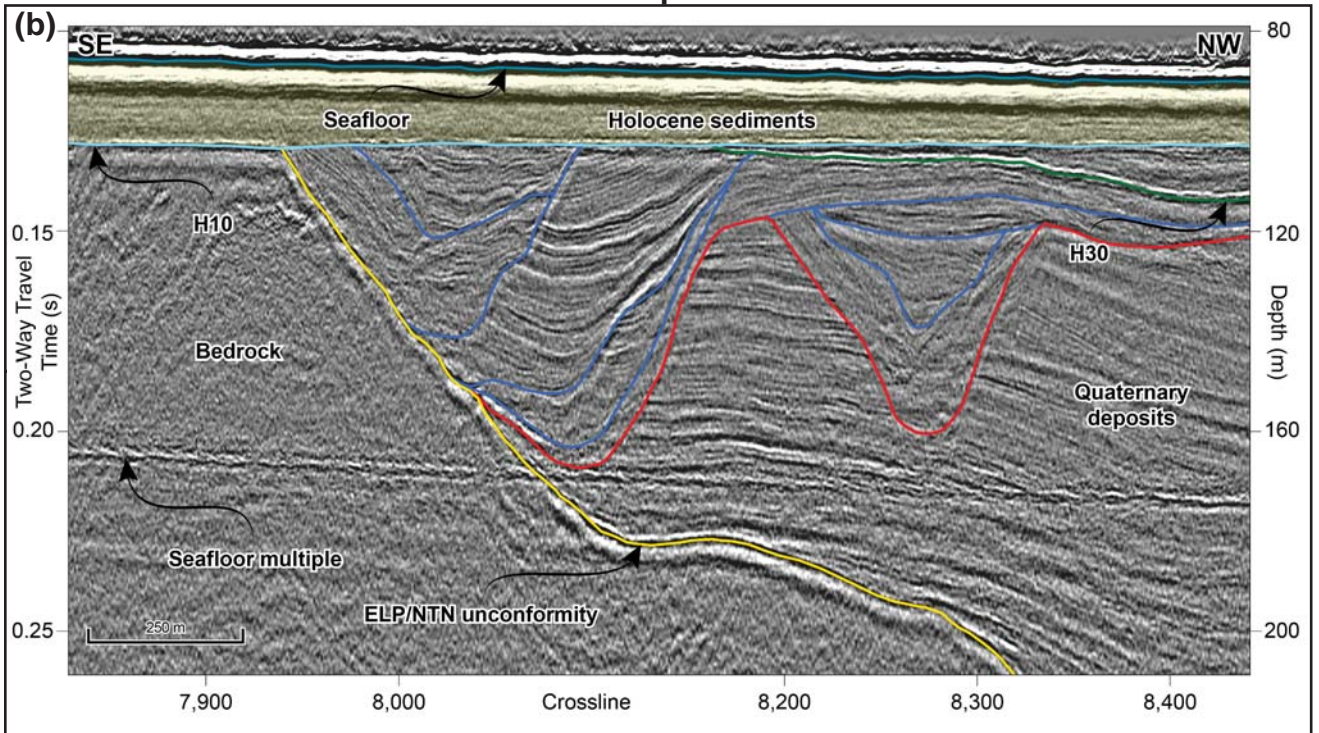
Notes:  
 1. Sea-level curve modified from Waelbroeck et al. (2002). See Figures 1-6, 6-52, and 7-45.  
 2. See Section 1.2.9.1 for discussion of alternative age models.

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd\Figure\_1-9\_NestedChannels.mxd; Date: 6/9/2014; User: Raron Dulberg; Figuro, Rev.3

### Uninterpreted

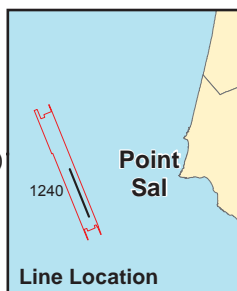


### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/near top of Neogene unconformity (ELP/NTN)
- Nested channel margin
- Base of channel complexes
- 2012 Point Sal 3D high-resolution survey extent



Note: Depth values on seismic profile assume a velocity of 1,600 m/s.

### Example of Nested Channels

#### OFFSHORE LESS STUDIES

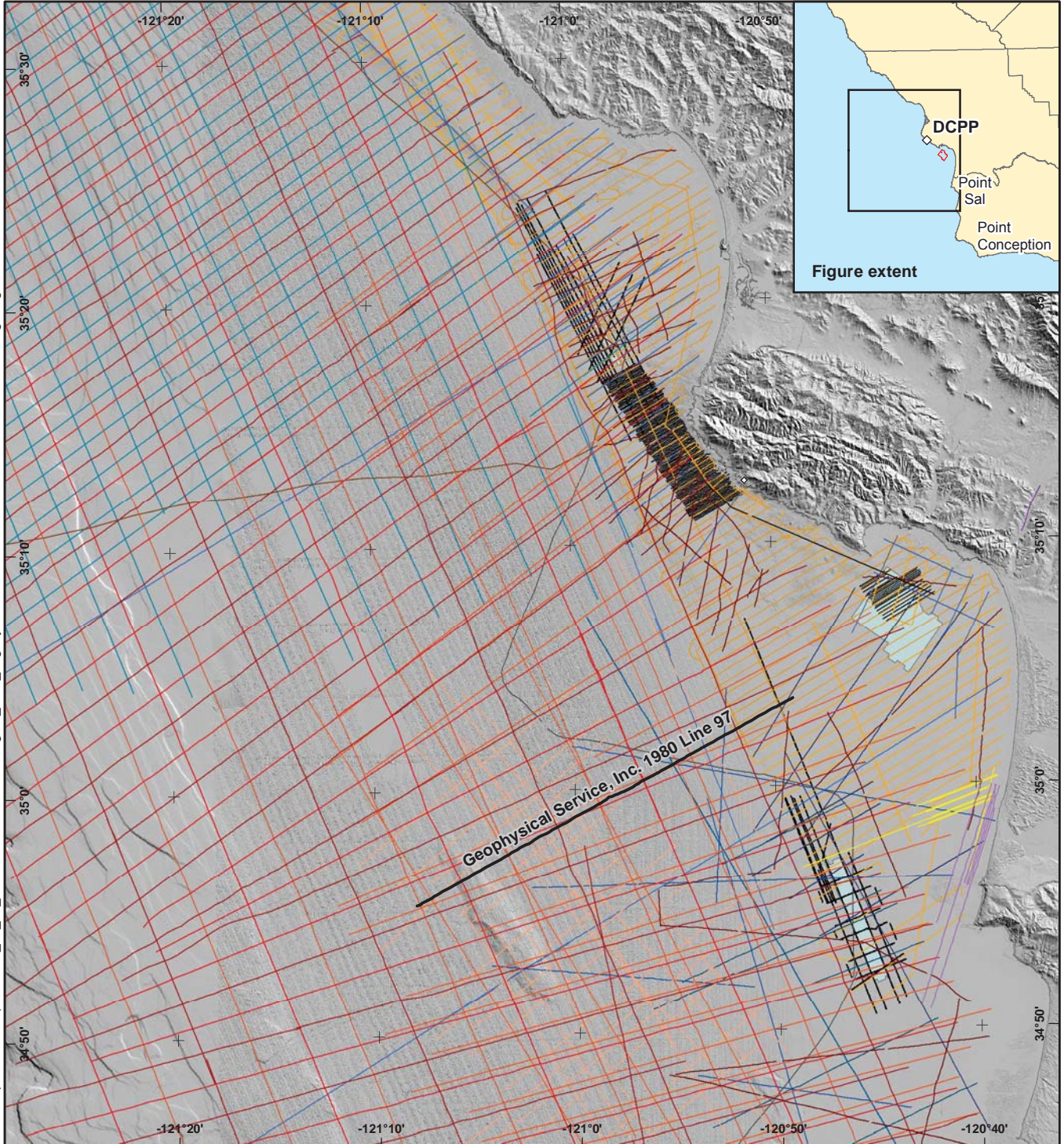


Pacific Gas and Electric Company

Figure 1-9

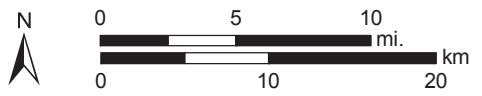


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**EXPLANATION**

- |                    |                 |                  |
|--------------------|-----------------|------------------|
| Fugro 3D 2011-2012 | W-38-83-SC      | Aquatronics 1974 |
| Fugro 2010-2012    | USGS W-32-82-SC | PXP Price Canyon |
| USGS S-6-09-SC     | GSI 1980        |                  |
| USGS S-6-08-SC     | USGS H-14-79-SC |                  |
| USGS L-4-90-SC     | USGS L-5A-79-NC |                  |
| PG&E FLEC 1987     | USGS W-22-79-SC |                  |
| COMAP 1986         | USGS W-10-78-SC |                  |
| DSL 1986           | USGS W-12-76-SC |                  |
| Nekton 1986        | USGS W-5-75-SC  |                  |
| GSI 1985           | USGS W-4-74-SC  |                  |
| NEKTON 1985        |                 |                  |



Map projection and scale: WGS 84 / UTM Zone 10N, 1:450,000

**Regional Trackline Map from Legacy Archive Data**

**OFFSHORE LESS STUDIES**

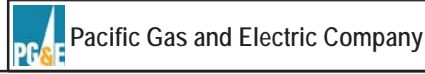
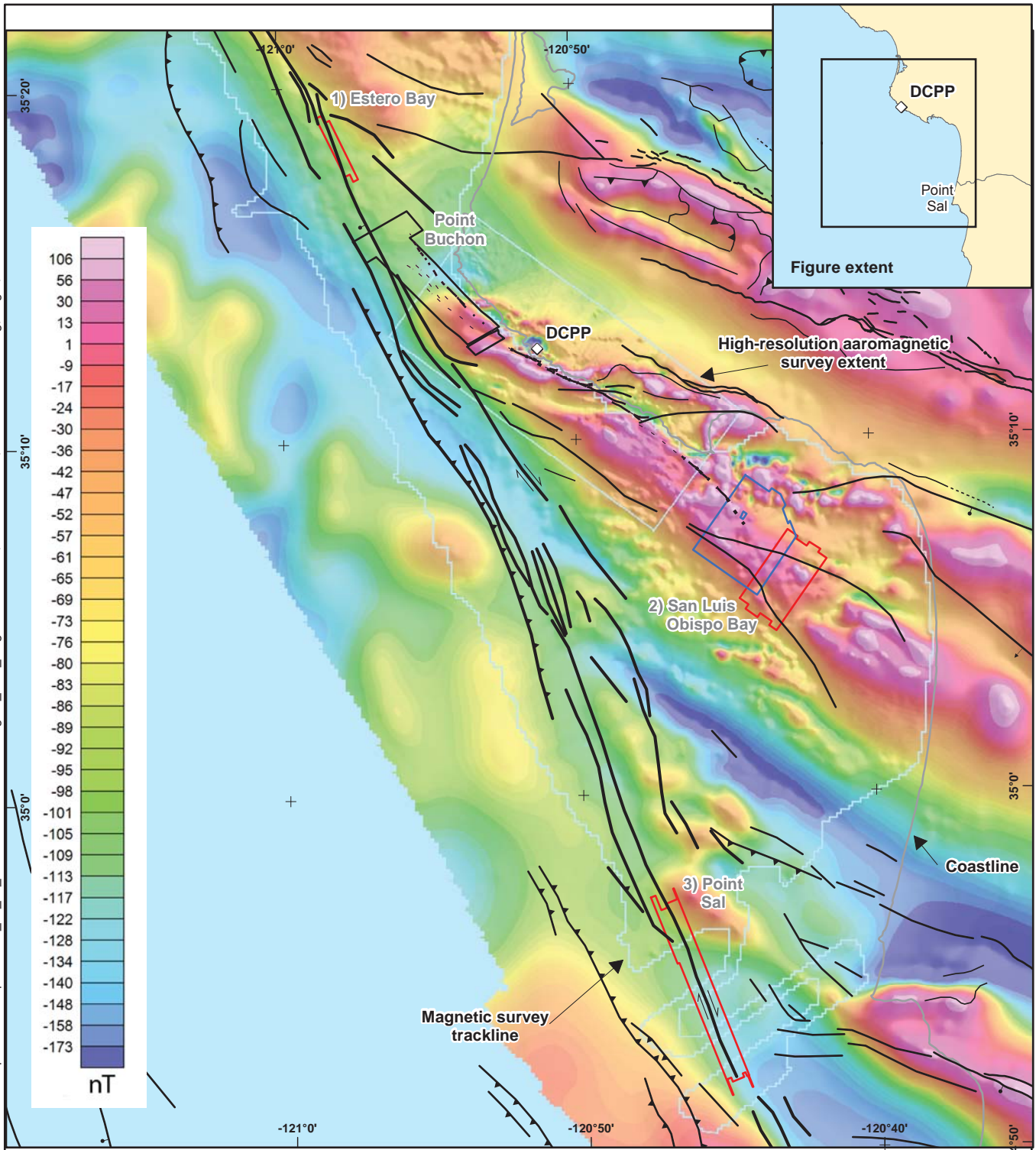


Figure **1-10**

Source: PG&E DEM compilation v2013.07.



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_1-11\_MagneticData.mxd; Date: 6/9/2014; User: Raron Dulberg; Fugro; Rev. 3



**EXPLANATION**

- Fault well located
  - - - Fault approximated
  - ..... Fault concealed
  - ▼ Thrust fault
  - ▲ Normal fault
  - 2011 3D high-resolution survey extent
  - 2012 3D high-resolution survey extent
  - 2010/2011 3D high-resolution survey extent
- Sources:  
 Fault locations from Jennings and Bryant (2010) and PG&E (2011).  
 PG&E DEM compilation v2013.07.

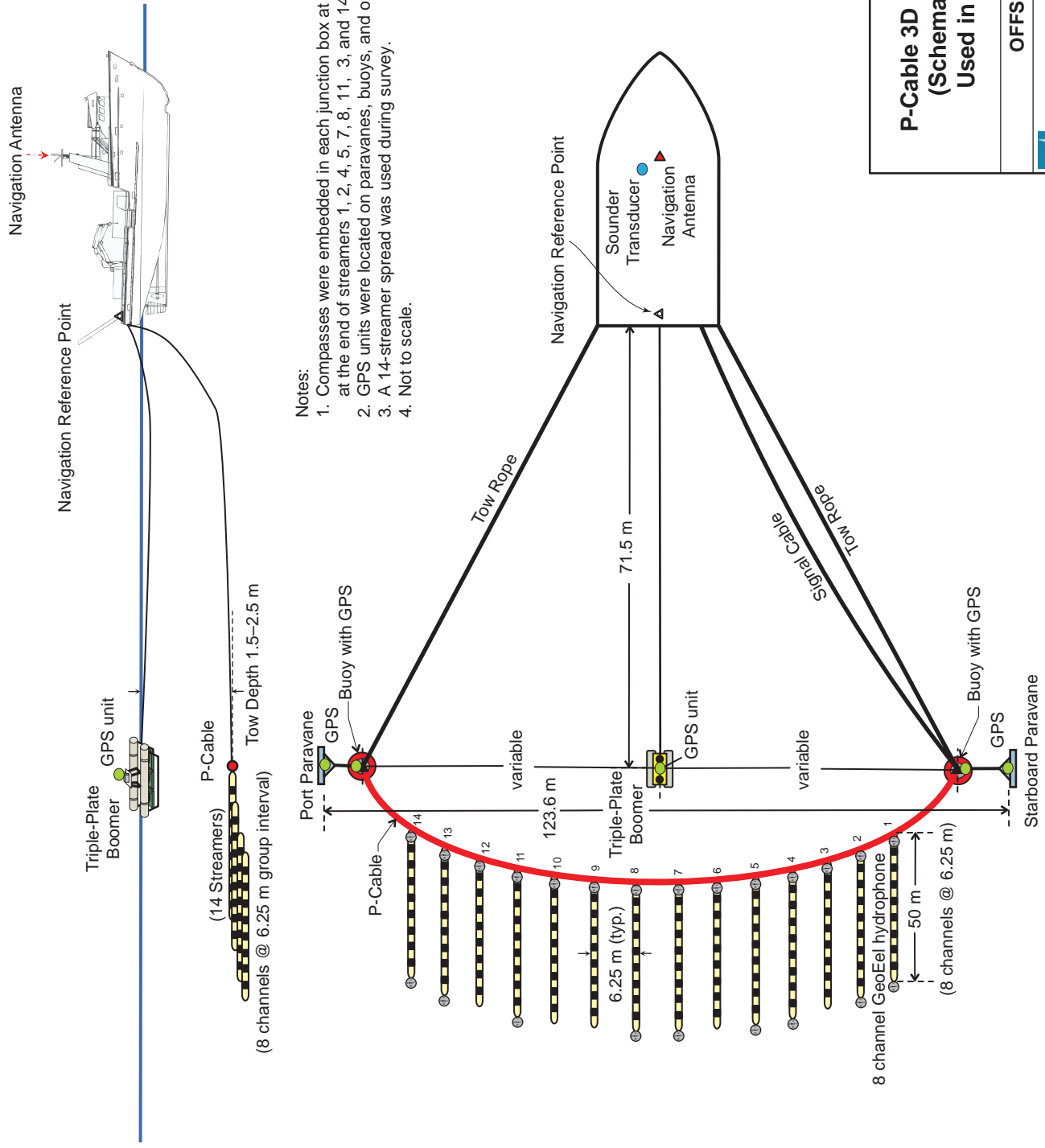
Note: See Plate 1 for details.

N

Map projection and scale: WGS 84 / UTM Zone 10N, 1:300,000

<b>Magnetic Data</b>	
<b>OFFSHORE LESS STUDIES</b>	
Pacific Gas and Electric Company	Figure <b>1-11</b>





**Notes:**

1. Compasses were embedded in each junction box at the head of each streamer and at the end of streamers 1, 2, 4, 5, 7, 8, 11, 3, and 14 ( ① )
2. GPS units were located on paravanes, buoys, and on the triple-plate boomer sled.
3. A 14-streamer spread was used during survey.
4. Not to scale.

**P-Cable 3D Survey Streamer Layout  
(Schematic Layback Diagram)  
Used in 2012 Data Collection**

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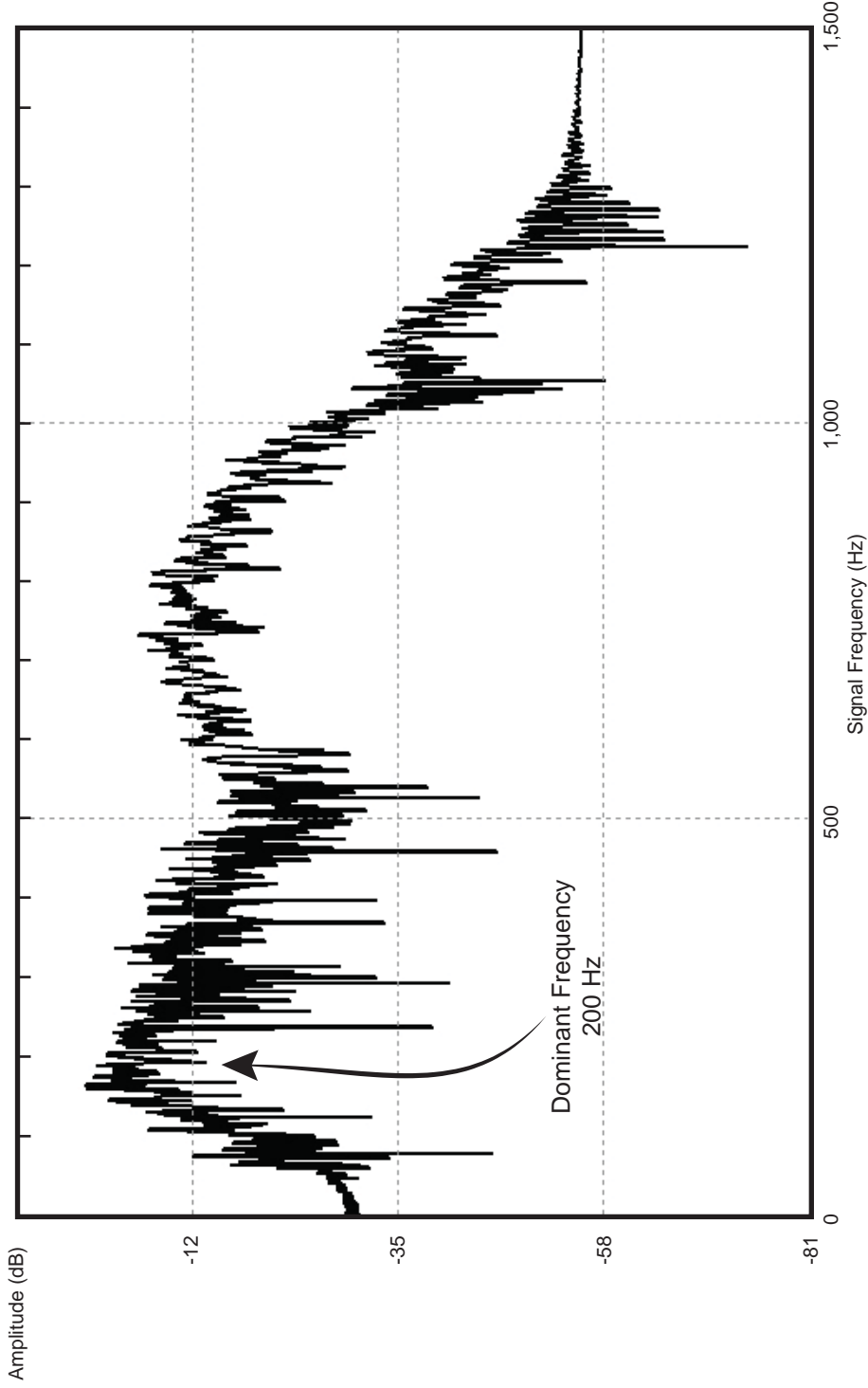
**OFFSHORE LESS STUDIES**

---

Pacific Gas and Electric Company Figure 2-1

---

# Amplitude Frequency Spectrum



## Calculated Vertical Resolution

$$VR = \frac{\lambda}{4} = \frac{T \times v}{4} = \frac{DF \times 4}{4} = \frac{1600 \text{ m/s}}{200 \text{ Hz} \times 4} = 2 \text{ m}$$

VR = vertical resolution, DF = dominant frequency, v = velocity, λ = wavelength, and T = period

Frequency Spectrum for  
2D/3D Seismic Source

OFFSHORE LESS STUDIES

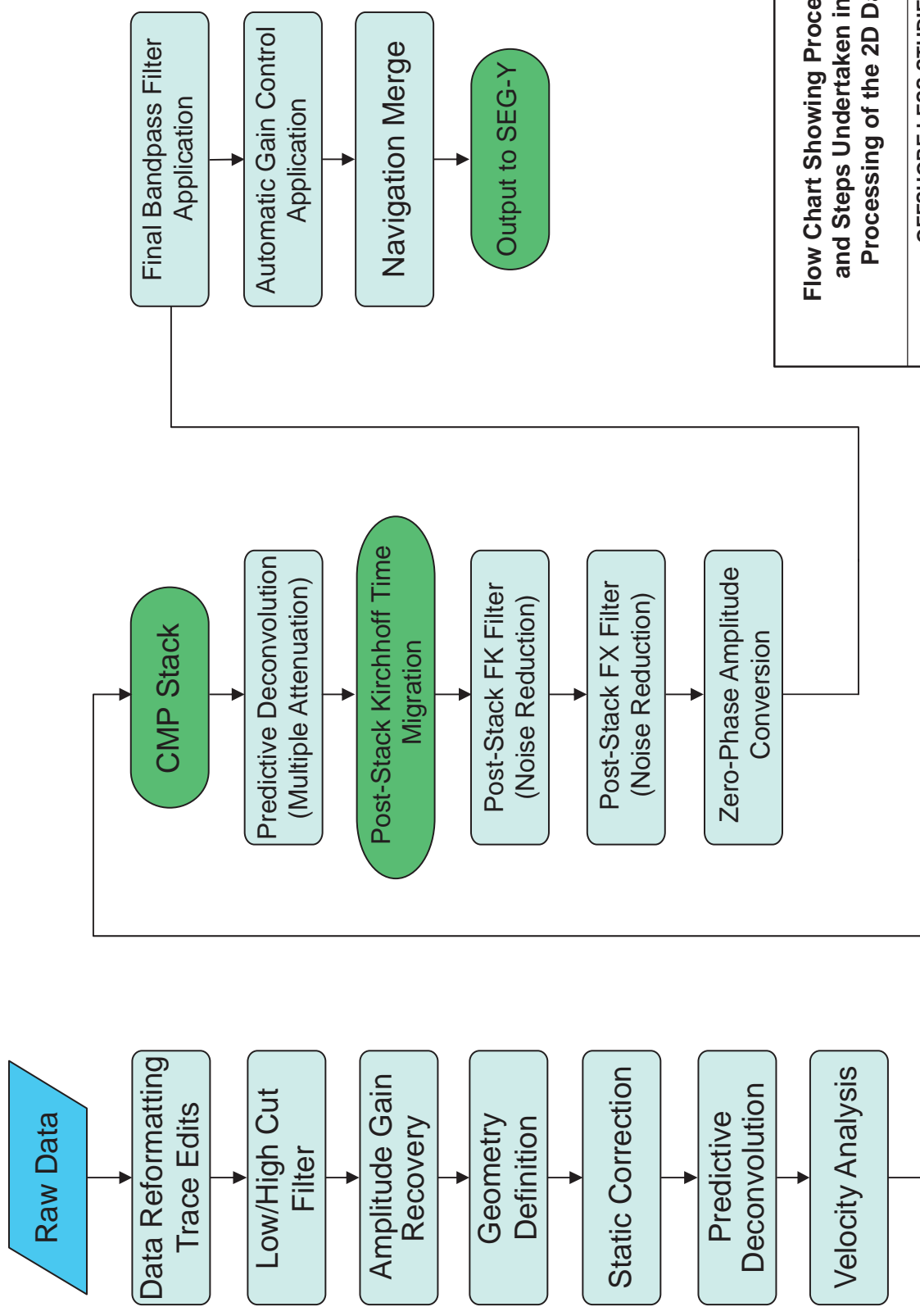
Pacific Gas and Electric Company

Figure 2-2





# 2D Processing Flow



**Flow Chart Showing Procedures and Steps Undertaken in the Processing of the 2D Data**

OFFSHORE LESS STUDIES

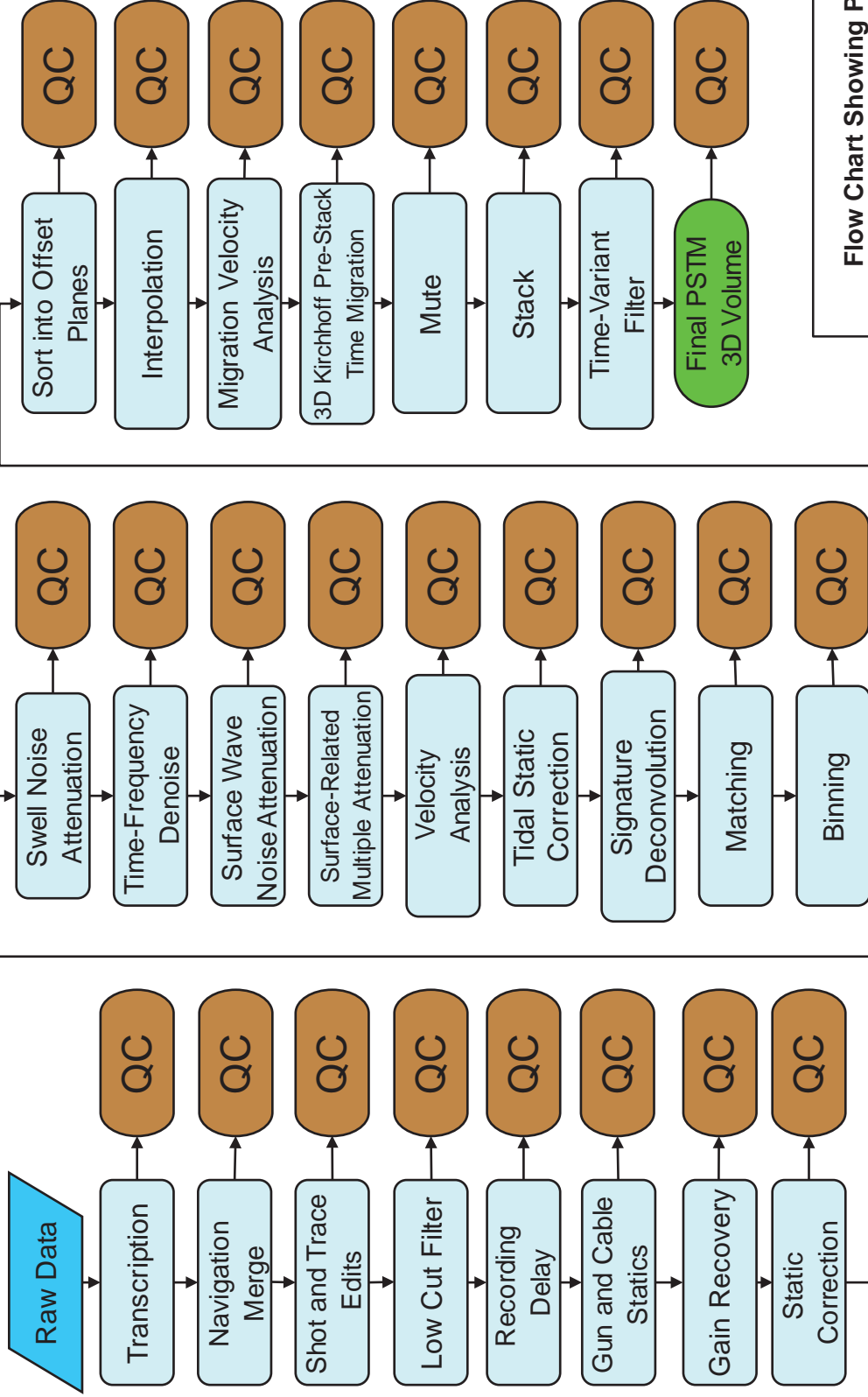
Pacific Gas and Electric Company

Figure 2-3



File path: N:\Project\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\Figure\_2-3\_2DProcessingFlow.a; Date: 05/15/2014; User: Bryan Bergkamp; Fugro; Rev.3

# 3D Processing Flow



Flow Chart Showing Procedures and Steps Undertaken in the Processing of the 3D Data

OFFSHORE LESS STUDIES

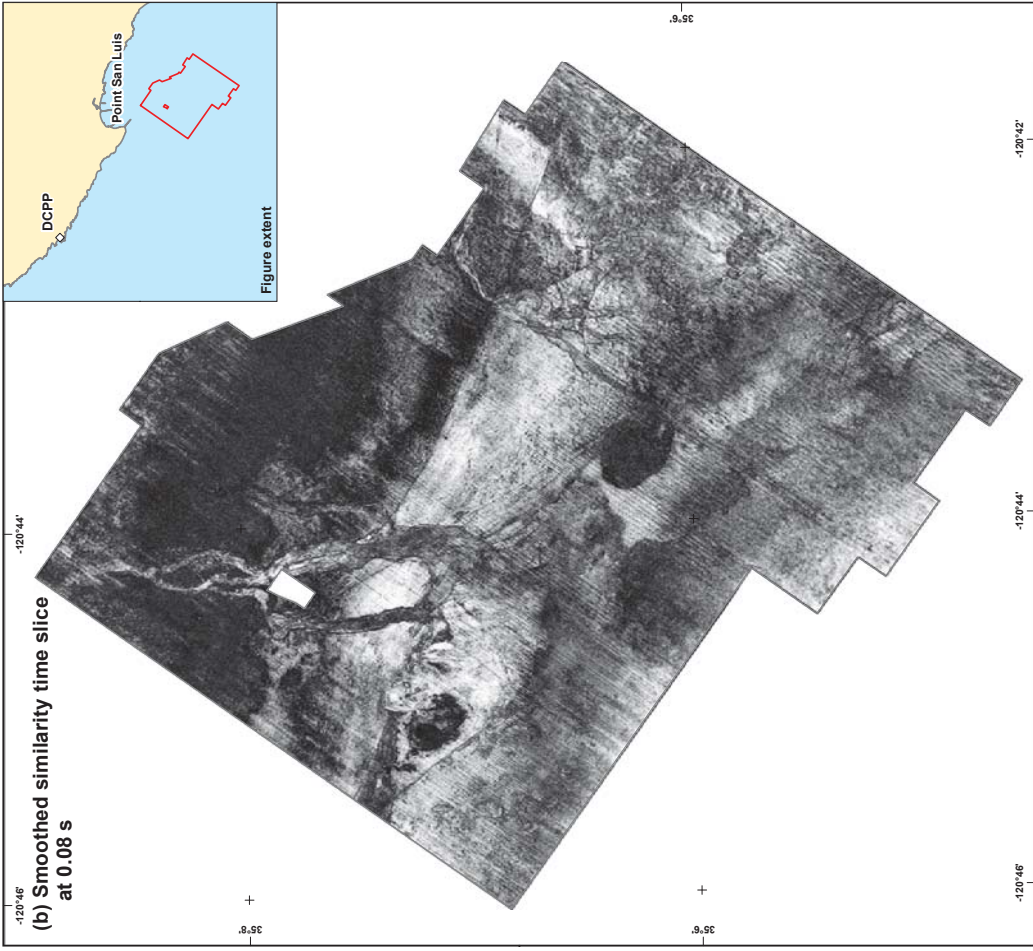
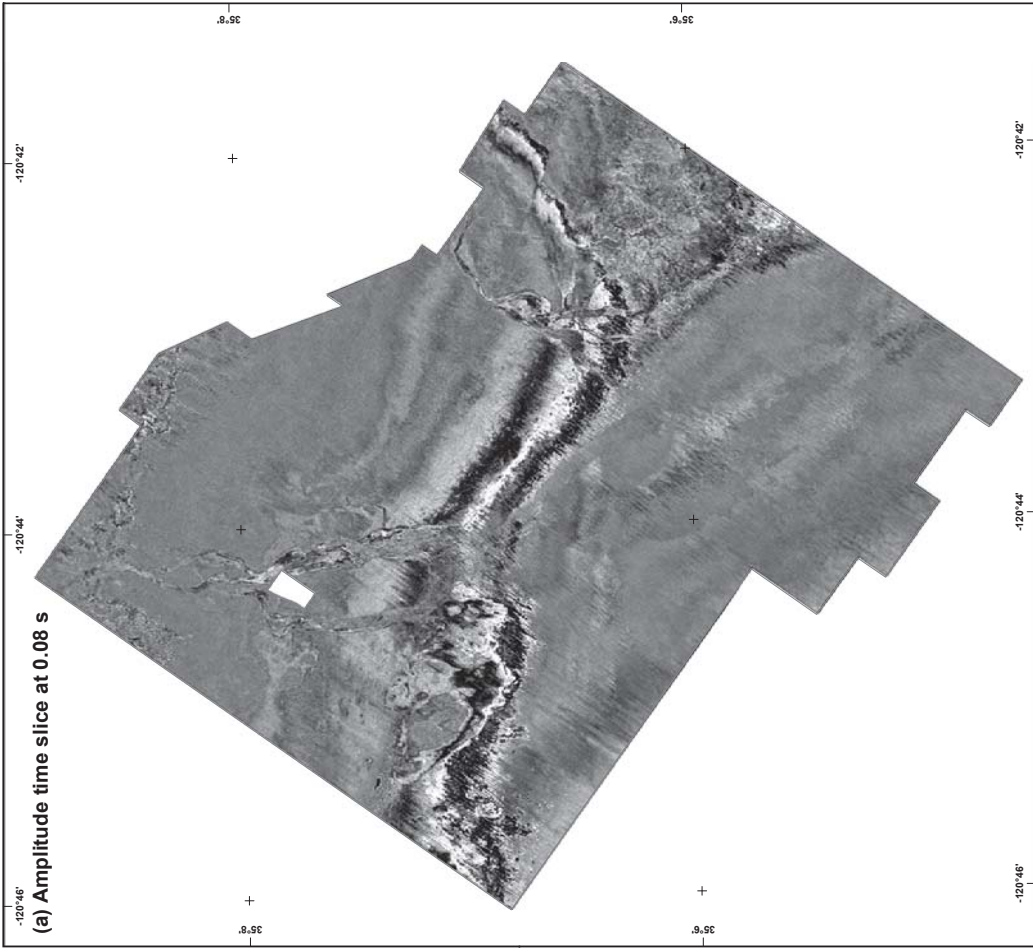
Pacific Gas and Electric Company

Figure 2-4

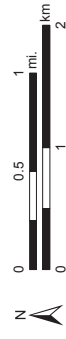
Note: All quality control (QC) assessments were made prior to advancing to the next step of processing.

File path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\Fig\Figure\_2-4\_3DProcessingFlow.ai; Date: 05/15/2014; User: Bryan Bergkamp; Fugro; Rev:3





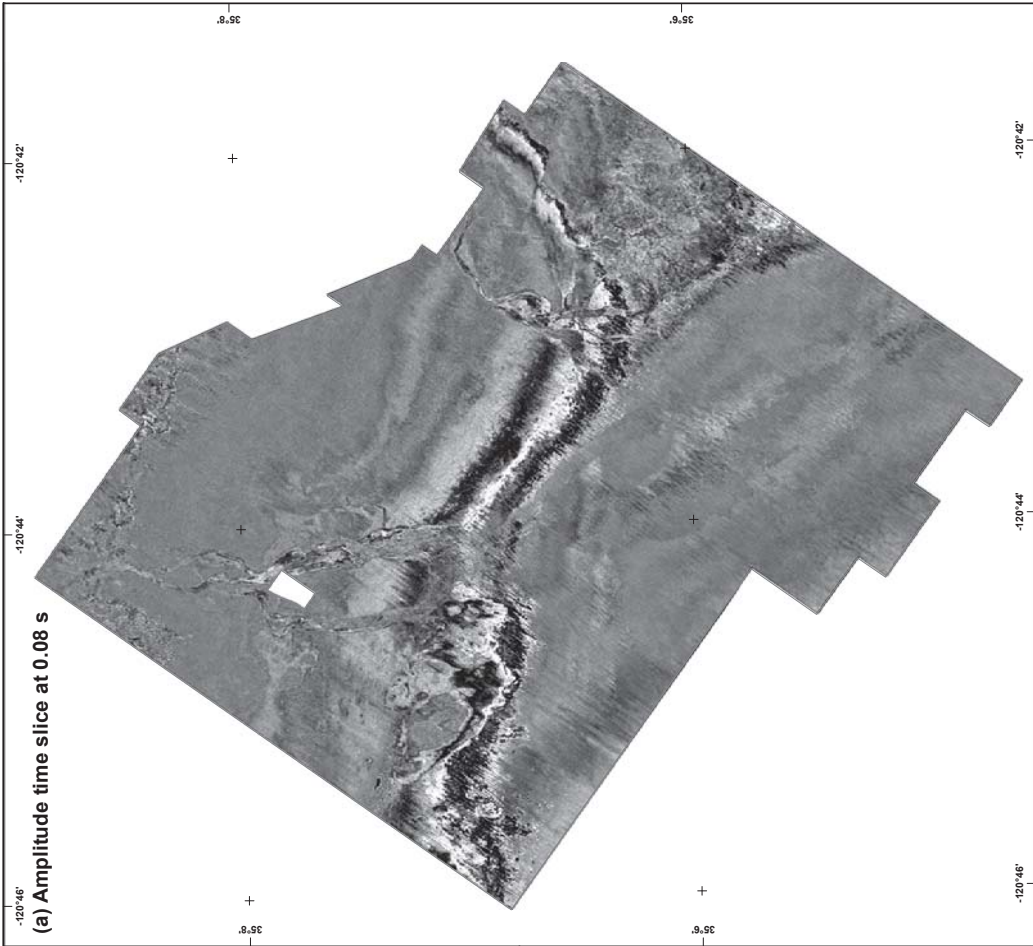
**EXPLANATION**  
 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



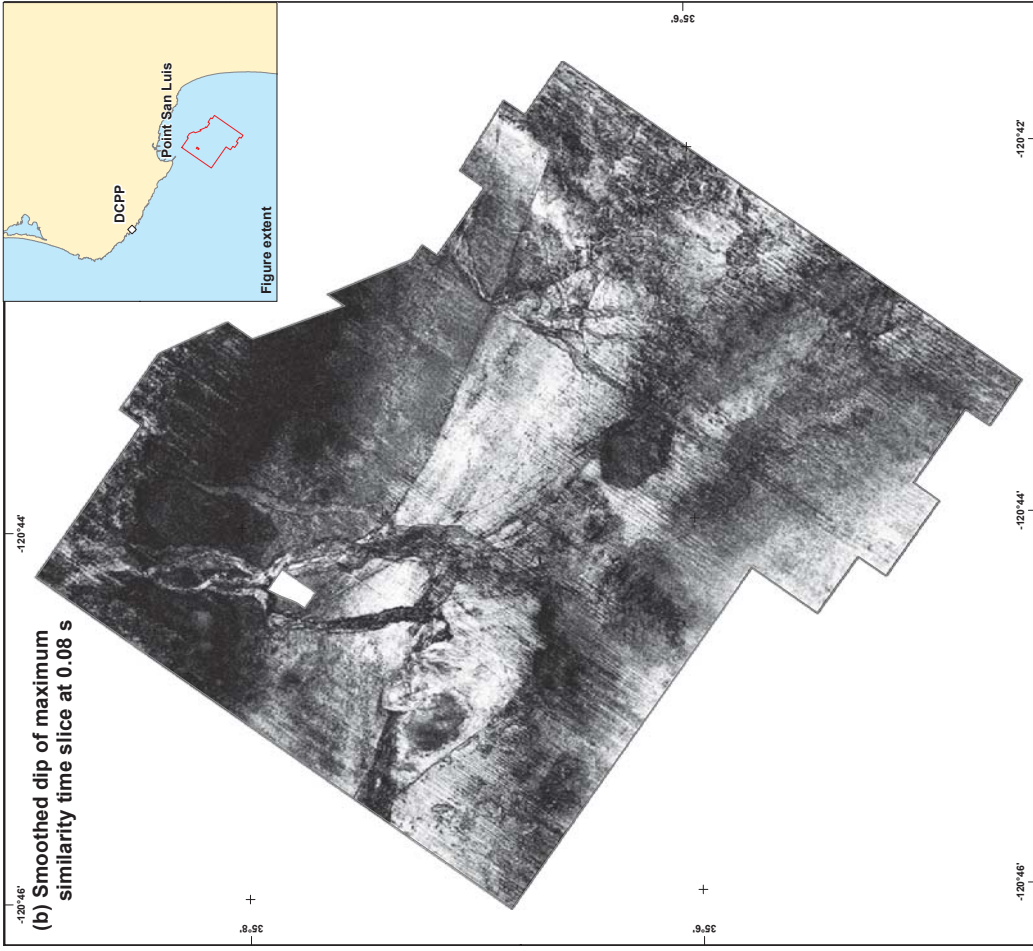
Map projection and scale: WGS 84 / UTM Zone 10N, 1:40,000

**Comparison Plot of Seismic Amplitude and Smoothed Similarity Time Slices at 0.08 s TWTT**

<b>OFFSHORE LESS STUDIES</b>	
Pacific Gas and Electric Company	Figure <b>2-5</b>



(a) Amplitude time slice at 0.08 s



(b) Smoothed dip of maximum similarity time slice at 0.08 s

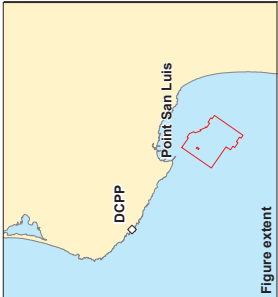
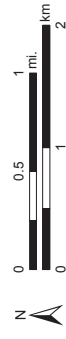


Figure extent

**EXPLANATION**

2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:40,000

**Comparison Plot of Seismic Amplitude and Smoothed Dip of Maximum Similarity Time Slices at 0.08 s TWTT**

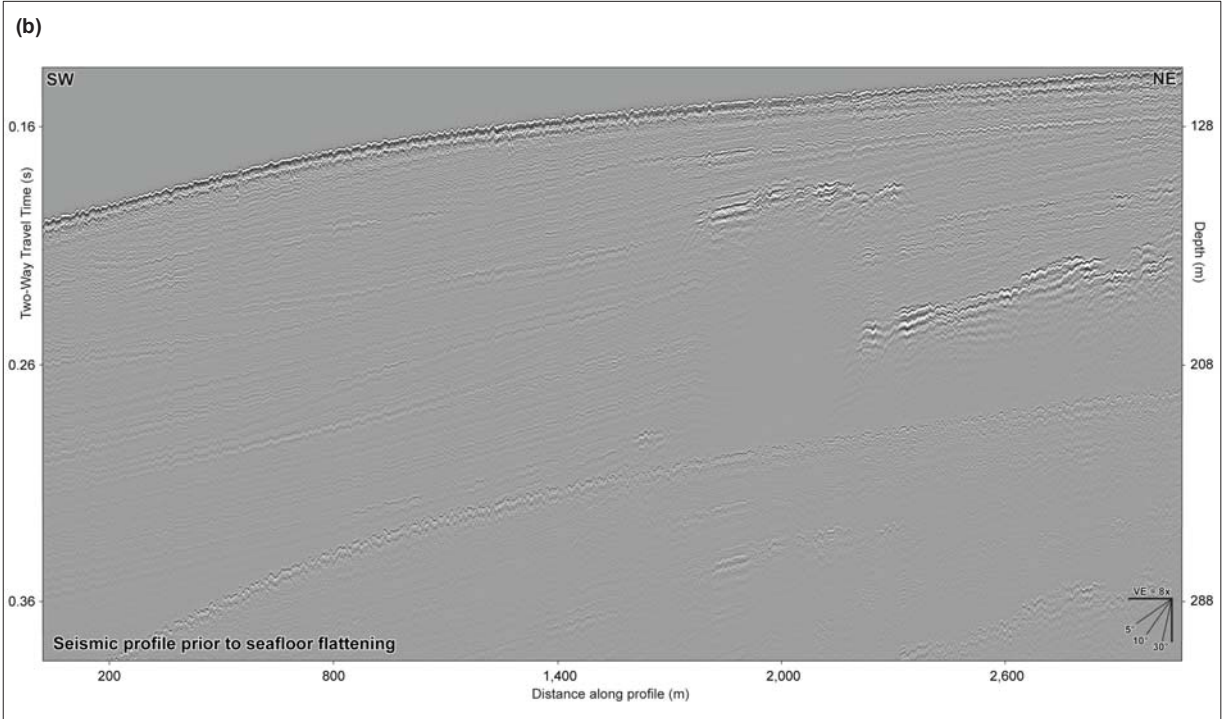
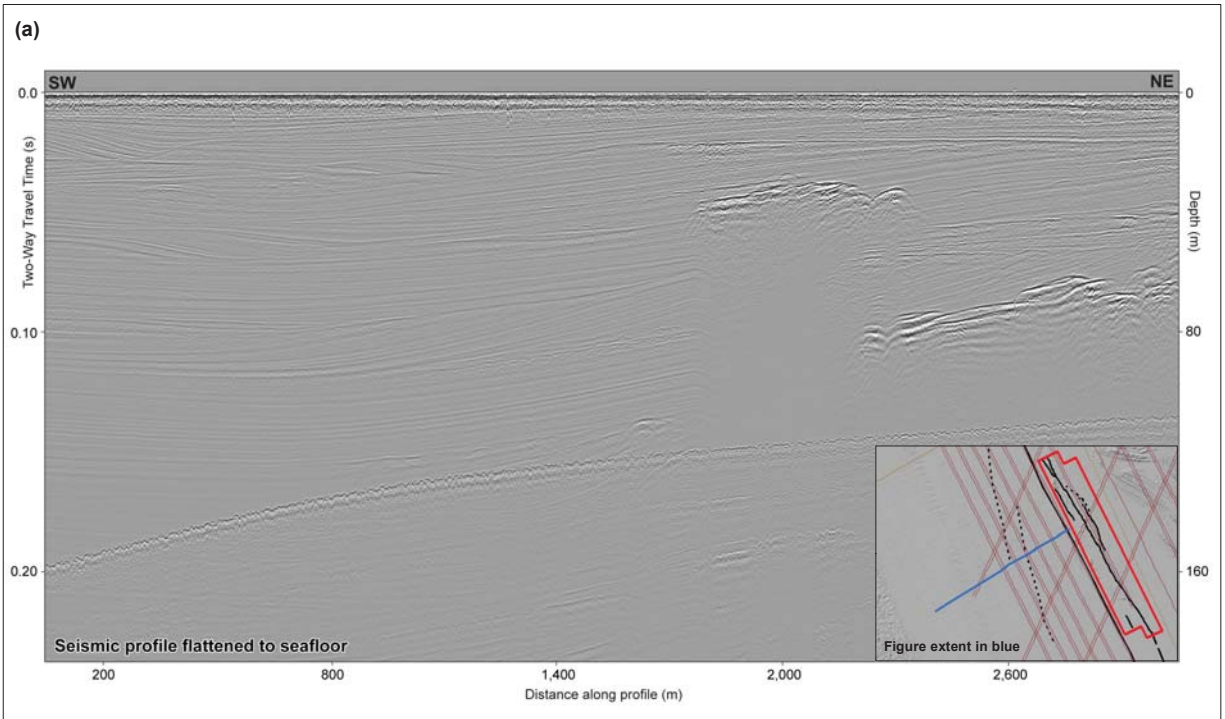
OFFSHORE LESS STUDIES

Pacific Gas and Electric Company

Figure

2-6





**EXPLANATION**

- Location of seismic profile
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline

Notes:

1. See Figure 1-1 for location of study area.
2. Depth values on seismic profile assume a velocity of 1,600 m/s.
3. Faults in location map described on Plate 1a.

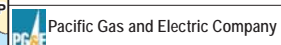
Sources:

- USGS seismic-reflection data (Sliter et al., 2009).
- Fugro 2D and 3D seismic-reflection data (2012).

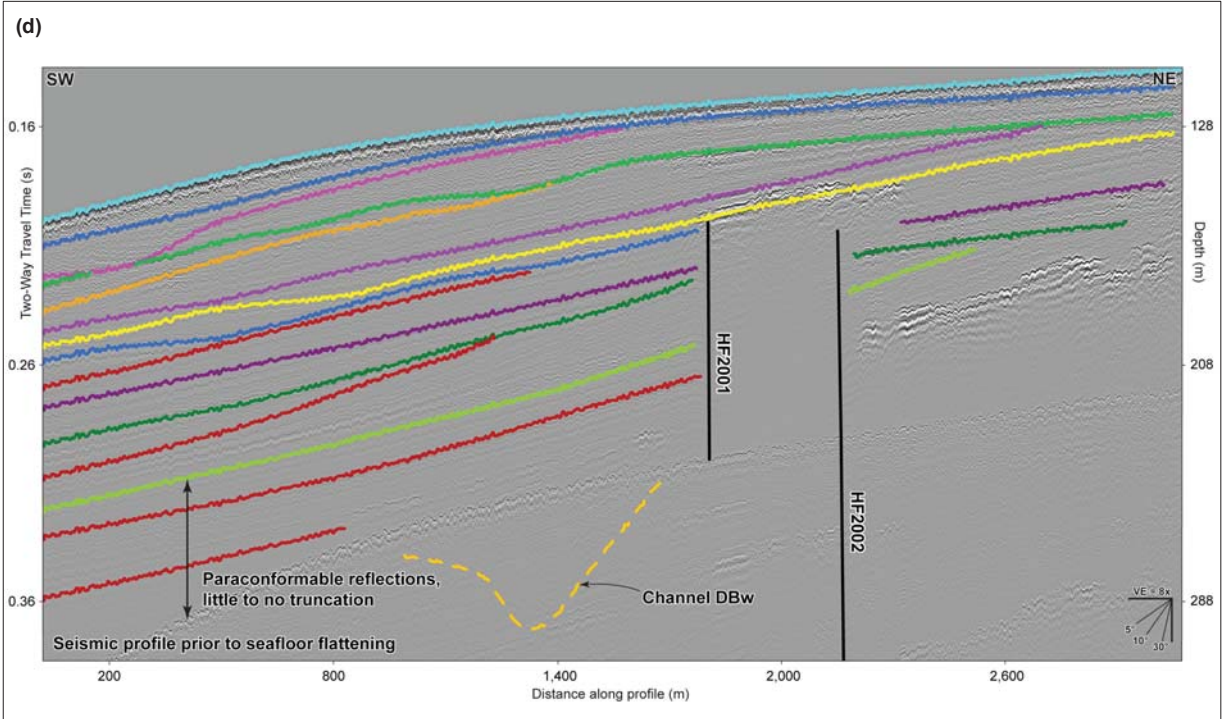
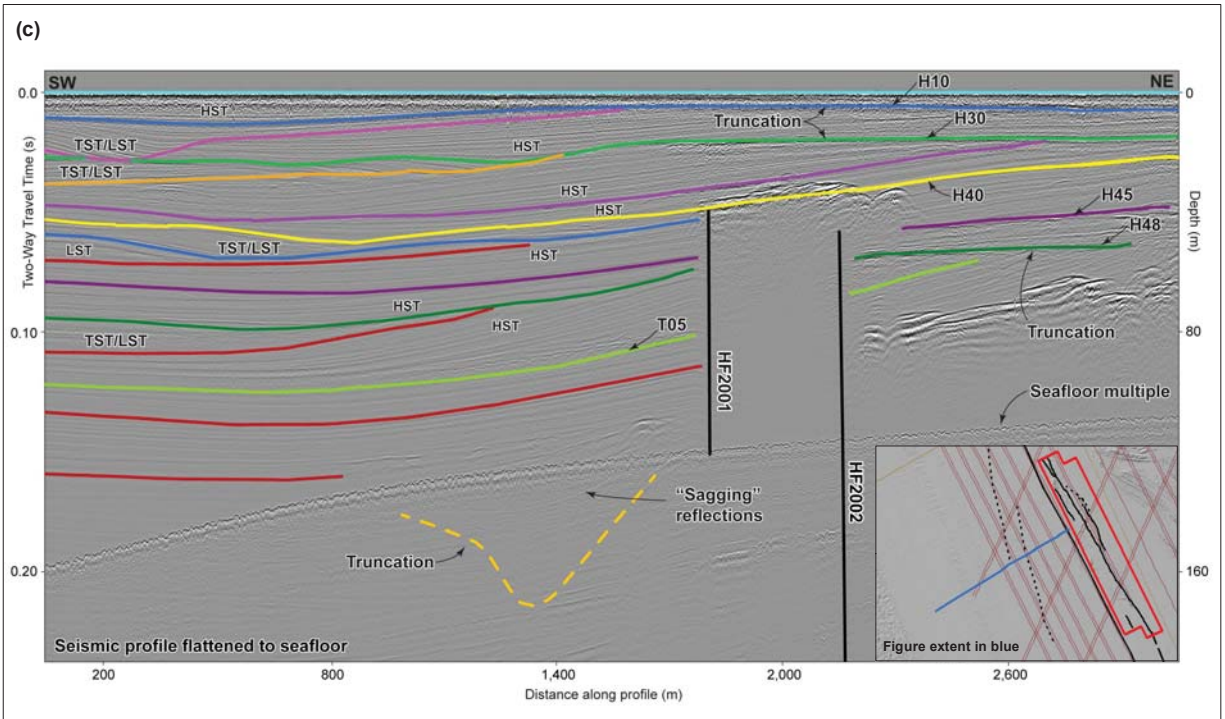


**Excerpt of Profile PBS-36 Showing Transition from Continental Slope to Continental Shelf Environment**

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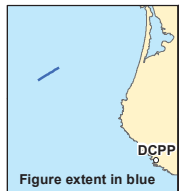


**Figure 6-1a**



**EXPLANATION**

- Seafloor
  - Unconformity H10
  - Unconformity H20
  - Unconformity H30
  - Unconformity H32
  - Unconformity H35
  - Unconformity H40
  - Unconformity H42
  - Unconformity H45
  - Unconformity H48
  - Unconformity T05
  - Other unconformities
  - Channel DBw
  - - - - - Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
  - Location of seismic profile
  - Fugro 3D survey extent
  - Fugro 2D survey trackline
  - USGS survey trackline
- HST** = Highstand systems tract  
**TST** = Transgressive systems tract  
**LST** = Lowstand systems tract
- Notes:**  
 1. See Figure 1-1 for location of study area.  
 2. Unconformity T05 marks a transition in style of sedimentation. Below unconformity T05, parallel reflectors record relatively uniform sedimentation in a continental slope environment. Above unconformity T05, a succession of unconformable sequences records episodic deposition and erosion, consistent with deposition in or near a continental shelf environment during periods of repeated sea-level fluctuations.  
 3. Depth values on seismic profile assume a velocity of 1,600 m/s.  
 4. Faults in location map described on Plate 1a.
- Sources:**  
 - USGS seismic-reflection data (Sliter et al., 2009).  
 - Fugro 2D and 3D seismic-reflection data (2012).



**Excerpt of Profile PBS-36 Showing Transition from Continental Slope to Continental Shelf Environment**

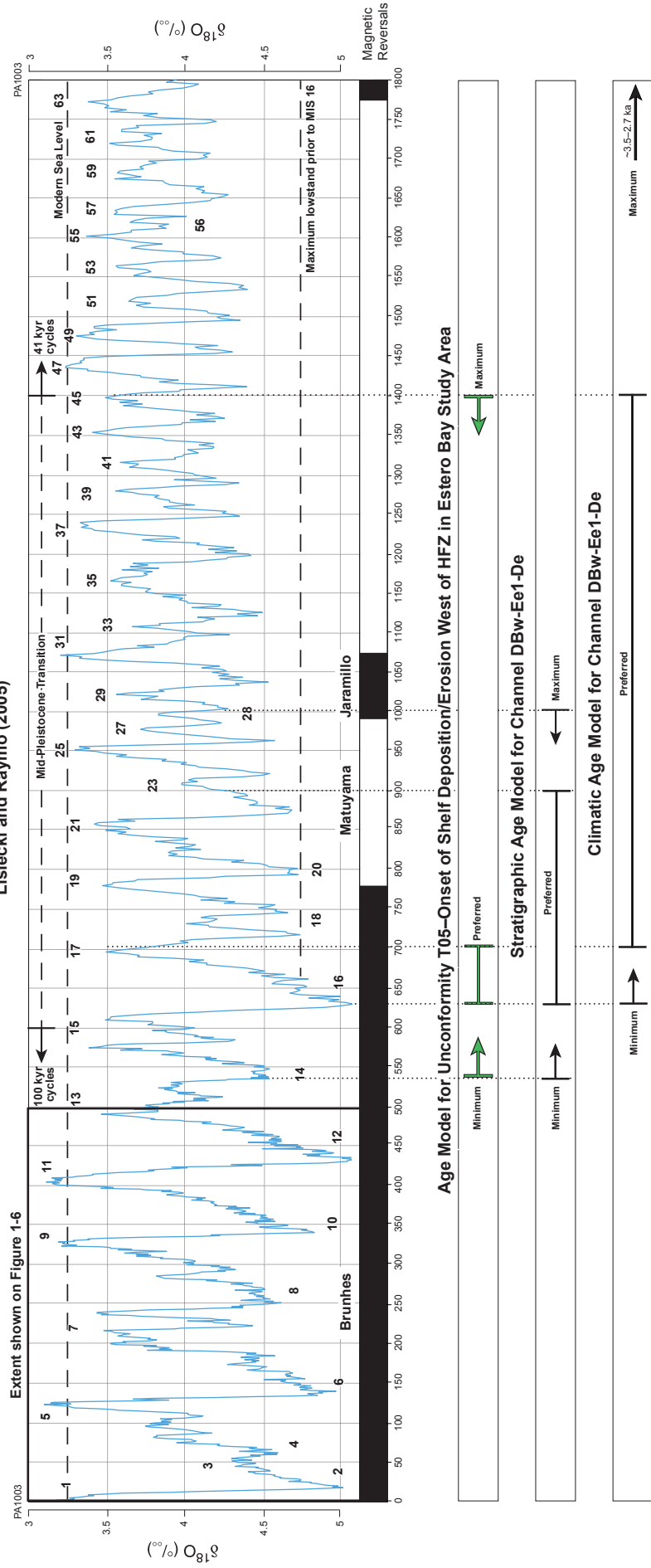
**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company **Figure 6-1b**

File path: S:\1\005\033\GIS\Figures\Figure\_06-01b.mxd; Date: 07/11/2014; User: Alex Remar, LCI; Rev: 1



Lisiecki and Raymo (2005)



Notes:

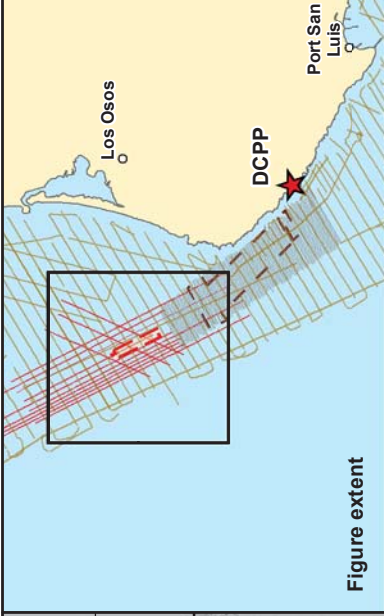
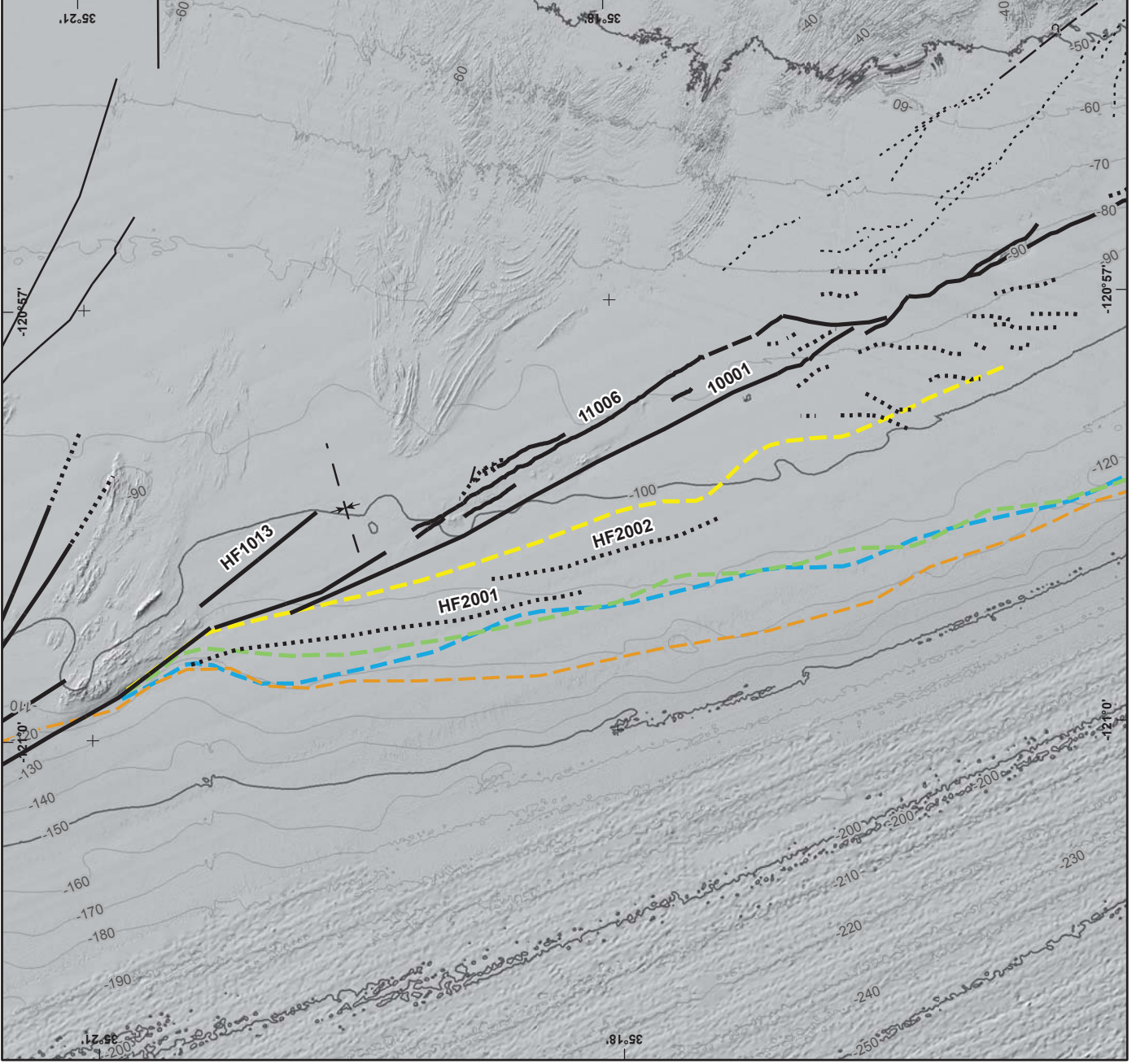
1. Lisiecki and Raymo (2005) use 57 globally distributed  $\delta^{18}\text{O}$  records to compile a 5.3 Myr record of sea-level fluctuations.
2. Timing of mid-Pleistocene transition from Bintanja and van de Wal (2008).
3. Age models for piercing points are discussed in Section 6.

Age Model for Unconformity T05 and Channel DBw-Ee1-De

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Figure 6-2



**Figure extent**

**EXPLANATION**

— · · · · · Hosgrü fault zone traces: solid where well located, dashed where approximately located, dotted where concealed, short dashed where inferred, queried where existence is uncertain.

— · · · · · Other Quaternary fault: solid where well located, dashed where approximately located, dotted where concealed, short dashed where inferred, queried where existence is uncertain.

— Modern shelf break

— H10 shelf break, ~20 ka

— H30 shelf break, ~135 ka

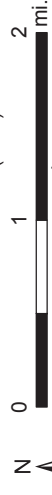
— H40 shelf break, ~240 ka

**Notes:**

1. See Figure 1-1 for location of study area.
2. Bathymetric contour interval is 10 m. Heavy contours are 50 m isobaths.
3. Refer to Plate 1 for explanation of tracklines.

**Sources:**

- Project DEM compilation v2013.07
- Traces of Point Buchon fault from PG&E (2012).



Map projection and scale: WGS 84 / UTM 10N, 1:65,000

**Migration of the Shelf Break Through Time**

**OFFSHORE LESS STUDIES**



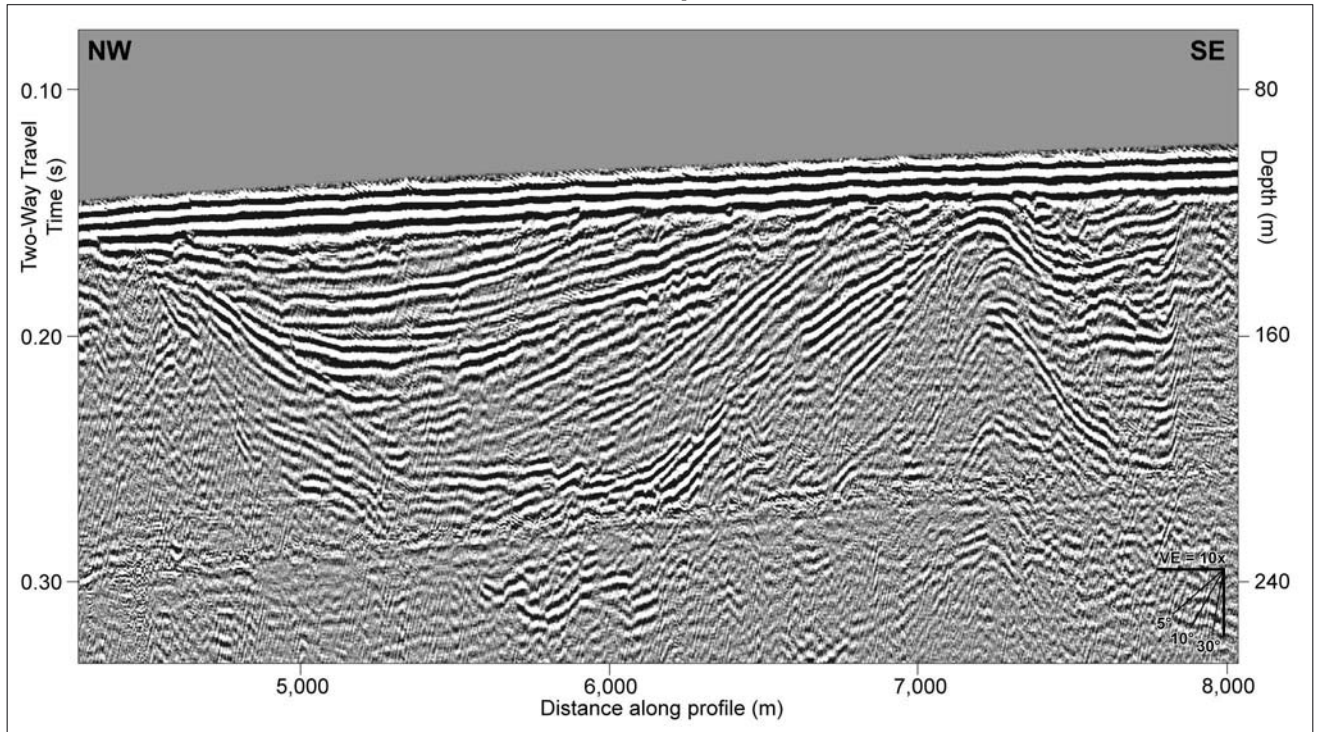






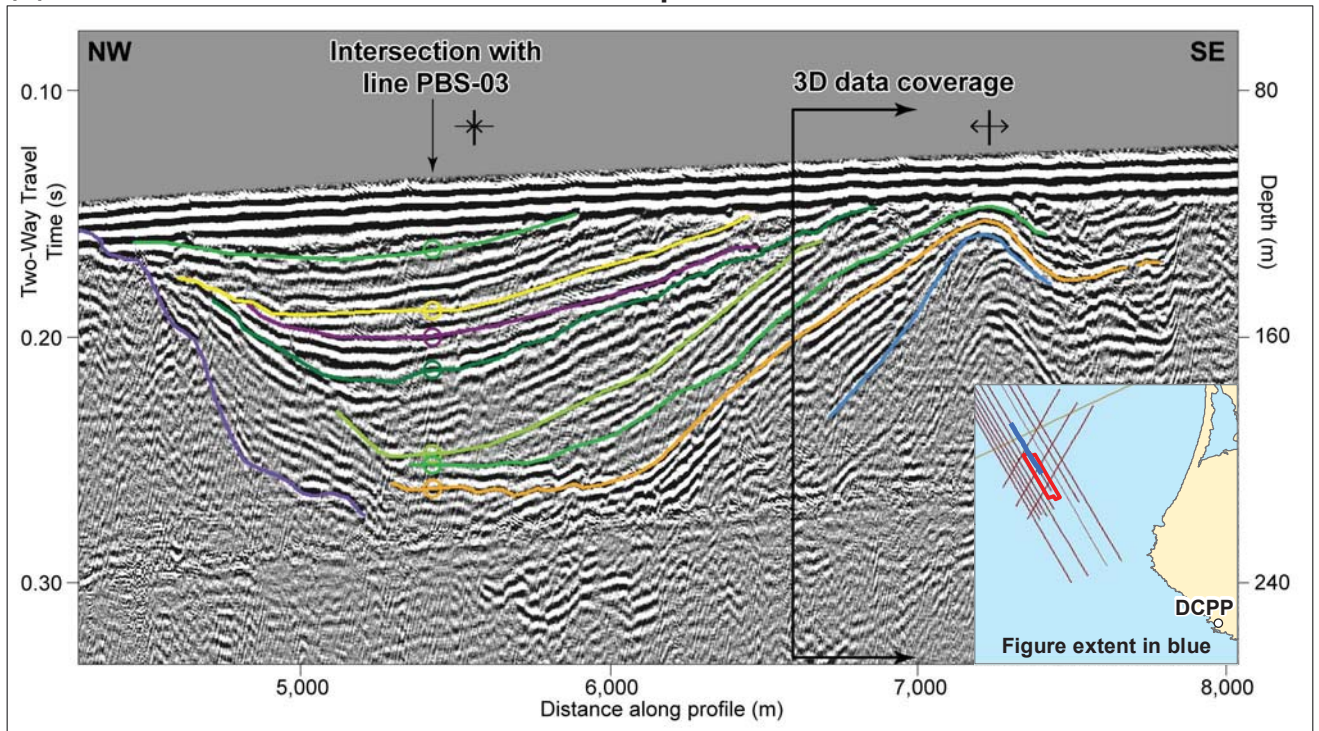
(a)

### Uninterpreted



(b)

### Interpreted



#### EXPLANATION

- Unconformity H30
  - Unconformity H40
  - Unconformity H45
  - Unconformity H48
  - Unconformity T05
  - Unconformity T10
  - Unconformity T30
  - Unconformity T50
  - Top of pre-Quaternary rock
  - Location of seismic profile
  - Fugro 3D survey extent
  - Fugro 2D survey trackline
  - USGS survey trackline
- Notes:
- See Figure 1-1 for location of study area.
  - Depth values on seismic profile assume a velocity of 1,600 m/s.
- Sources:
- Fugro 2D and 3D seismic-reflection data (2012).
  - USGS seismic-reflection data (Sliter et al., 2009).

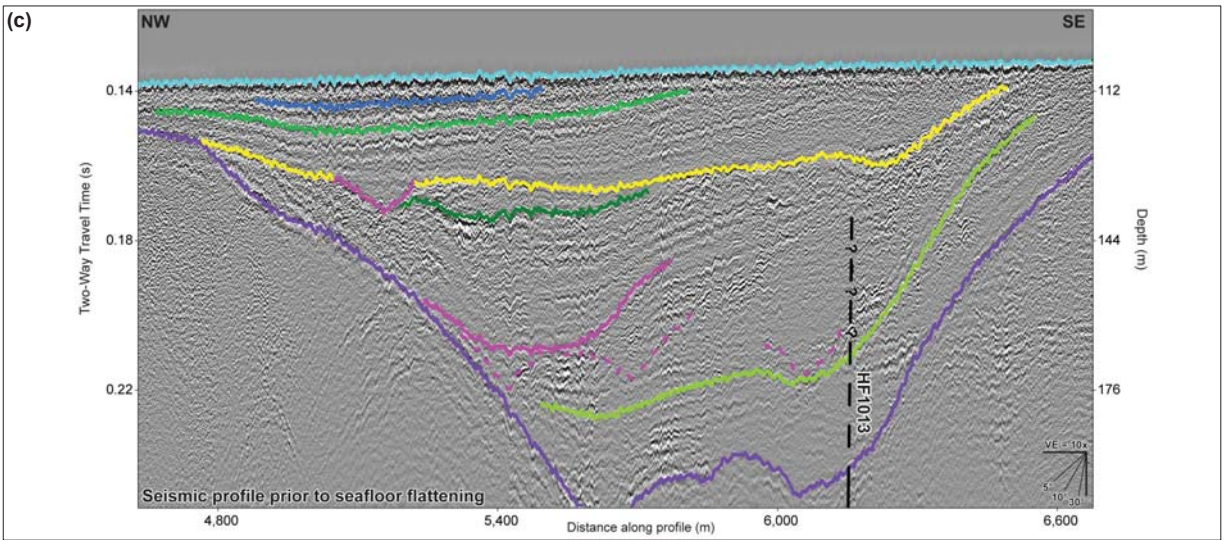
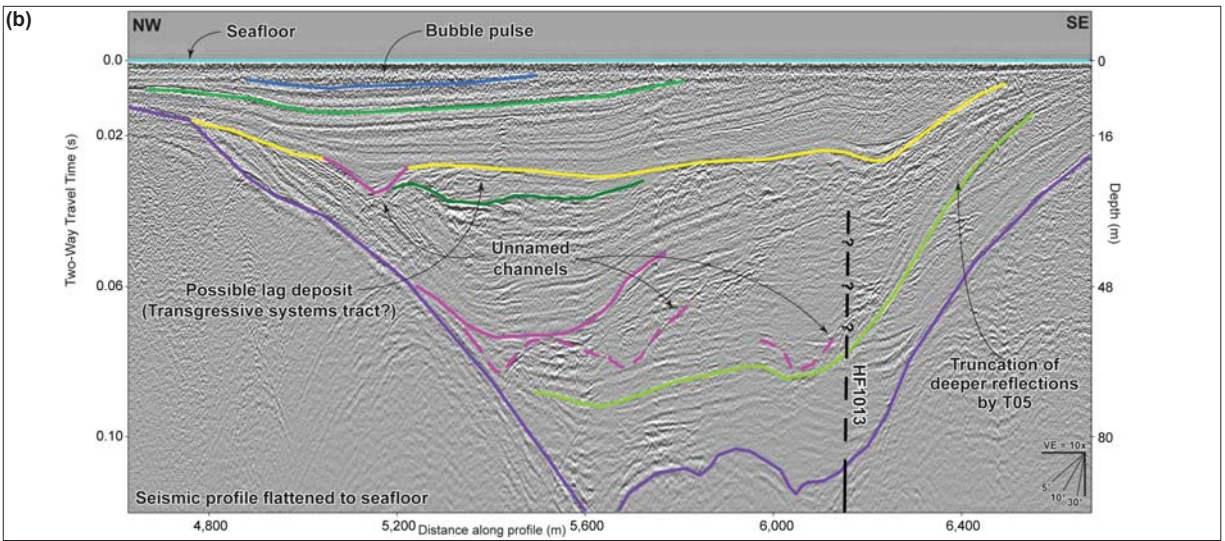
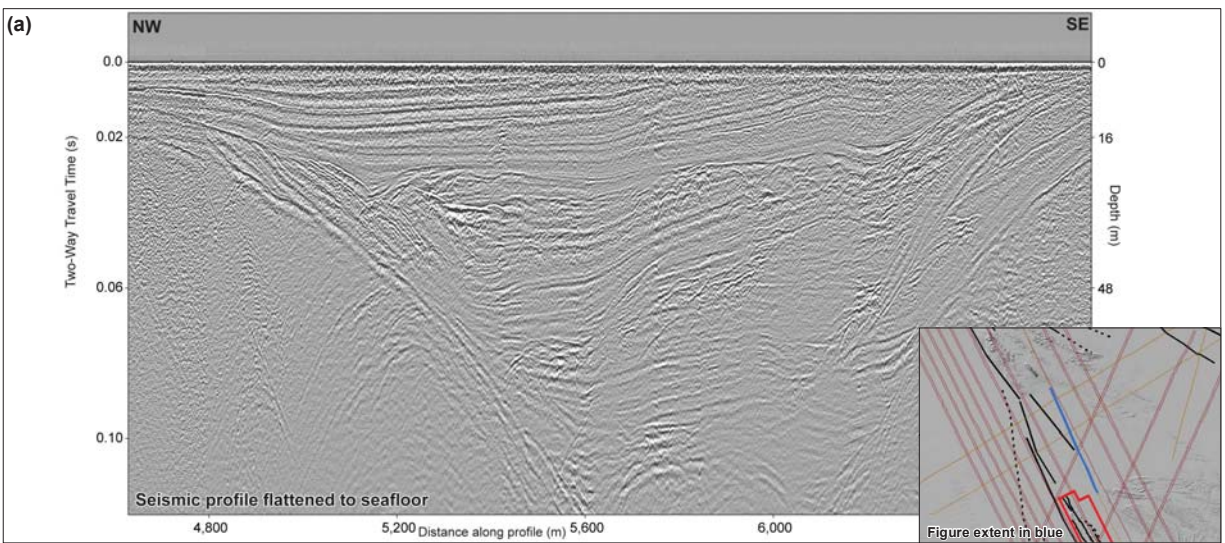
**Excerpt of Profile EB9-S14  
Showing Relationship Between  
Regional Unconformities and Reflections  
in 3D Volume East of the HFZ**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company	Figure <b>6-5</b>
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File path: S:\1005\033\GIS\Figures\Figure\_06-05.mxd; Date: 04/25/2014; User: Jereme Chandler, LCI; Rev.1





**EXPLANATION**

- Seafloor
  - Unconformity H10
  - Unconformity H30
  - Unconformity H40
  - Unconformity H48
  - Unconformity T05
  - Top of pre-Quaternary rock
  - Fugro 3D survey extent
  - Fugro 2D survey trackline
  - USGS survey trackline
  - Location of seismic profile
- Notes:
- See Figure 1-1 for location of study area.
  - Depth values on seismic profile assume a seismic velocity of 1,600 m/s.
  - Faults in location map described on Plate 1a.
- Sources:
- USGS seismic-reflection data (Sliter et al., 2009)
  - Fugro 3D and 2D seismic-reflection data (2012).
- ?--- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.

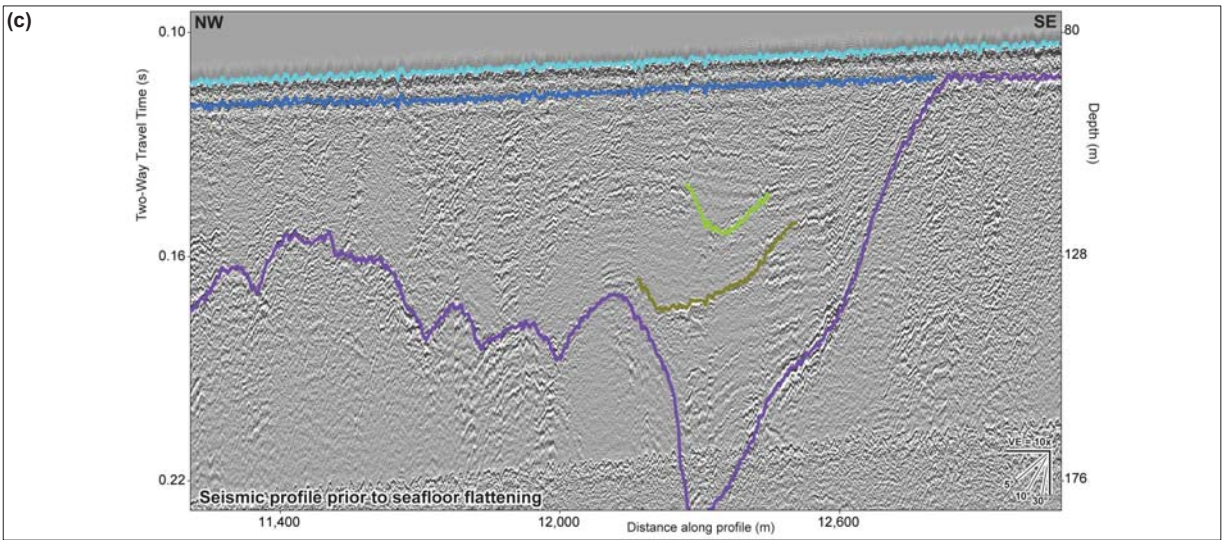
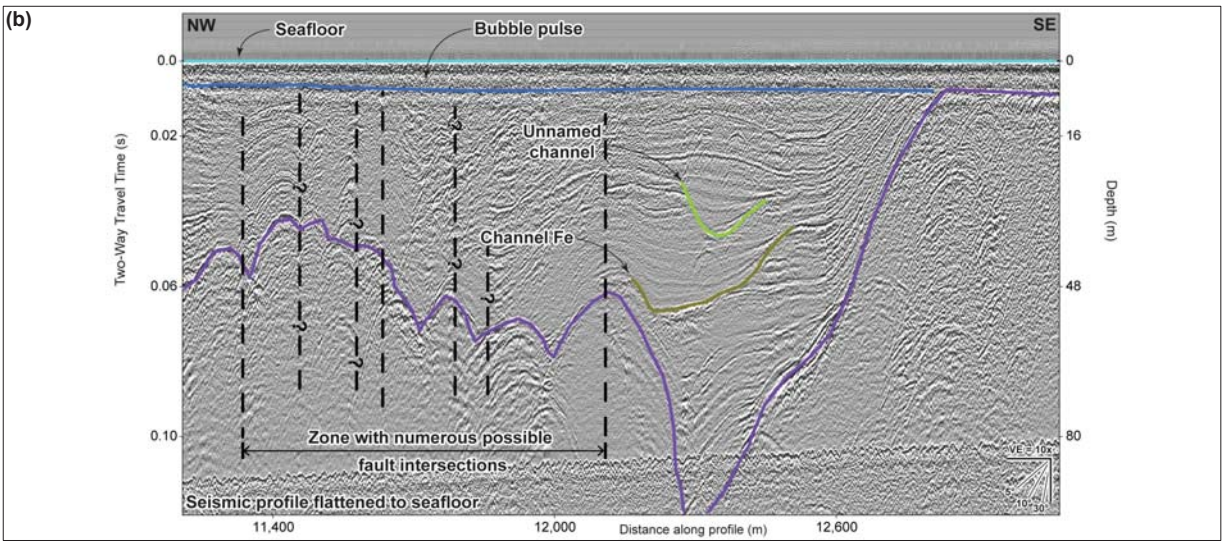
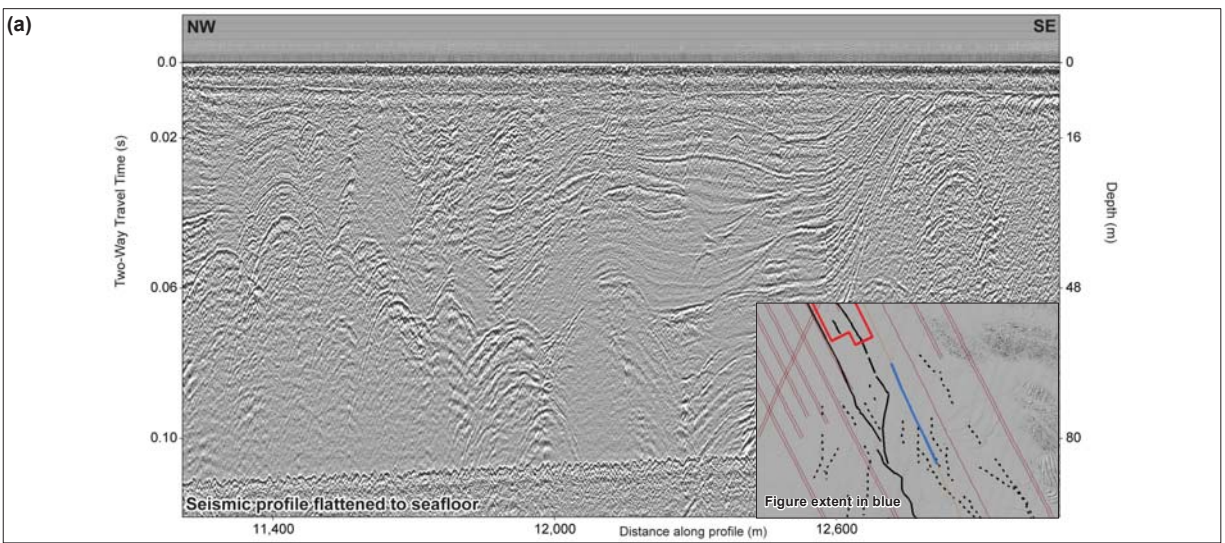


**Excerpt of Line PBS-T1A Showing Channels in Embayment North of 3D Volume**

**OFFSHORE LESS STUDIES**  
 Pacific Gas and Electric Company  
 Figure 6-6

File path: S:\1005\033\GIS\Figures\Figure\_06-06.mxd; Date: 04/25/2014; User: Alex Remar, LCI; Rev: 1





**EXPLANATION**

- Seafloor
- Unconformity H10
- Top of pre-Quaternary rock
- Channel Fe
- Unnamed channel
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline
- Location of seismic profile

- Notes:
1. See Figure 1-1 for location of study area.
  2. Depth values on seismic profile assume a seismic velocity of 1,600 m/s.
  3. Faults in location map described on Plate 1a.

- Sources:
- USGS seismic-reflection data (Sliter et al., 2009).
  - Fugro 3D and 2D seismic-reflection data (2012).



**Excerpt of Line PBS-T1A Showing Channel Fe**

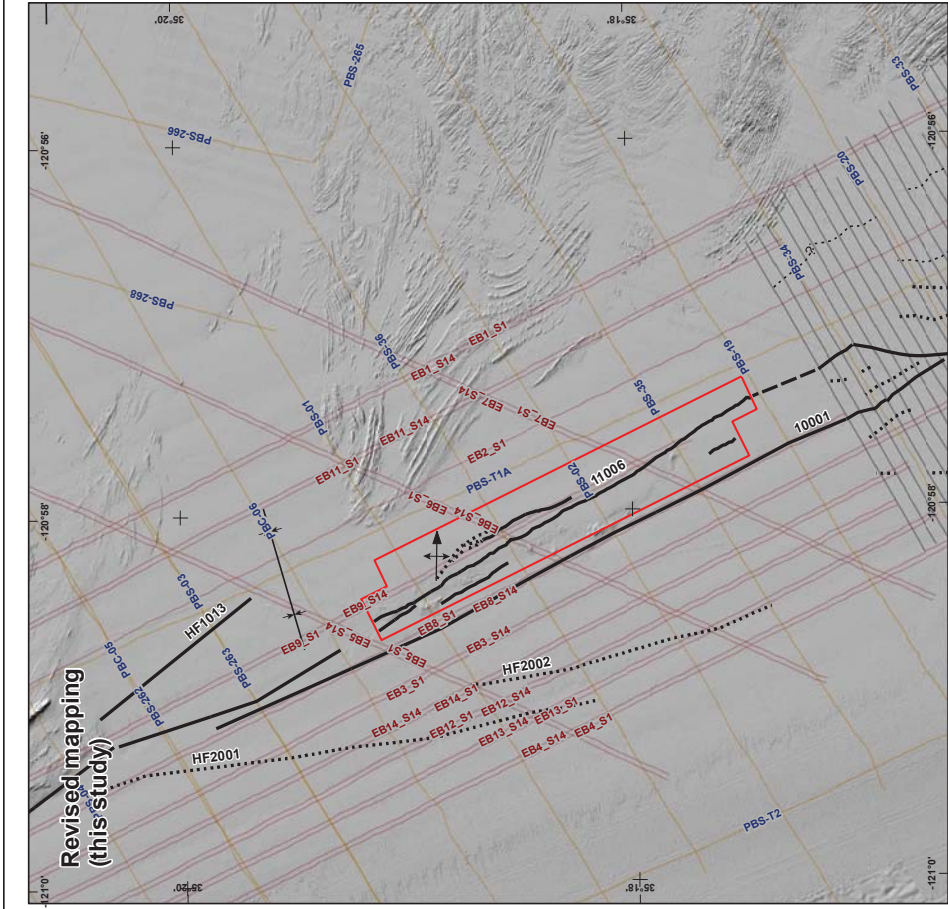
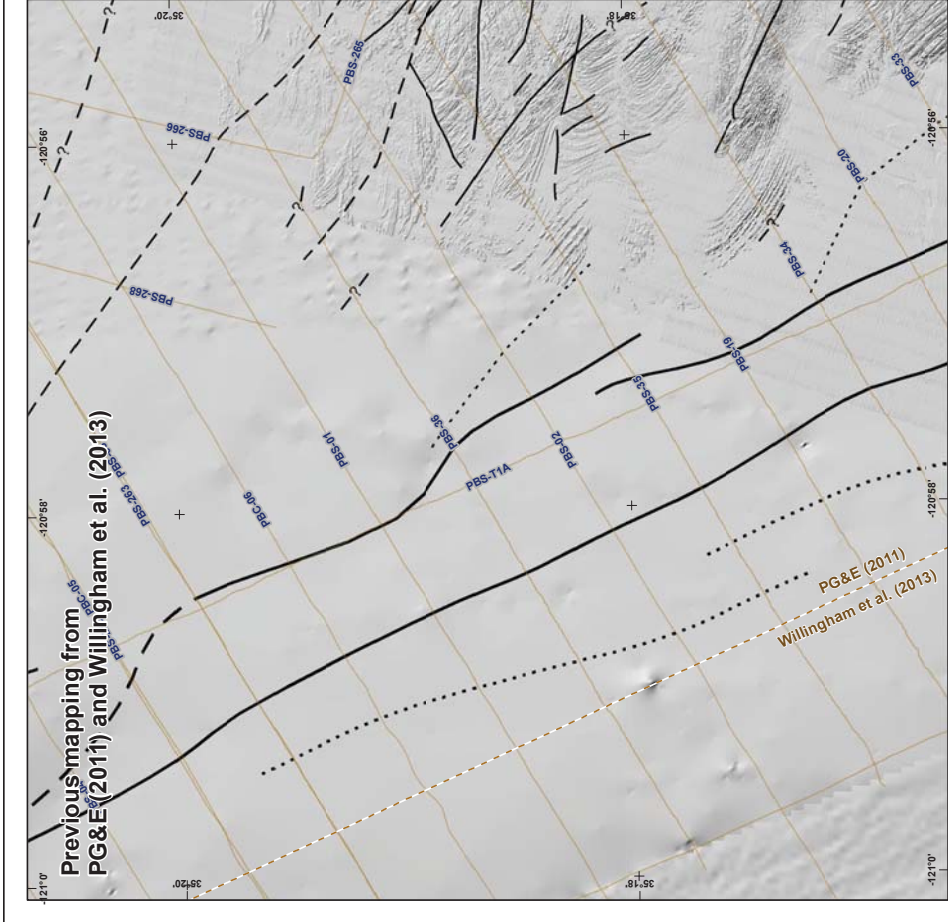
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Pacific Gas and Electric Company

Figure 6-7

File path: S:\1005\033\GIS\Figures\Figure\_06-07.mxd; Date: 07/11/2014; User: Alex Remar; LCI; Rev. 1





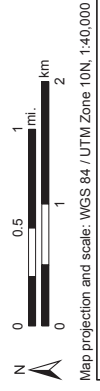
**EXPLANATION**

- Hosgr fault zone traces: solid where well located, dashed where approximately located, dotted where inferred, queried where existence is uncertain.
- - - Other Quaternary fault: solid where well located, dashed where approximately located, dotted where concealed, short dashed where inferred, queried where existence is uncertain.
- Fugro 3D survey trackline
- Fugro 2D survey trackline
- USGS survey trackline

- Antidive, arrow on axis indicates direction of plunge
- Syncline

- Notes:
1. See Figure 1-1 for location of study area.
  2. Faults in left panel mostly from PG&E (2011). Faults from Willingham et al. (2013) shown outside map boundary of PG&E (2011) (brown and white line).
  3. Project DEM compilation v6 from PG&E (2011) shown on left panel.

- Sources:
- USGS seismic-reflection data (Sliter et al., 2009).
  - Fugro 2D and 3D seismic-reflection data (2012).
  - Project DEM compilation v2013.07.

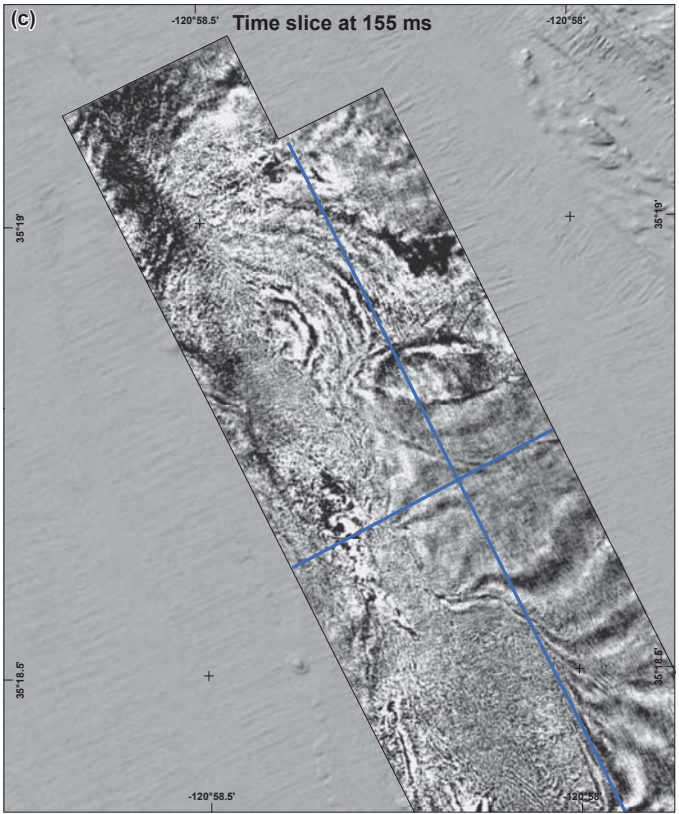
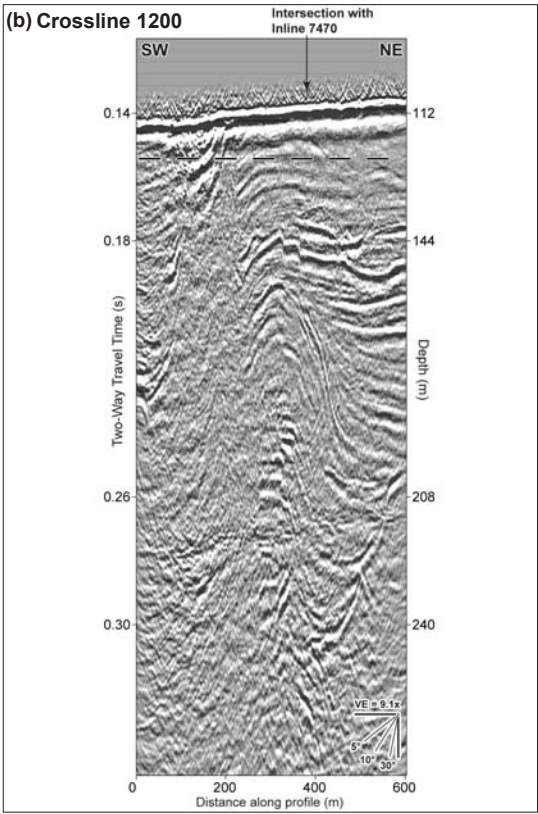
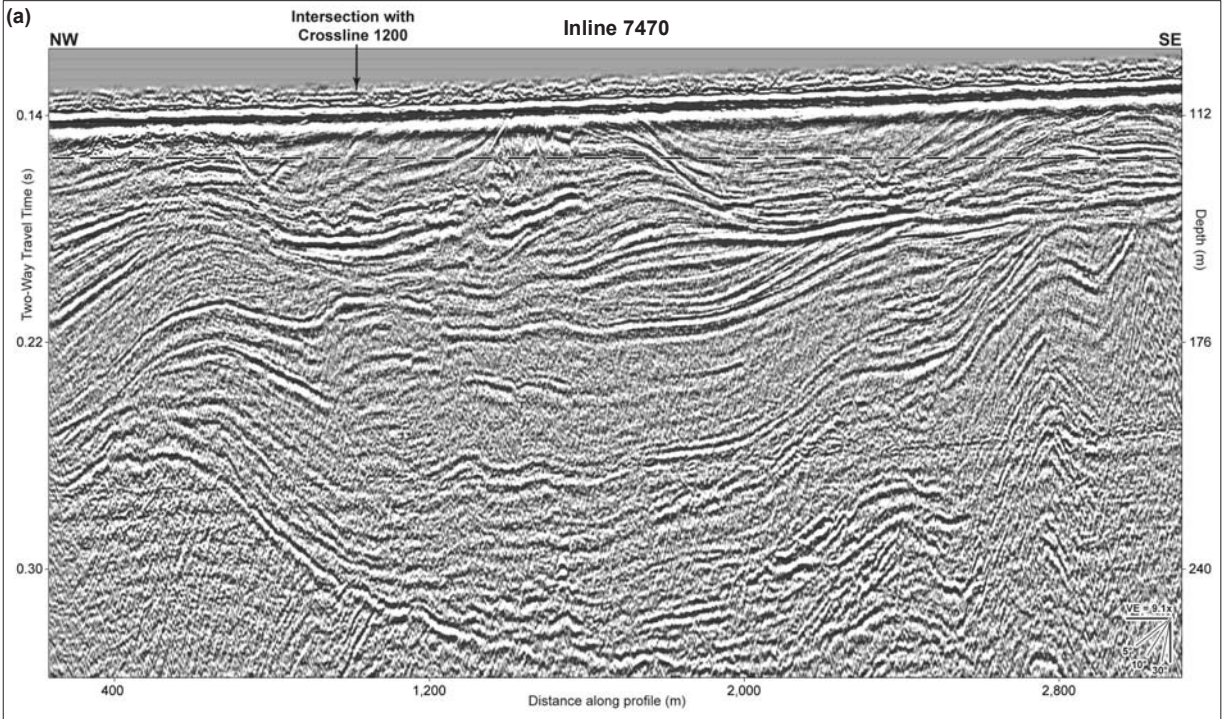


Map projection and scale: WGS 84 / UTM Zone 10N, 1:40,000

**Fault Map Comparison**

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Pacific Gas and Electric Company

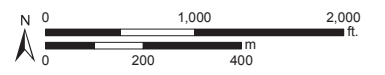




**EXPLANATION**

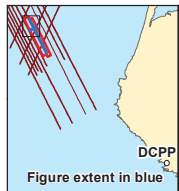
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline
- Location of seismic profile

Sources:  
 - 3D seismic reflection data from Fugro (2013).  
 - Project DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:10,000

- Notes:
1. See Figure 1-1 for location of study area.
  2. Depth values on seismic profile assume a seismic velocity of 1,600 m/s.
  3. Folded reflectors on the northwest side of the profile in panel (a) are also imaged in plan view on the time slice in panel (c). Reflectors on panel (c) are folded adjacent to the east trace of the Hosgri fault zone, centered around a minor (approximately 30 m wide) double left bend in the fault trace. Closure of channel margins in the same image indicates the channels are also folded adjacent to the fault.



**Uninterpreted Profiles and Time Slice at 155 ms Showing Localization of Folding Adjacent to Minor Bend in Eastern Trace of HFZ**

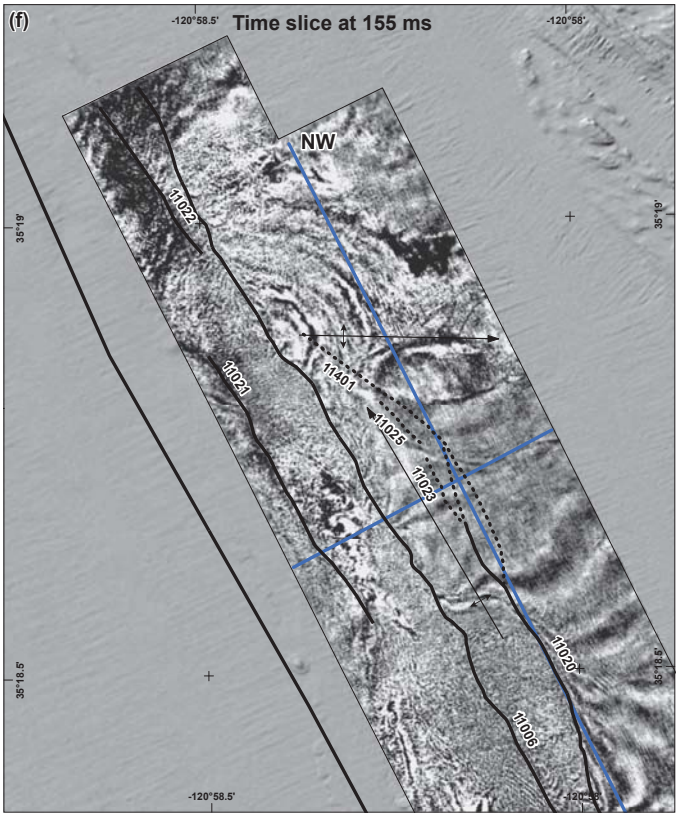
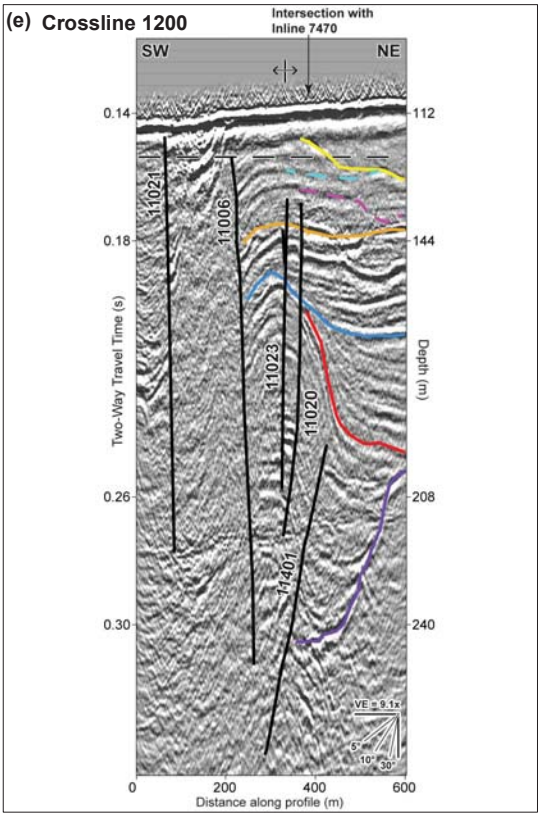
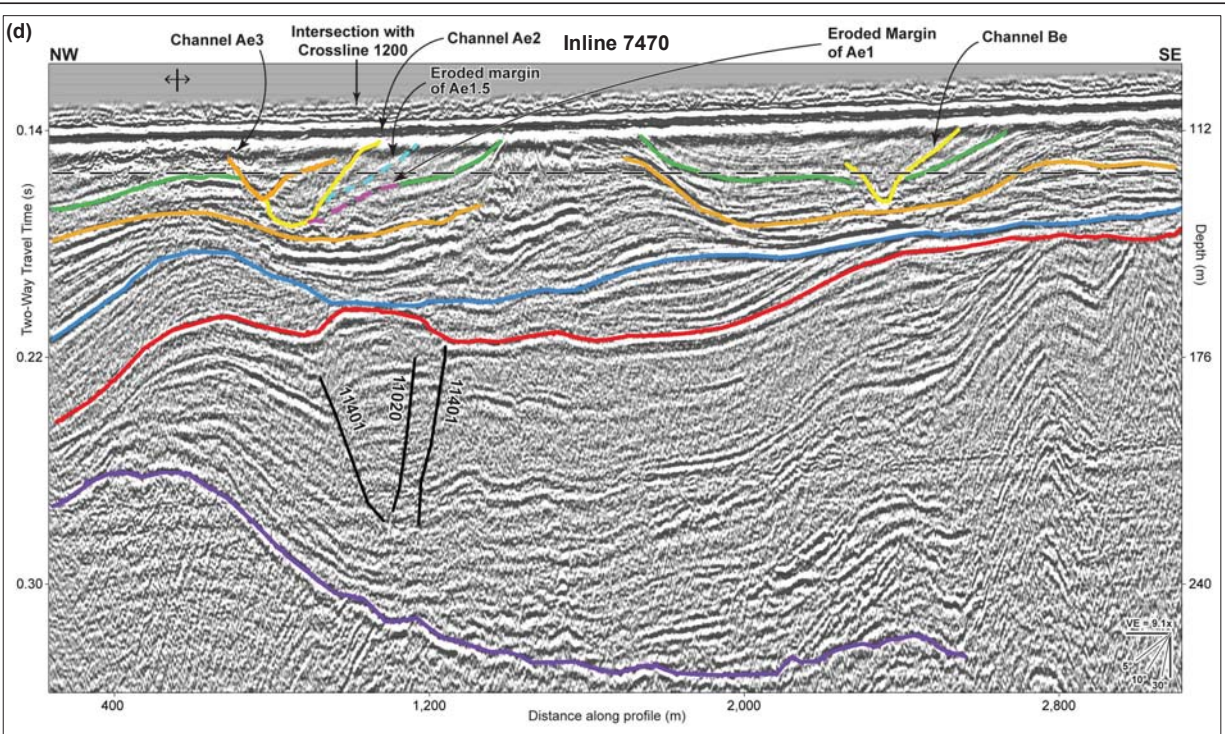
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Figure 6-9a

File path: S:\1005\033\GIS\Figures\Figure\_06-09a.mxd; Date: 07/11/2014; User: Jereme Chandler, LCI; Rev: 1





**EXPLANATION**

- Unconformity T10
- Unconformity T30
- Unconformity T50
- Unconformity T70
- Top of pre-Quaternary rock
- ↔ Anticline
- Depth of time slice
- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
- ↕ Anticline, arrow on axis indicates direction of plunge
- Location of seismic profile

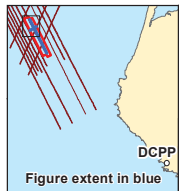
Notes:  
 1. See Figure 1-1 for location of study area.  
 2. Depth values on seismic profile assume a seismic velocity of 1,600 m/s.  
 3. Folded reflections on the northwest side of the profile in panel (a) are also imaged in plan view on the time slice in panel (c). Reflections on panel (c) are folded adjacent to the east trace of the Hosgr fault zone, centered around a minor (approximately 30 m wide) double left bend in the fault trace. Closure of channel margins in the same image indicates the channels are also folded adjacent to the fault.

Sources:  
 - 3D seismic reflection data from Fugro (2013).  
 - Project DEM compilation v2013.07.

Legend:  
— Fugro 3D survey extent  
— Fugro 2D survey trackline  
— USGS survey trackline

Map projection and scale: WGS 84 / UTM Zone 10N, 1:10,000

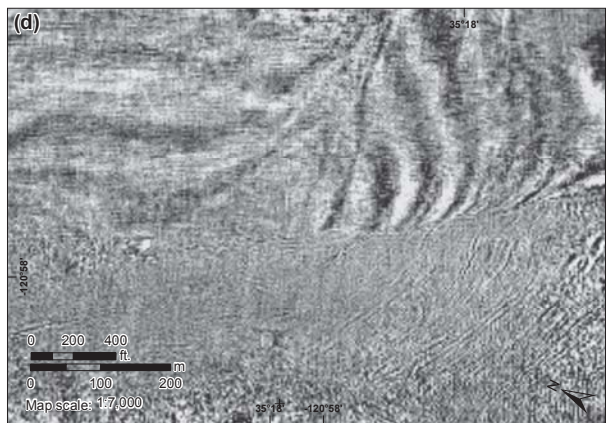
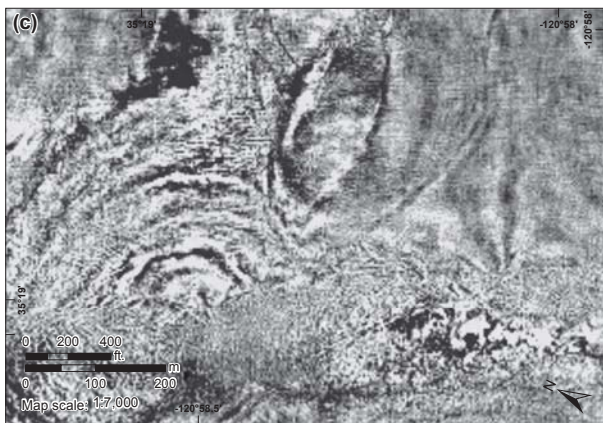
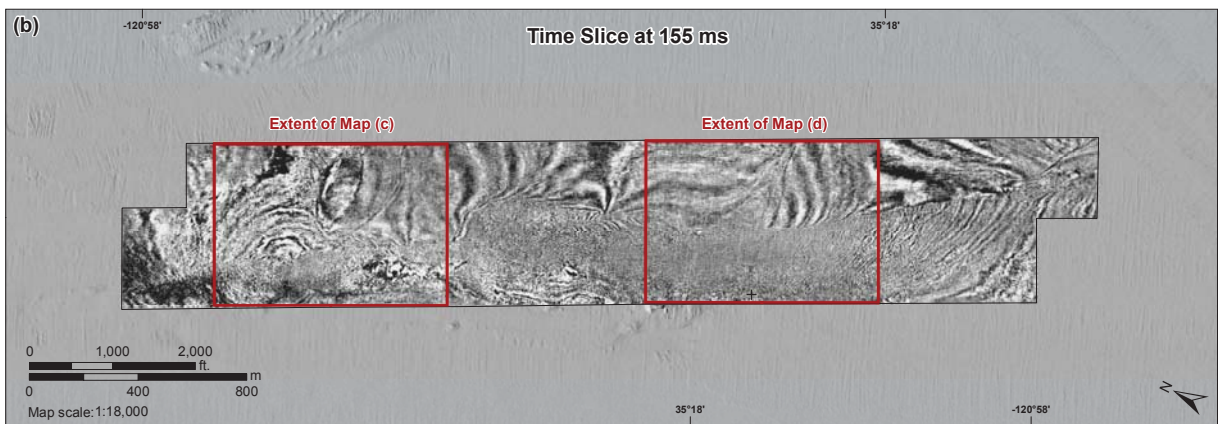
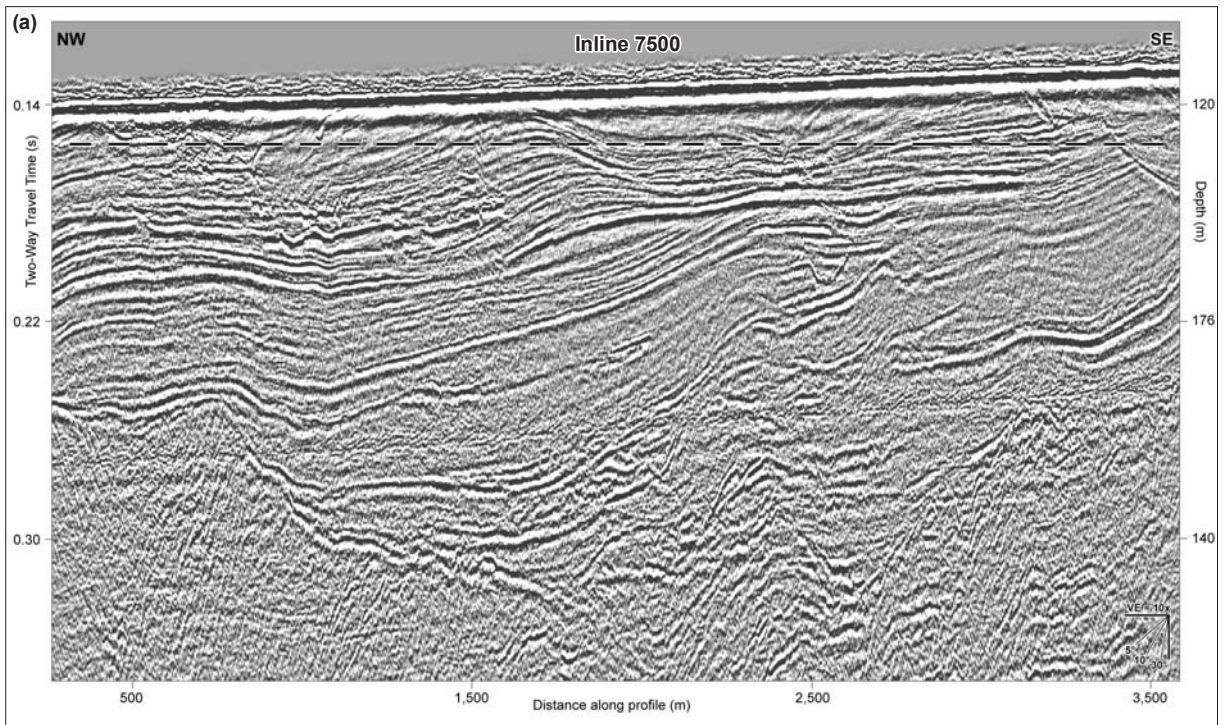
Scale bar: 0 to 2,000 m / 0 to 400 ft.



**Interpreted Profiles and Time Slice at 155 ms Showing Localization of Folding Adjacent to Minor Bend in Eastern Trace of HFZ**

File path: S:\1005\033\GIS\Figures\Figure\_06-09b.mxd; Date: 07/11/2014; User: Jereme Chandler, LCI; Rev: 1





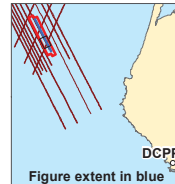
**EXPLANATION**

- Unconformity T10
- Unconformity T30
- Unconformity T50
- Unconformity T70
- Top of pre-Quaternary rock
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline

- Notes:
- See Figure 1-1 for location of study area.
  - Depth values on seismic profile assume a seismic velocity of 1,600 m/s.
  - Faults are shown where they intersect the 150 ms time slice.
  - Channels are incised into deformed strata east of Hosgri fault zone. They are buried by a thin layer of sediment that was likely deposited during or after the most recent transgression and is obscured by the bubble pulse.
  - Channels Ae2 and Ae1 are folded adjacent to the Hosgri fault zone.
  - Channel Be is truncated by the primary eastern strand of the Hosgri fault zone.

Sources:  
 - 3D seismic reflection data from Fugro (2013).  
 - Project DEM compilation v2013.07.

Map projection: WGS 84 / UTM Zone 10N



**Uninterpreted Time Slice at 155 ms and Inline 7500 Showing Shallow Channels East of HFZ**

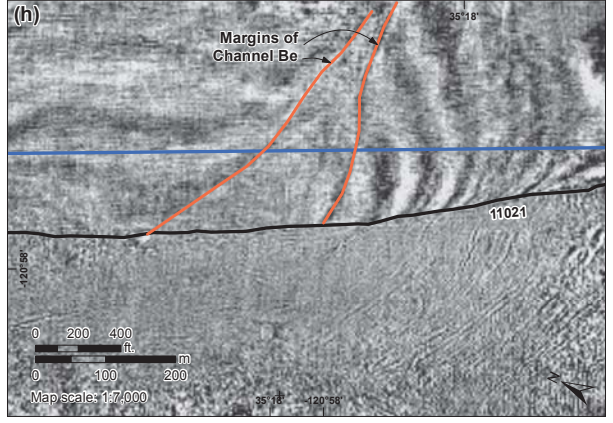
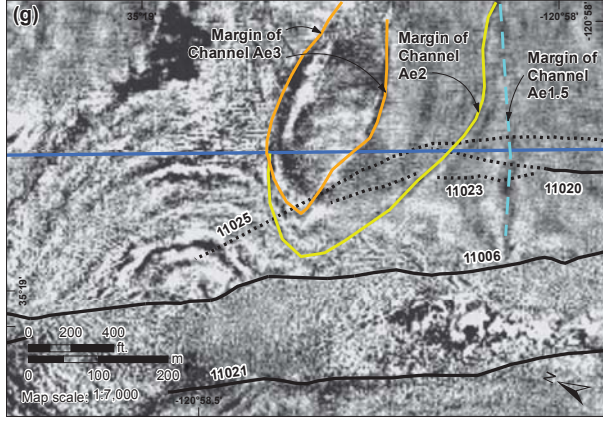
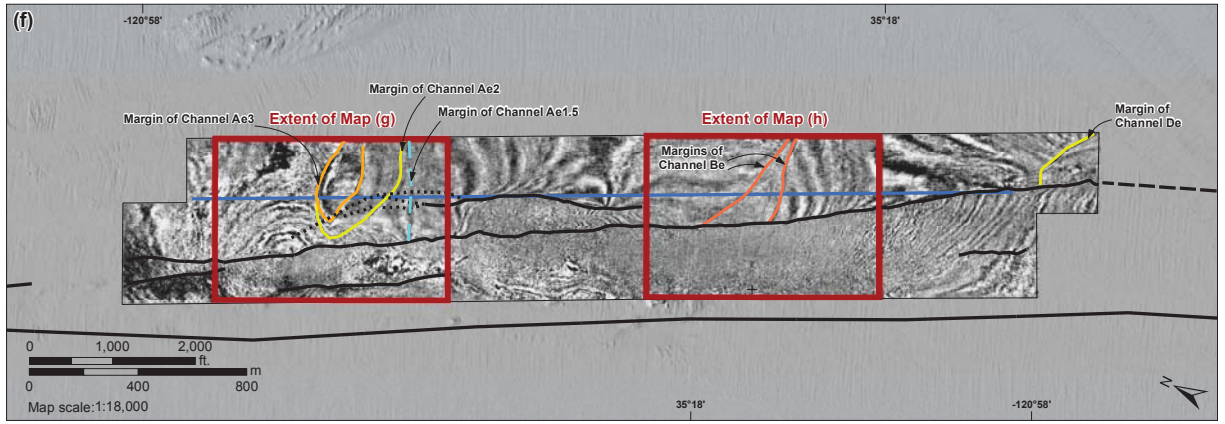
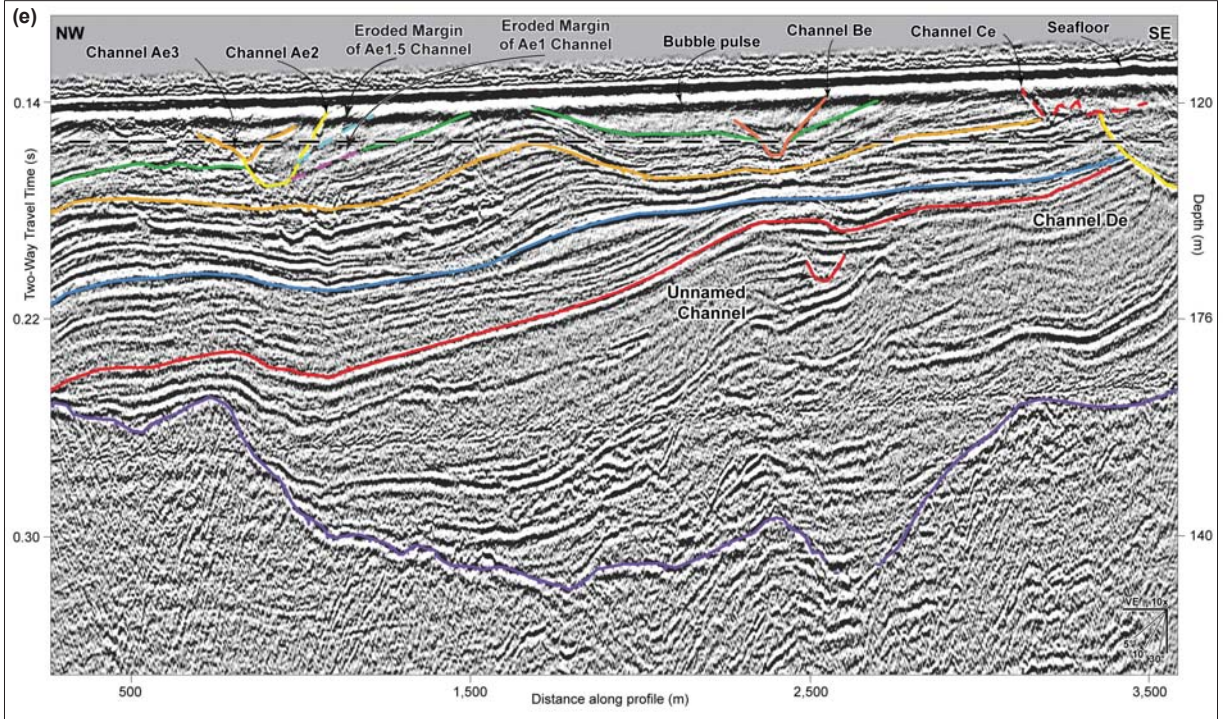
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Figure 6-10a

File path: S:\1005\033\GIS\Figures\Figure\_06-10a.mxd; Date: 04/28/2014; User: Jereme Chandler, LCI; Rev: 1





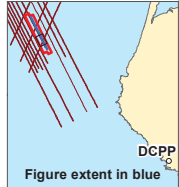
**EXPLANATION**

- Unconformity T10
- Unconformity T30
- Unconformity T50
- Unconformity T70
- Top of pre-Quaternary rock
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline

- Notes:**
1. See Figure 1-1 for location of study area.
  2. Depth values on seismic profile assume a seismic velocity of 1,600 m/s.
  3. Faults are shown where they intersect the 155 ms time slice.
  4. Channels are incised into deformed strata east of the Hosgr fault zone. They are buried by a thin layer of sediment that was likely deposited during or after the most recent transgression and is obscured by the bubble pulse.
  5. Channels Ae2 and Ae1 are folded adjacent to the Hosgr fault zone.
  6. Channel Be is truncated by fault 11006, the primary eastern strand of the Hosgr fault zone.

Sources:  
 - 3D seismic reflection data from Fugro (2013).  
 - Project DEM compilation v2013.07.

Map projection: WGS 84 / UTM Zone 10N



**Interpreted Time Slice at 155 ms and Inline 7500 Showing Shallow Channels East of the HFZ**

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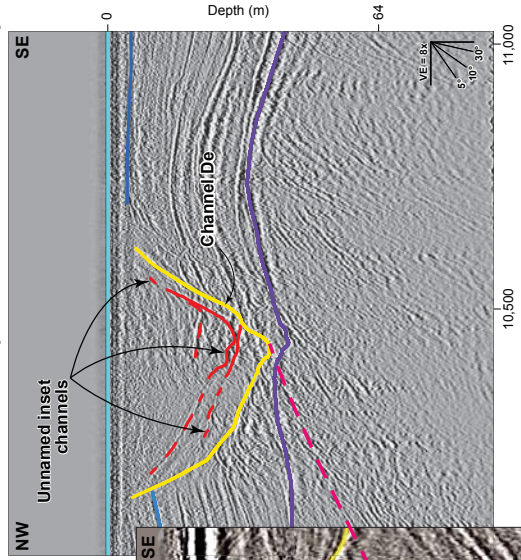
Pacific Gas and Electric Company

Figure 6-10b

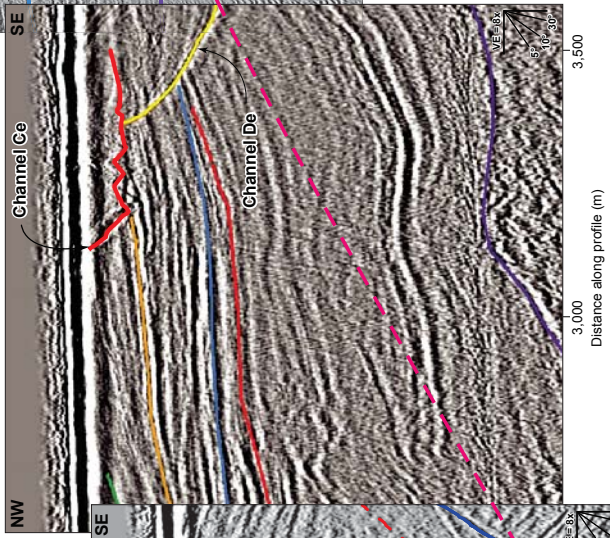
File path: S:\1005\033\GIS\Figures\Figure\_06-10b.mxd; Date: 07/11/2014; User: Jereme Chandler, LCI; Rev: 1



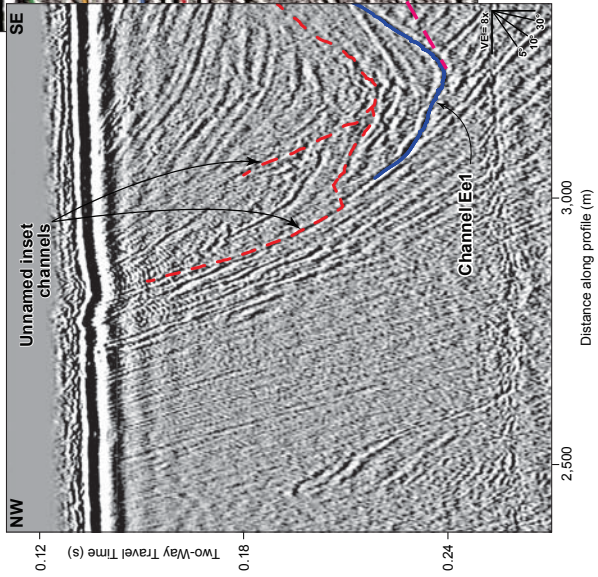
# Line PBS-T1A (Flattened to Seafloor)



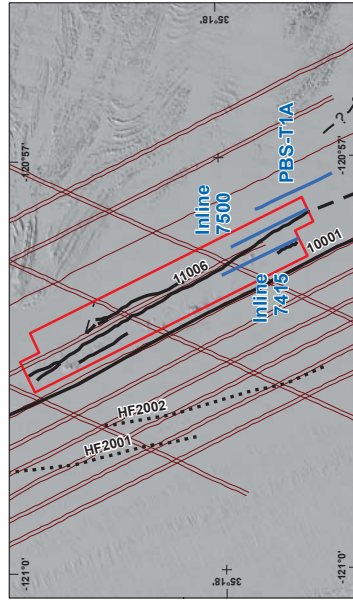
## Inline 7500



## Inline 7415



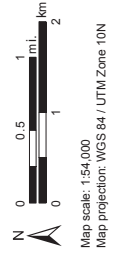
Distance along profile (m)



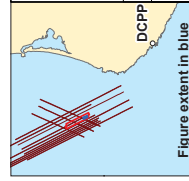
### EXPLANATION

- Seafloor
- Unconformity H10
- Unconformity T30
- Unconformity T50
- Unconformity T70
- Top of pre-Quaternary rock
- Channel|Ee
- Channel|De
- Unnamed inset channels
- Fault, solid where well located, dashed where approximately located, dotted uncertain.
- Location of seismic profile
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline
- Channel|thaiweg correlation

- Notes:
1. See Figure 1-1 for location of study area.
  2. Depth values on seismic profile assume a velocity of 1,600 m/s.
  3. Unnamed inset channels are local features that are not shown in the three profiles illustrated due to gaps in data coverage.
  4. All profiles displayed at 8x vertical exaggeration.
- Sources:
- USGS seismic-reflection data (Siller et al., 2009).
  - Project DEM compilation v2013.07.
  - 3D seismic-reflection data from Fugro (2012).
  - Traces of Point Eucion fault from PG&E (2012).



### Fence Diagram Showing Correlation of Channels De and Ee

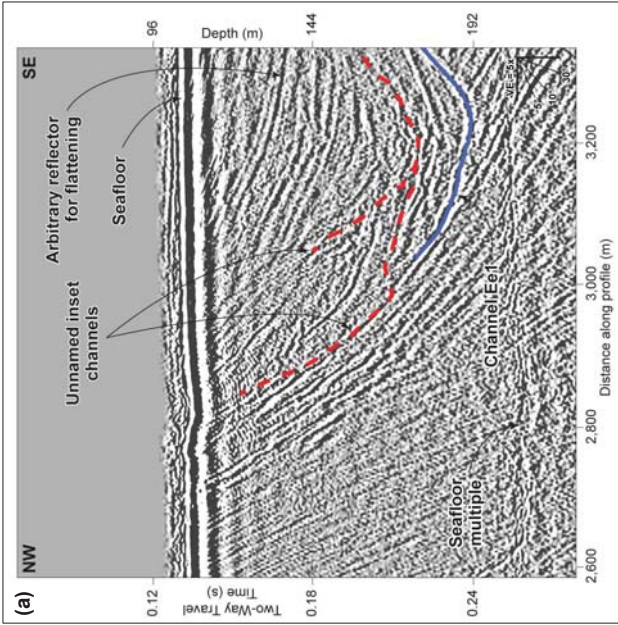


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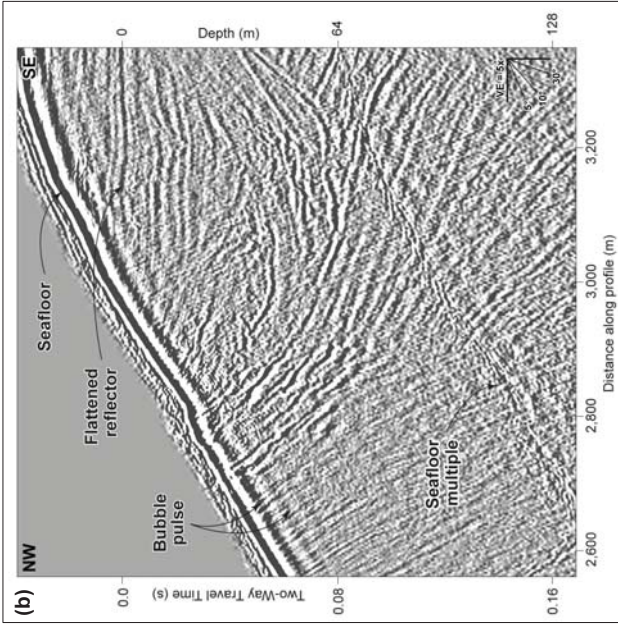
Figure 6-11



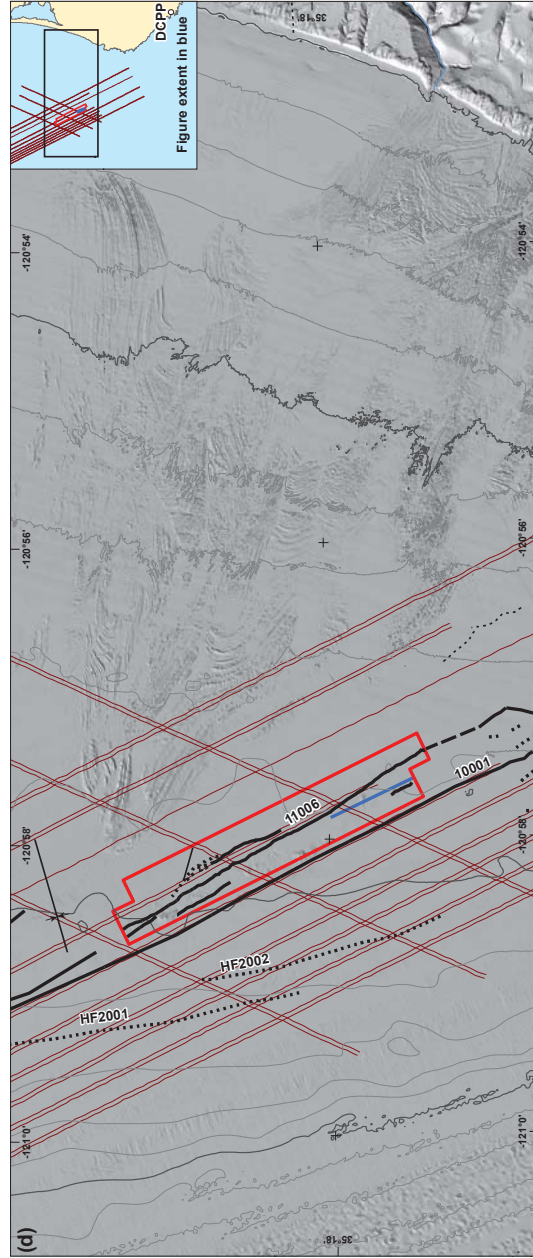
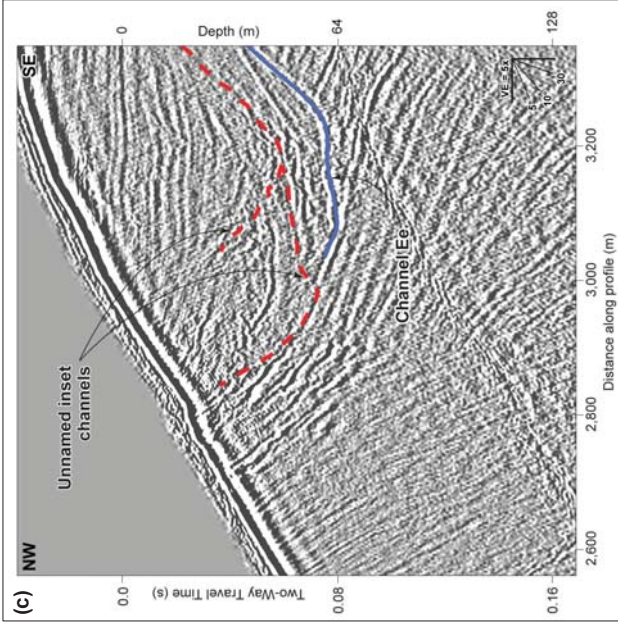
**Interpreted**



**Deformation Restored to Arbitrary Horizon Above Channels**



**Interpretation of Restored Profile**

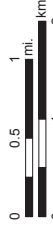


**EXPLANATION**

- - - Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
- Location of seismic profile
- Fugro 3D survey extent
- Fugro 2D survey trackline
- - - Unnamed/inset channels
- ⊕ Anticlinal
- ⊖ Syndinal

- Notes:**
1. See Figure 1-1 for location of study area.
  2. Unnamed inset channels are recognized only locally.
  3. Dip angles on seismic profile assume a seismic velocity of 1,600 m/s.

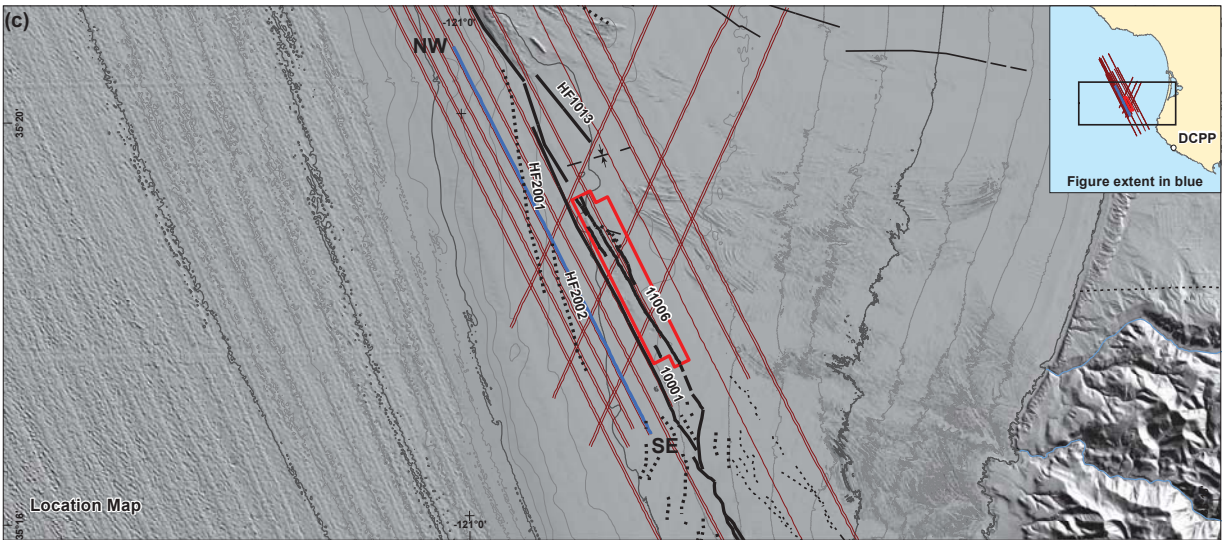
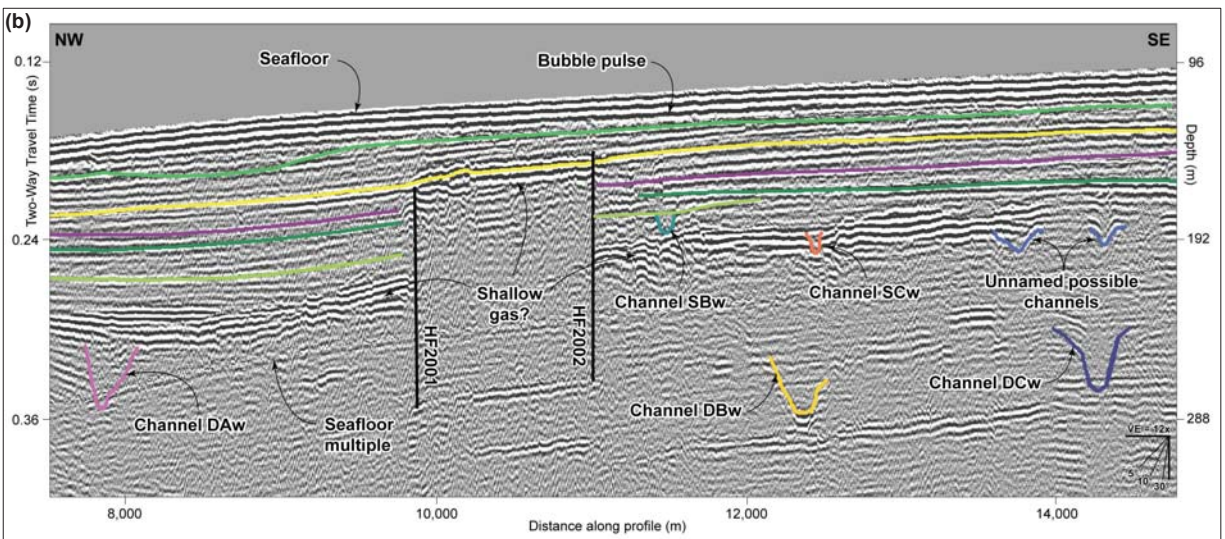
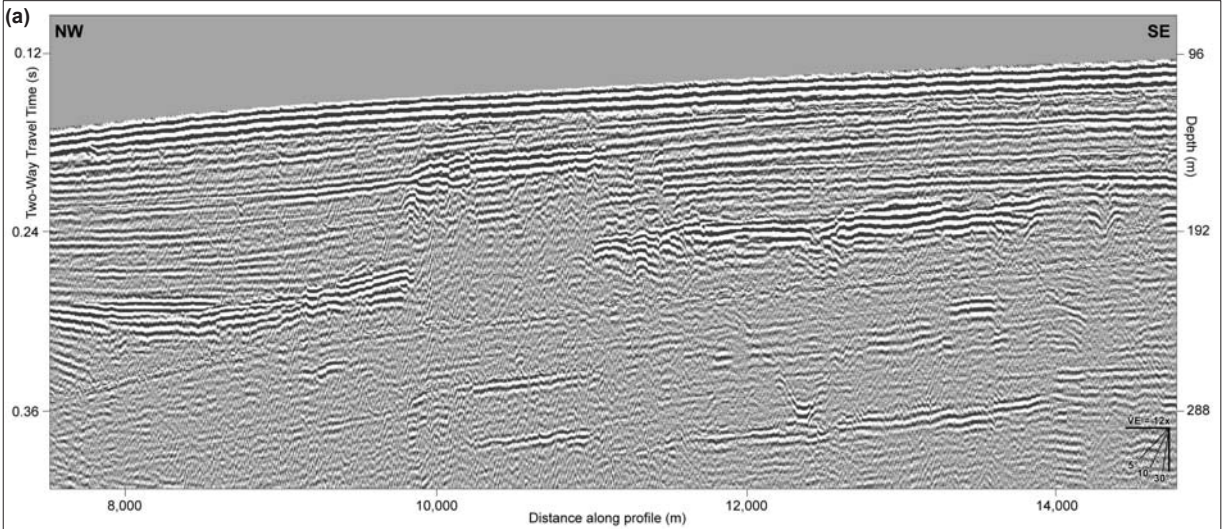
- Sources:**
- 2D and 3D seismic-reflection data from Fugro (2012).
  - Project DEM compilation v2013.07.
  - Bathymetric contour interval is 10 m.
  - Heavy contours are 50 m isobaths.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:50,000

**Excerpt of Inline 7415 Showing Deformed Channel Sequence Ee Between Strands of the HFZ**





**EXPLANATION**

- Unconformity H30
- Unconformity H40
- Unconformity H45
- Unconformity H48
- Unconformity T05

- Location of seismic profile
  - Fugro 3D survey extent
  - Fugro 2D survey trackline
- Notes:
1. See Figure 1-1 for location of study area.
  2. Depth values on seismic profile assume a velocity of 1,600 m/s.
  3. Unnamed possible channels are local features that are not observed on adjacent seismic lines.
- Sources:
- USGS seismic-reflection data (Slitter et al., 2009).
  - 2D and 3D seismic-reflection data from Fugro (2012).
  - Project DEM compilation v2013.01. Bathymetric contour interval is 10 m. Heavy contours are 50 m isobaths.
  - Traces of Point Buchon fault from PG&E (2012).

Map projection and scale: WGS 84 / UTM Zone 10N, 1:90,000

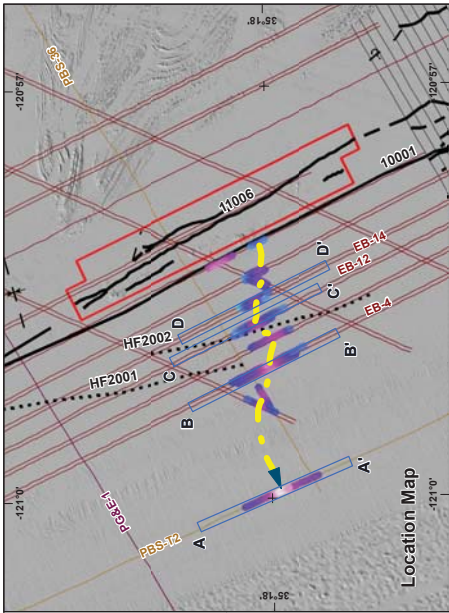
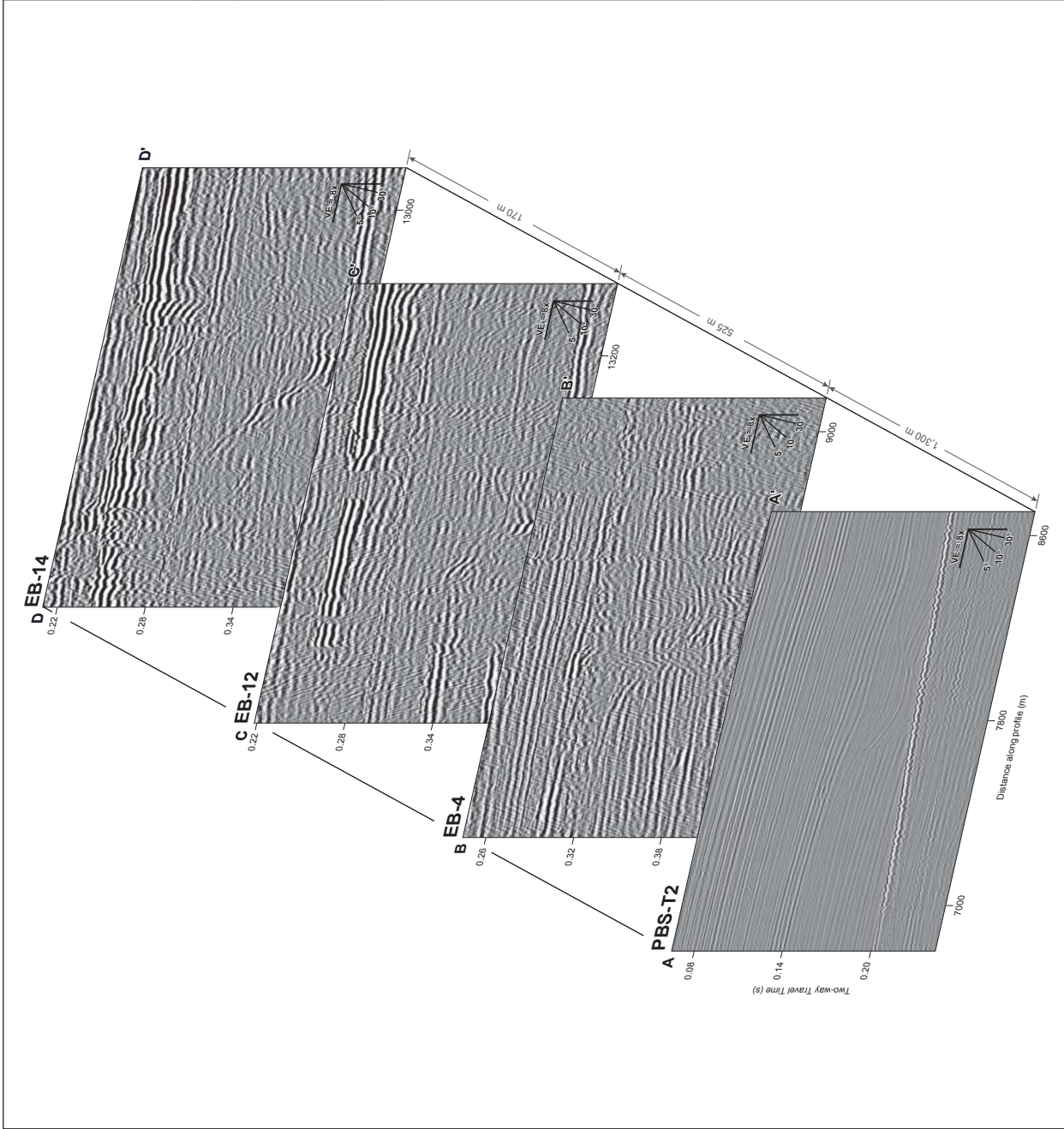
**Excerpt of 2D Profile EB14-S14  
Showing Stratigraphic Context of  
Possible Channels West of the HFZ**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company Figure 6-13

File path: S:\1005\033\GIS\Figures\Figure\_06-13.mxd; Date: 07/11/2014; User: Jereme Chandler, LC; Rev: 1





**EXPLANATION**

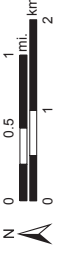
- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
  - Slope channel thalweg mapped from seismic-reflection data
  - Location of seismic profile
  - Fugro 3D survey extent
  - Fugro 2D survey trackline
  - USGS survey trackline
  - PG&E survey trackline
- Channel Depth**
- 130 ms (~100 m)
  - 440 ms (~350 m)

**Notes:**

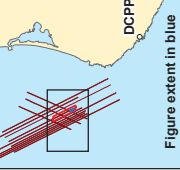
1. See Figure 1-1 for location of study area.
2. Depth values on seismic profile assume a velocity of 1,600 m/s.
3. USGS profile PBS-T2 is shown flattened to seafloor.
4. All profiles displayed at 8x vertical exaggeration.
5. Profiles were mapped geographically by Willingham et al. (2013). It is mapped onto USGS 2D profile PBS-T2 based on the direct intersection with line PGE-1, which was the basis for section C-C' in Willingham et al. (2013).

**Sources:**

- USGS seismic-reflection data (Sitter et al., 2009).
- Project DEM compilation v2013.07.
- Fugro 3D seismic-reflection data (2012).
- Traces of Point Buchon fault from PG&E (2012).



Map projection and scale: WGS 84 / UTM Zone 10N, 1:54,000



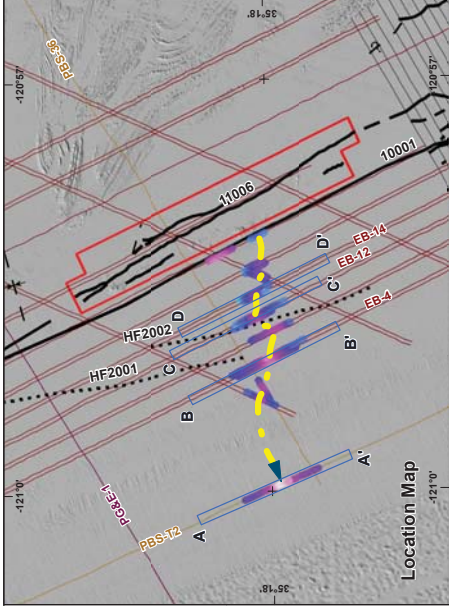
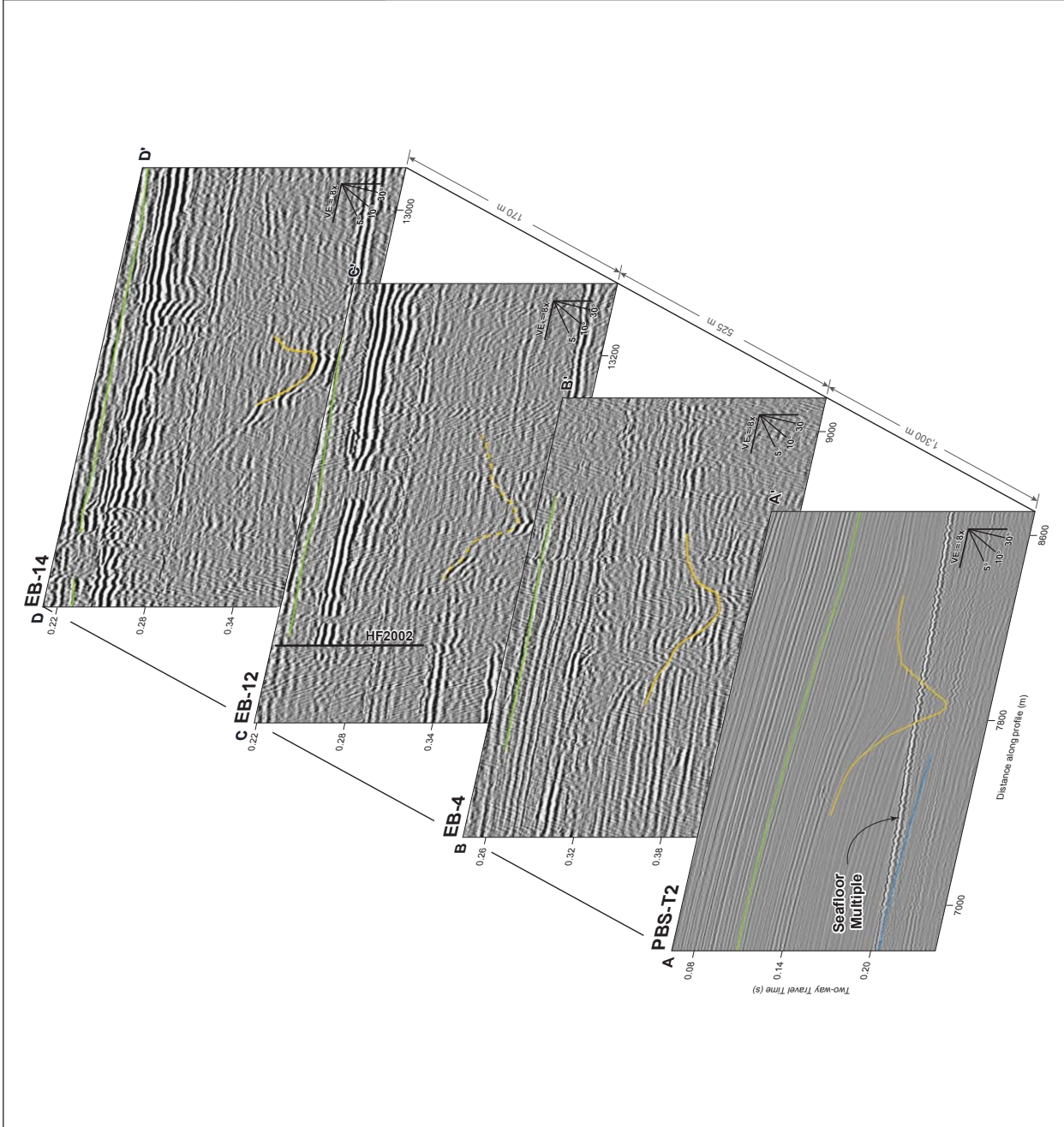
**Uninterpreted Fence Diagram Showing Channel DBw West of the HFZ**

OFFSHORE LESS STUDIES



Figure 6-14a

Figure extent in blue

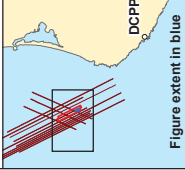


**EXPLANATION**

- Unconformity T05
- Unconformity ELP
- Channel DBw
- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried, where existence uncertain.
- Slope channel thalweg mapped from seismic-reflection data
- Location of seismic profile
- Fugro 3D survey extent
- Fugro 2D survey trackline
- USGS survey trackline
- PG&E survey trackline
- Channel Depth  
130 ms (~100 m)  
440 ms (~350 m)

**Notes:**  
 1. See Figure 1-1 for location of study area.  
 2. Depth values on seismic profile assume a velocity of 1,600 m/s.  
 3. USGS profile PBS-T2 is shown flattened to seafloor.  
 4. The early-late Pliocene unconformity mapped regionally by Willingham et al. (2013). It is mapped onto USGS 2D profile PBS-T2 based on the direct intersection with line PGE-1, which was the basis for section C-C' in Willingham et al. (2013).  
 Sources:  
 - USGS seismic-reflection data (Sitter et al., 2009).  
 - Project DEM compilation 2013 (Fugro, 2012).  
 - 2D seismic survey tracklines from PG&E (2012).  
 - Traces of Point Buchon fault from PG&E (2012).

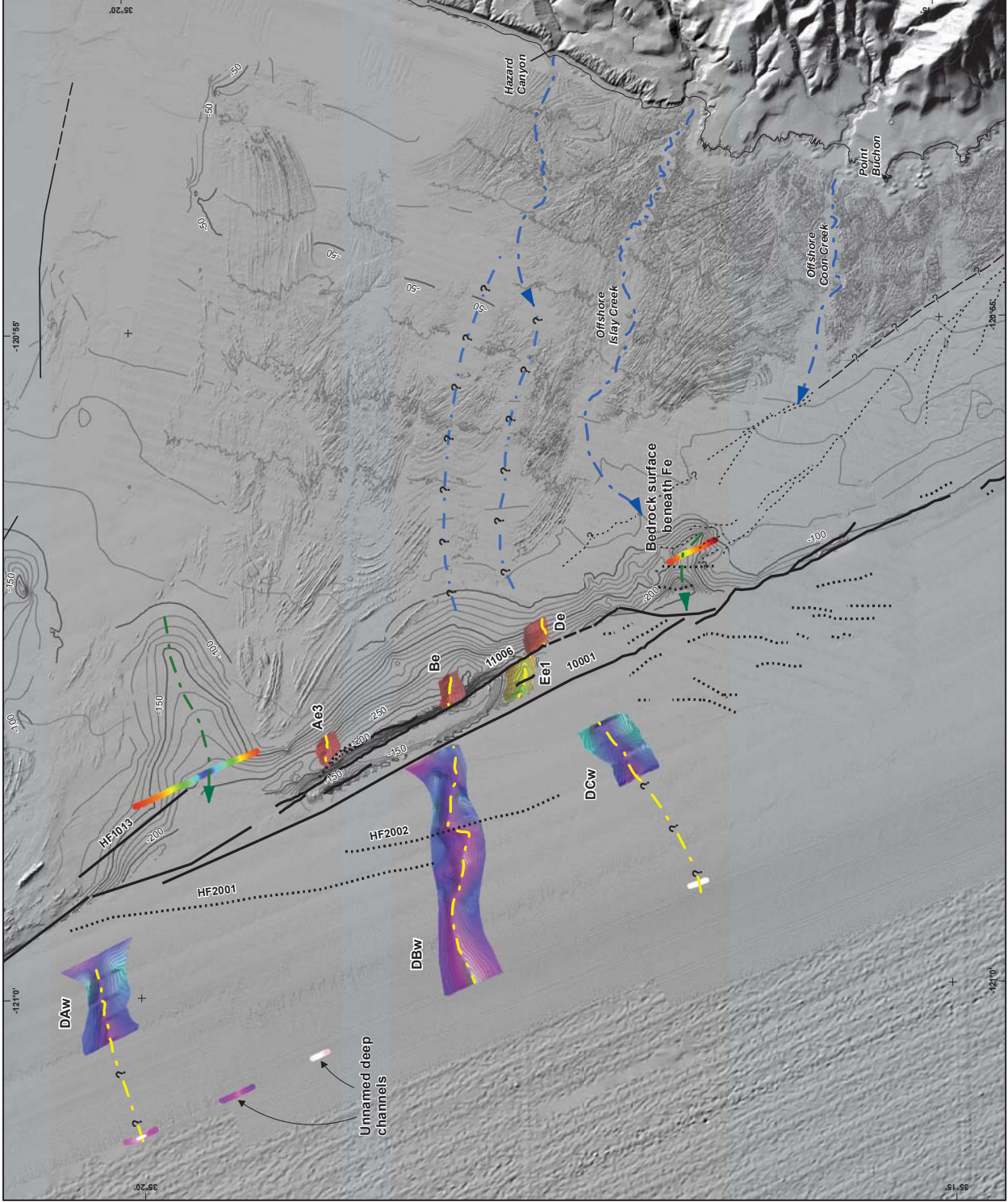
Map projection and scale: WGS 84 / UTM Zone 10N, 1:54,000



**Interpreted Fence Diagram Showing Channel DBw West of the HFZ**

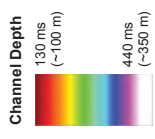
OFFSHORE LESS STUDIES  
 Pacific Gas and Electric Company  
 Figure 6-14b  
 Figure extent in blue





**EXPLANATION**

- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
- Slope channel thalweg mapped from seismic-reflection data
- Shelf channel or flow pathway mapped from bathymetry
- Approximate direction of slope channel inferred from contours on top of pre-Quaternary rock
- Structure contours on top of pre-Quaternary rock; 10 m contour interval, heavy contours are 50 m.



- Notes:**
1. See Figure 1-1 for location of study area.
  2. Contours within channels mapped from seismic data are on 5 ms intervals.
  3. Refer to Plate 3 for source of channel mapping.

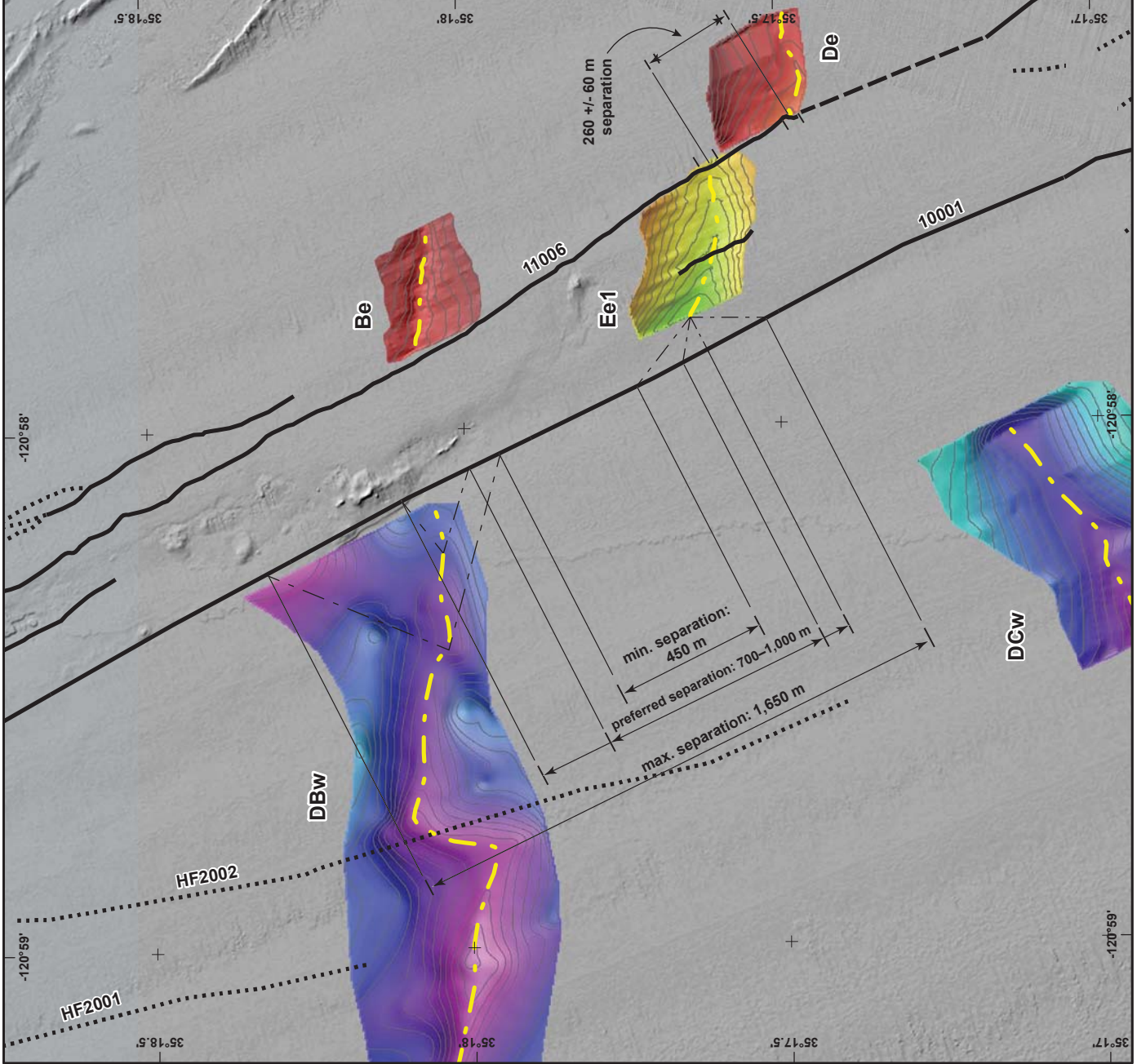
**Sources:**

- Project DEM compilation v2013.07.
- Traces of Point Buchon fault from PG&E (2012).

Map projection and scale: WGS 84 / UTM Zone 10N, 1:45,000

**Map of Channels, Flow Pathways, and Potential Sediment Sources on Shelf**

File path: S:\100503\GIS\Figures\Figure\_06-15.mxd, Date: 04/28/2014, User: Alex Remar, LCI, Rev: 1

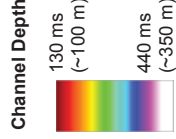


### EXPLANATION

---?--- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.

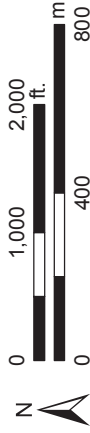
#### Interpreted Thalwegs

- Slope channel thalweg mapped from seismic-reflection data
- Alternative thalweg projection



- Notes:
1. See Figure 1-1 for location of study area.
  2. Contours within channels mapped from seismic data are on 5 ms intervals.
  3. Refer to Plate 2 for source of mapping.

Source: Project DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM 10N, 1:18,000

## Piercing Point DBW-Ee1-De Separation and Uncertainty

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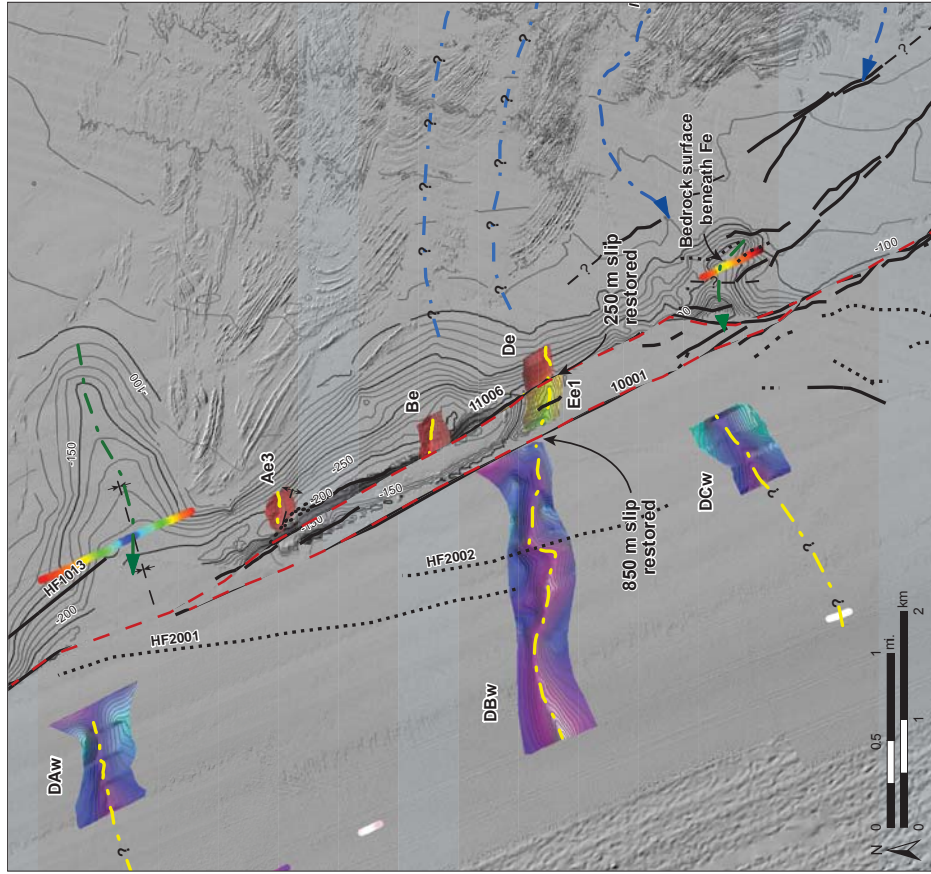
Pacific Gas and Electric Company

Figure 6-16

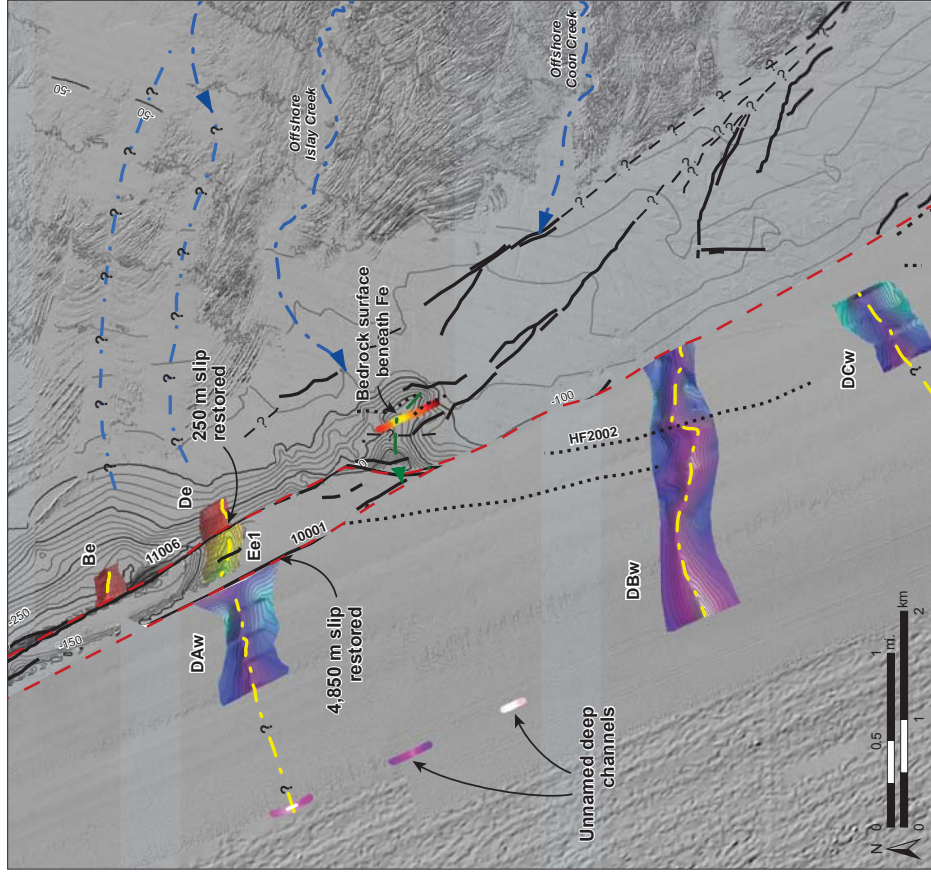




**Correlation A: DBw-Ee1-De-Cumulative 1.1 km Slip Restored**



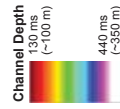
**Correlation B: DAW-Ee1-De-Cumulative 5.1 km Slip Restored**



**EXPLANATION**

- ?--- Fault, solid where well located, dashed where approximately located, dotted where inferred, queried where existence uncertain.
- Slope channel thalweg mapped from seismic-reflection data
- Shelf channel or flow pathway mapped from bathymetry
- Approximate direction of slope channel inferred from contours on top of pre-Quaternary rock.
- Block boundary for palimpsestic restoration.

Structure contours on top of pre-Quaternary rock; 10 m contour interval, heavy contours are 50 m.



Sources:  
 - Project DEM compilation v2013.07  
 - Traces of Point Bichon fault from P&E (2012).

- Notes:
1. See Figures 1-1 for location of study area
  2. Contours within channels mapped from seismic data are on 5 m intervals.
  3. Where they meet, bathymetric contours do not align with interpreted contours on the top of pre-Quaternary because the USGS seismic profiles are not depth-migrated, and depths of structure contours interpreted from the seismic reflection data were estimated using an assumed seismic velocity of 1,600 m/s. Therefore, the general shape of the structure contours is accurate, but the actual depths are an approximation.
  4. Alternative channel correlations across the HFZ are tested by palimpsestic restoration of slip along dominant strands of the HFZ.
  5. Refer to Plate 2 for source of mapping.

Map projection and scale: WGS 84 / UTM Zone 10N, 1:45,000

**Palimpsestic Restoration Illustrating Alternative Channel Correlations Across the HFZ**

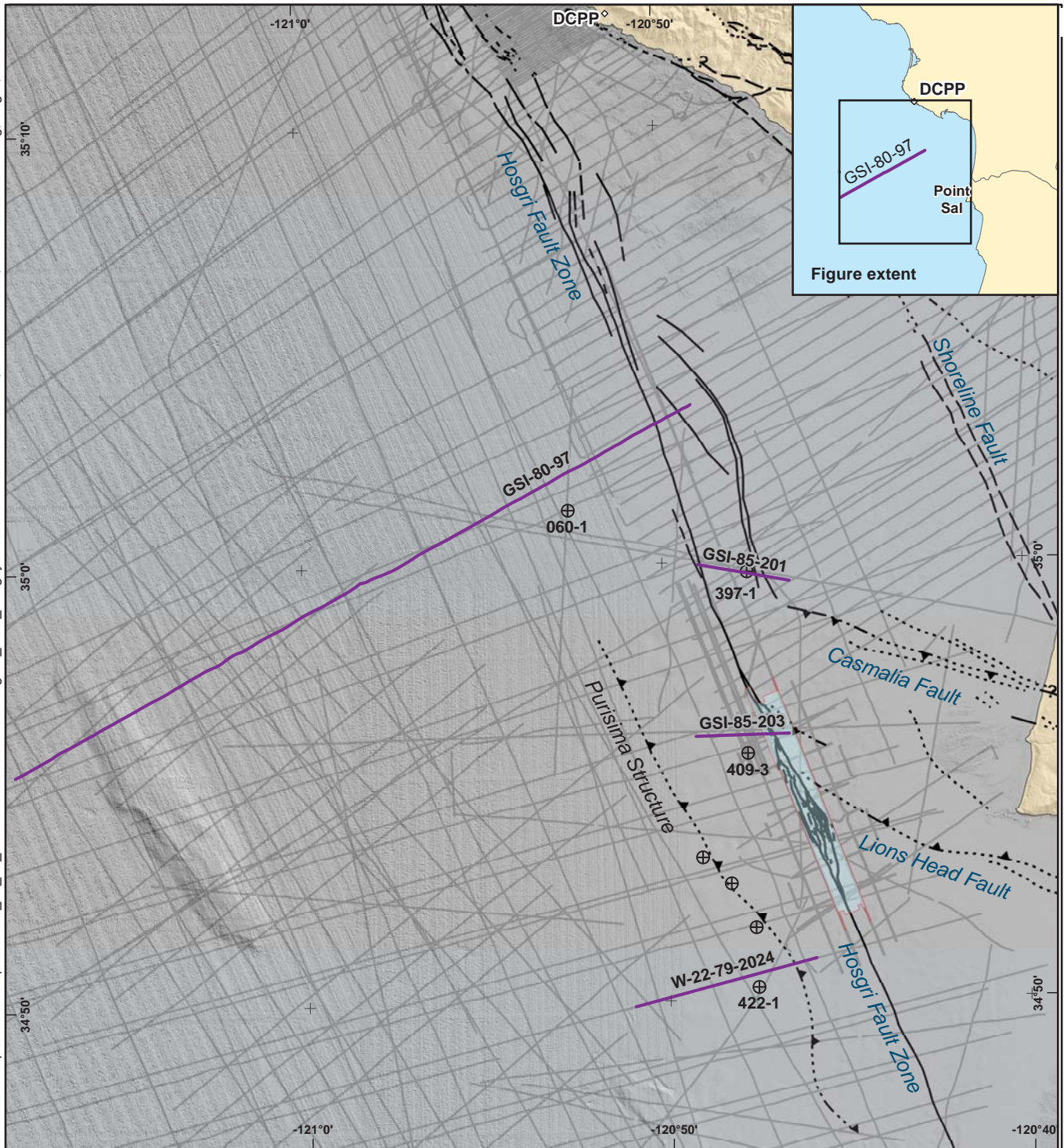
**OFFSHORE LESS STUDIES**



Figure **6-17**



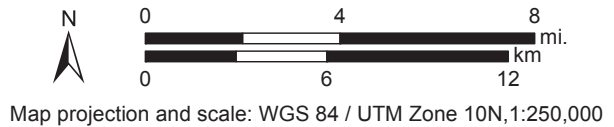
File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-18\_LeagcyArchiveWellTieLinesPointSal; Date: 6/9/2014; User: Ranon Dulberg, Fugro; Rev. 3



**EXPLANATION**

- <sup>397-1</sup> Legacy archive well tie line
- Exploratory well location and number
- 2012 Point Sal 3D high-resolution survey extent
- Legacy archive line

Sources:  
 -Well locations from Willingham et al. (2013).  
 -Project DEM compilation v2013.01.



**Legacy Archive Well Tie Lines,  
Offshore Point Sal**

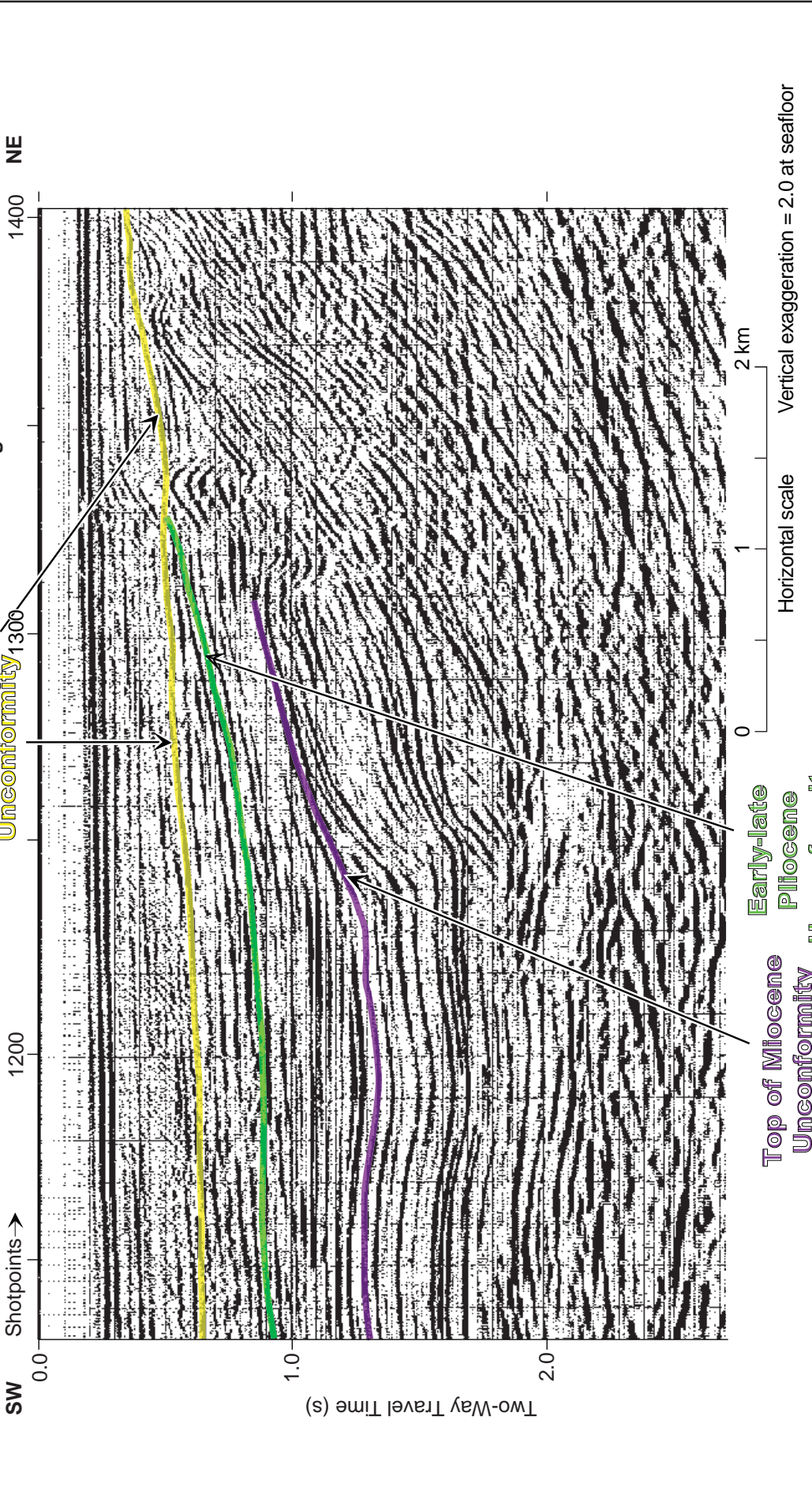
**OFFSHORE LESS STUDIES**



Pacific Gas and Electric Company

Figure **6-18**





**Migrated Seismic Reflection Record  
Showing Near Top of Neogene Unconformity  
Mapped in This Study**

**OFFSHORE LESS STUDIES**

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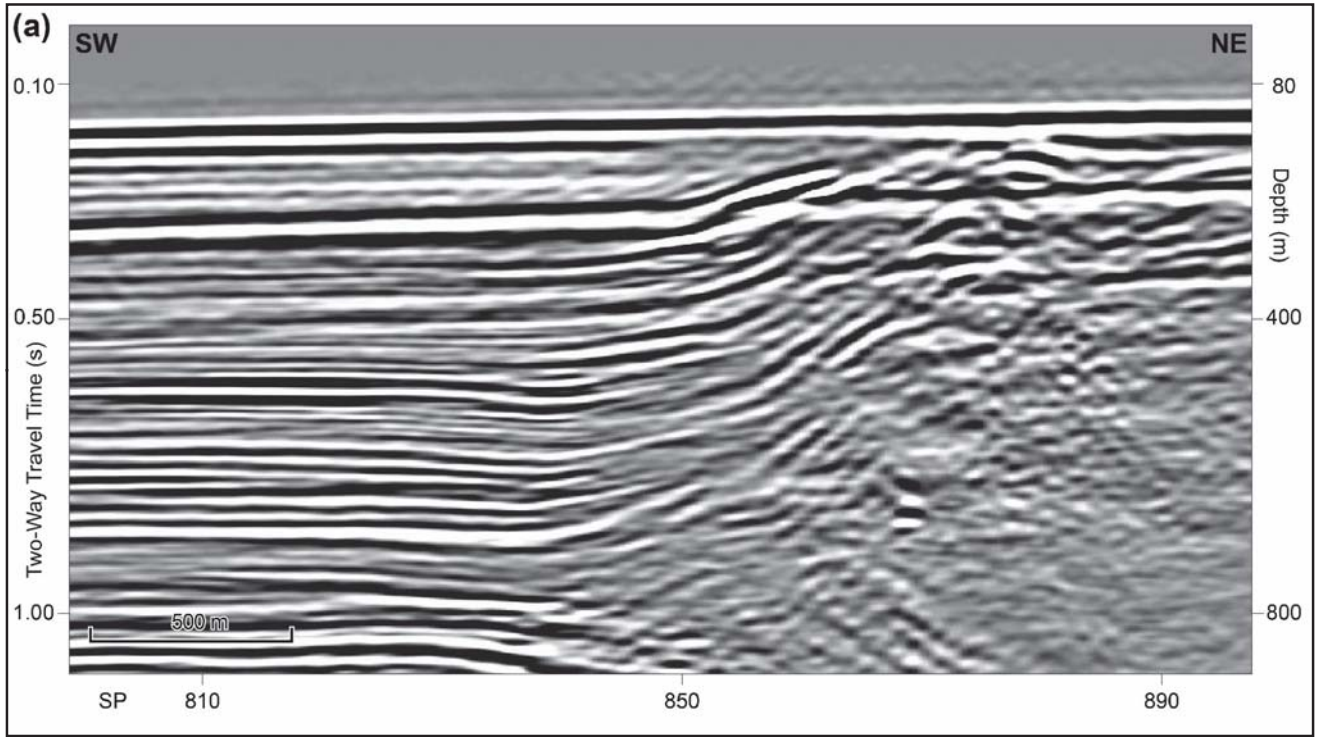
Figure **6-19**

- Notes:
1. Migrated seismic reflection GSI Line 97 showing three major unconformities in this study: (1) Top of Miocene unconformity, (2) early-late Pliocene unconformity, and (3) near top of Neogene unconformity.
  2. The data are from a seismic reflection line that crosses the Hosgri fault zone in the west-central part of San Luis Obispo Bay (Line GSI-97). Note the onlap of younger sediments onto the early-late Pliocene unconformity and the near top of Neogene unconformity.
  3. See Figure 6-18 for line location.

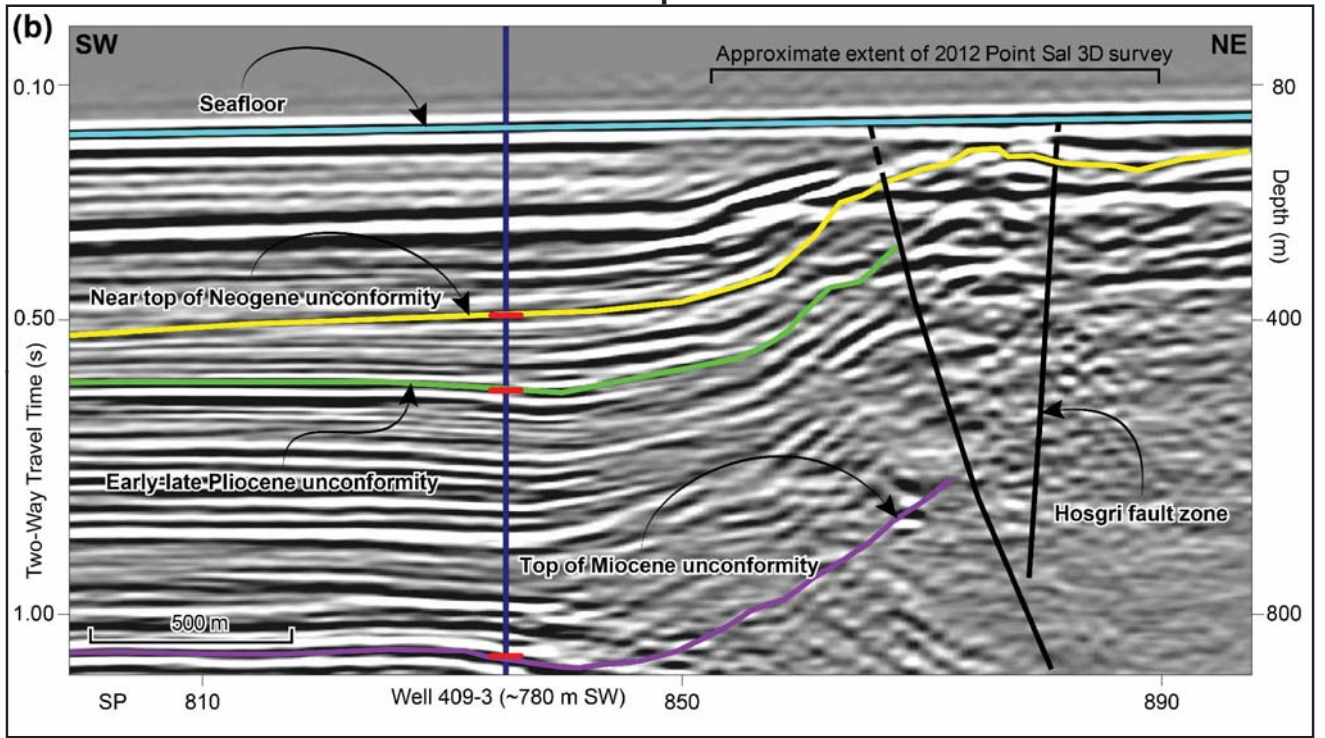
Source: Modified from Willingham et al. (2013, Figure 7).

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd\Figure\_6-20\_GSI\_Line\_1985\_203.mxd; Date: 7/18/2014; User: Bryan Bergkamp; Fugro; Rev.3

### Uninterpreted

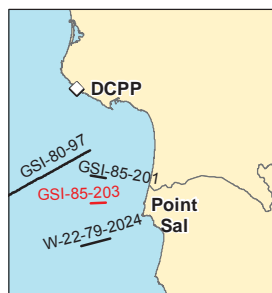


### Interpreted



#### EXPLANATION

- Seafloor
- Hosgri fault
- Stratigraphic well pick
- Near top of Neogene unconformity
- Early-late Pliocene unconformity
- Top of Miocene unconformity



**GSI Line 203 (1985)**

**OFFSHORE LESS STUDIES**

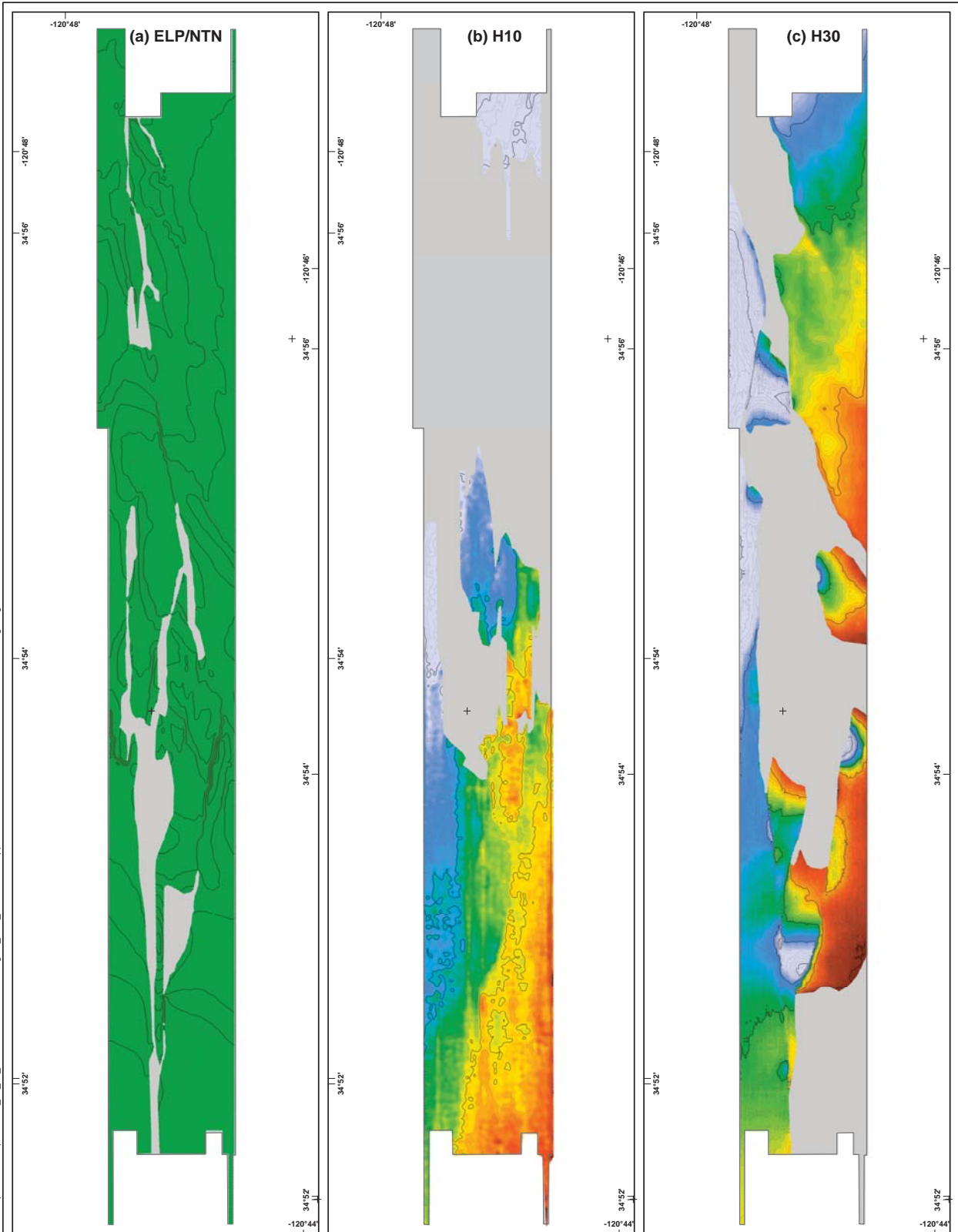


Pacific Gas and Electric Company

Figure **6-20**



File Path: N:\Projects\04\_2013\04\_7922\_4600\_PGESseismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudies\Rev3\mxd\Figure\_6-21\_DistributionMappedHoriz.mxd, Date: 4/28/2014, User: Ranan Dulberg, Fugro, Rev:3

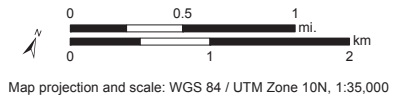


**EXPLANATION**

□ 2012 Point Sal 3D high-resolution survey extent

**Notes:**

1. Maps are rotated 22 degrees to the northeast.
2. Gray areas are where the unconformity or horizon are not mapped.
3. Contour interval for early-late Pliocene / near top of Neogene (ELP/NTN) unconformity is 0.01 seconds for minor contours and 0.05 for major contours.
4. Contour interval for H10 and H30 horizons is 0.001 seconds for minor contours and 0.005 for major contours.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:35,000

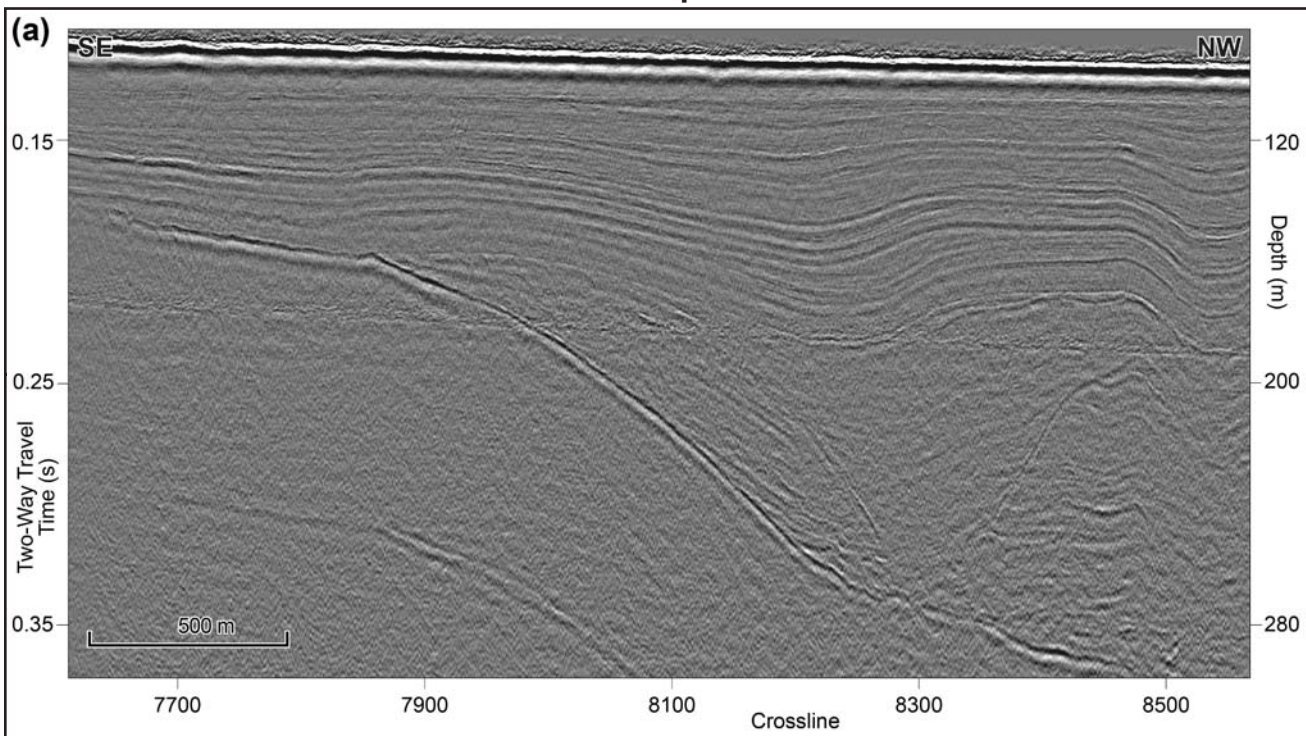
**Distribution of Mapped ELP/NTN Unconformity and H10 and H30 Horizons, Point Sal**

**OFFSHORE LESS STUDIES**

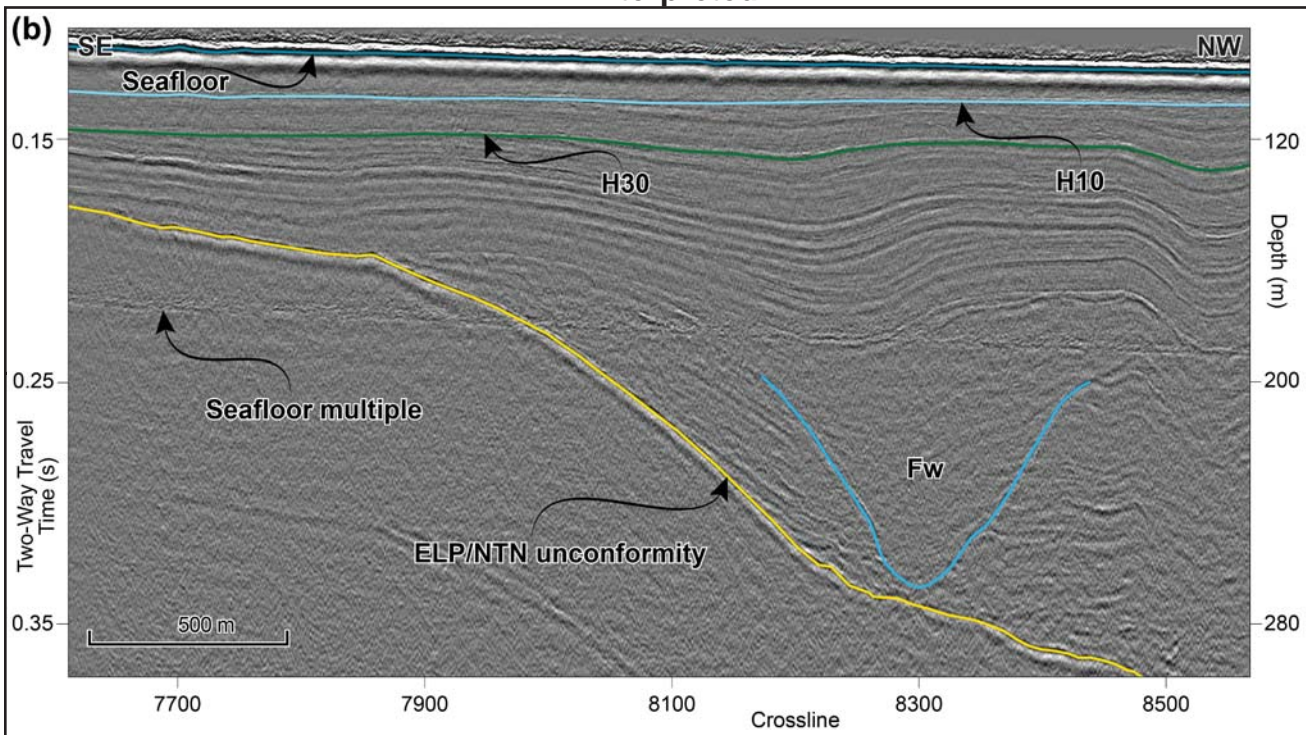
Pacific Gas and Electric Company Figure 6-21

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd\Figure\_6-22\_Line1083.mxd; Date: 6/10/2014; User: Ranon Dulberg; Figuro; Rev.3

### Uninterpreted



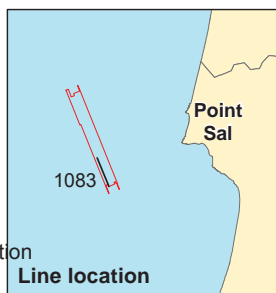
### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/ near top of Neogene unconformity (ELP/NTN)
- Channel F margin
- 2012 Point Sal 3D high-resolution survey extent

Note: See Figure 6-27 for line location.



**Line 1083, West of HFZ  
Showing ELP/NTN Unconformity and  
H10 and H30 Horizons**

**OFFSHORE LESS STUDIES**

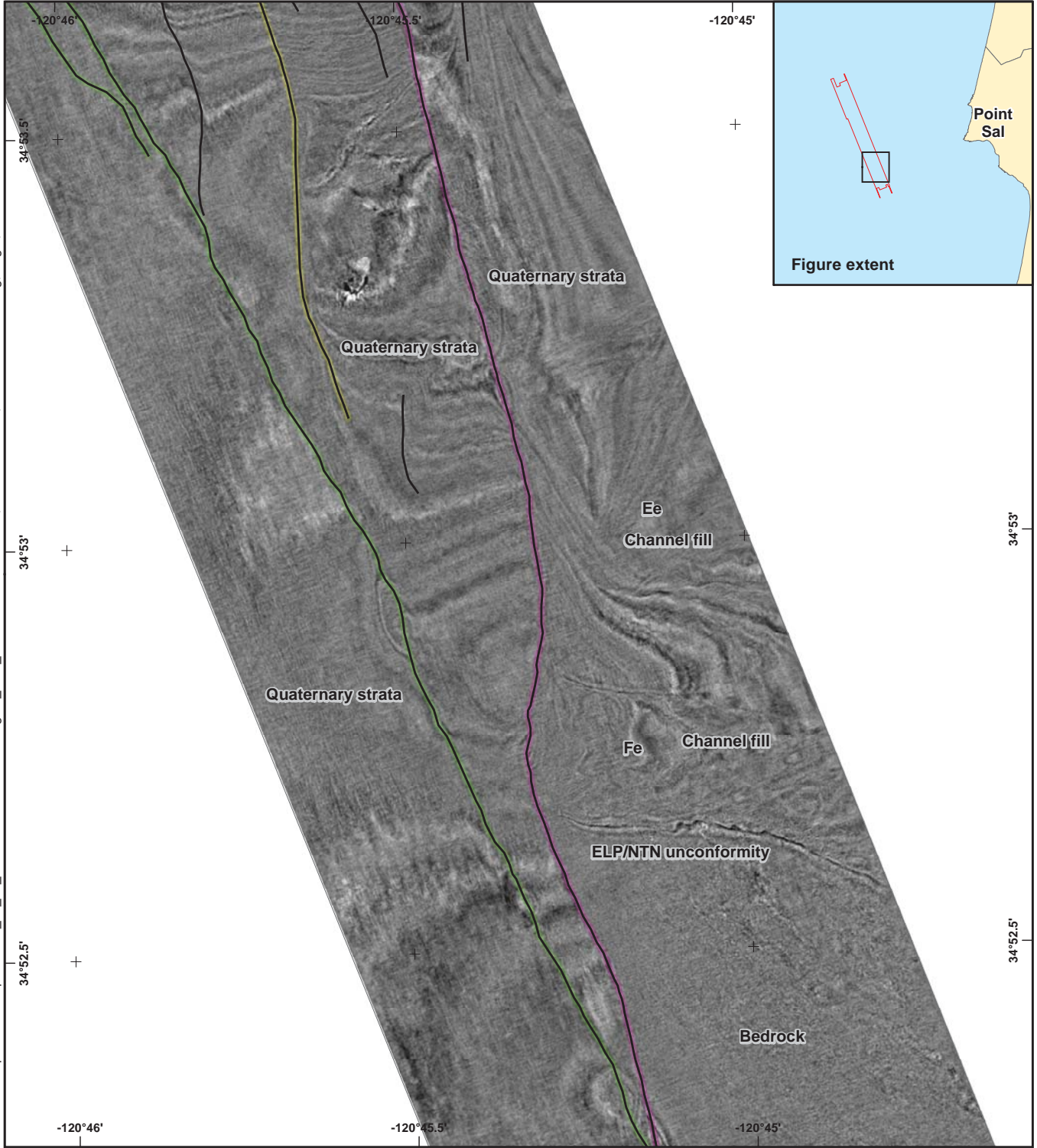


Pacific Gas and Electric Company

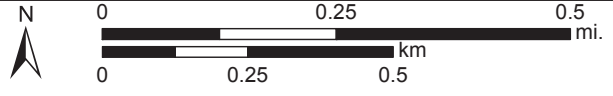
Figure **6-22**



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-23\_TimeSlice150South.mxd; Date: 6/10/2014; User: Ranon Dulberg, Fugro; Rev.3



- EXPLANATION**
- Fault
  - Hosgri central strand
  - Hosgri eastern strand
  - Hosgri western strand
  - 2012 Point Sal 3D high-resolution survey extent

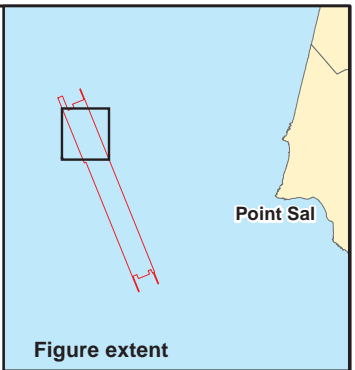
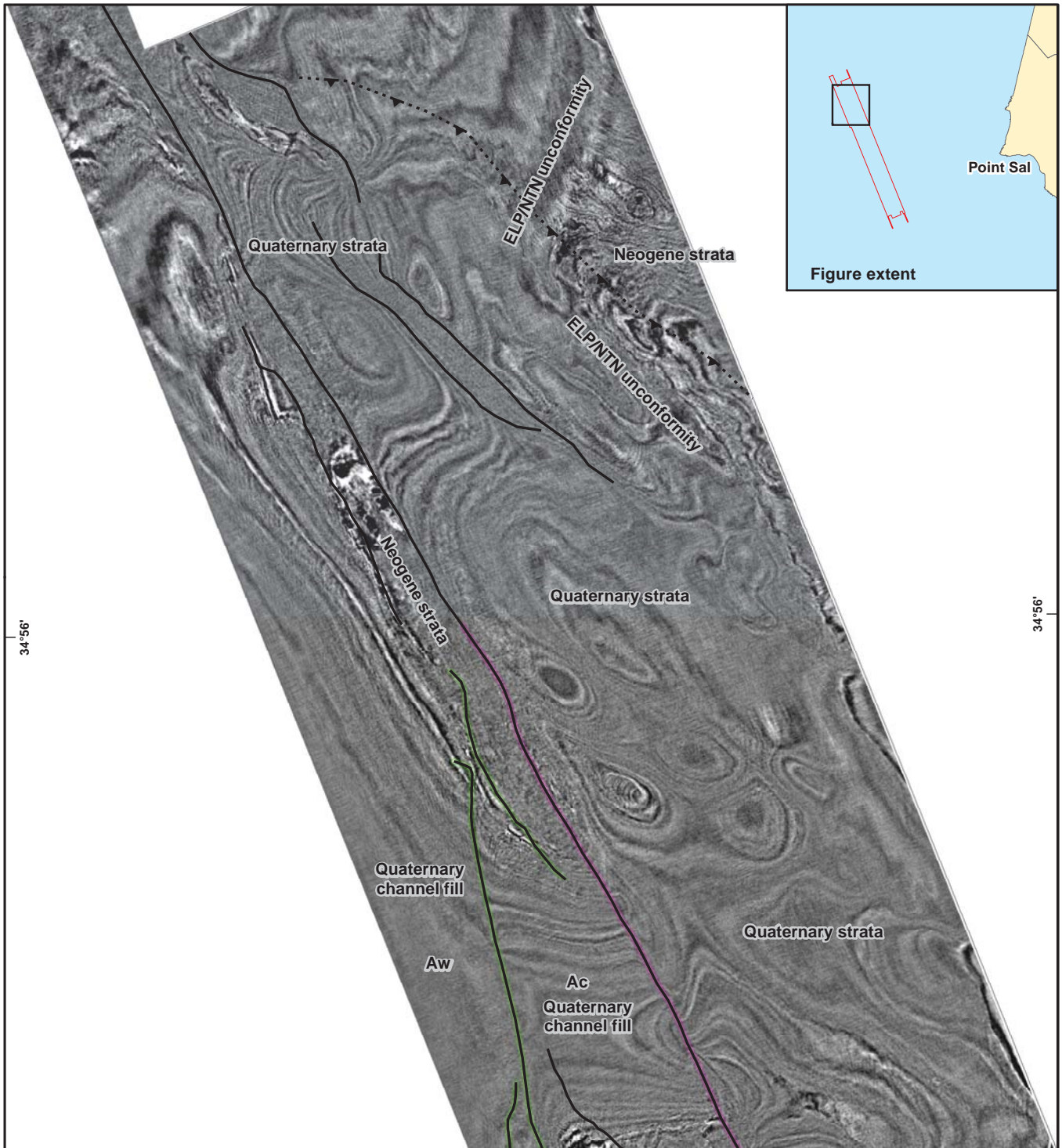


Map projection and scale: WGS 84 / UTM Zone 10N, 1:13,000

**Time Slice at 150 ms in  
Southern Part of Point Sal Study Area**

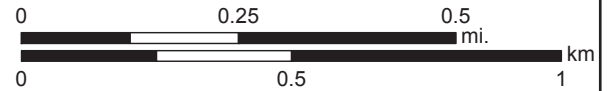
**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company	Figure <b>6-23</b>
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**EXPLANATION**

- Fault
- ▲ Reverse fault concealed
- Hosgri eastern strand
- Hosgri western strand
- 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:14,000

**Time Slice at 180 ms in Northern Part of Point Sal Study Area**

**OFFSHORE LESS STUDIES**

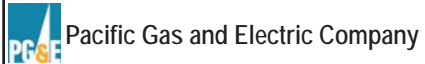
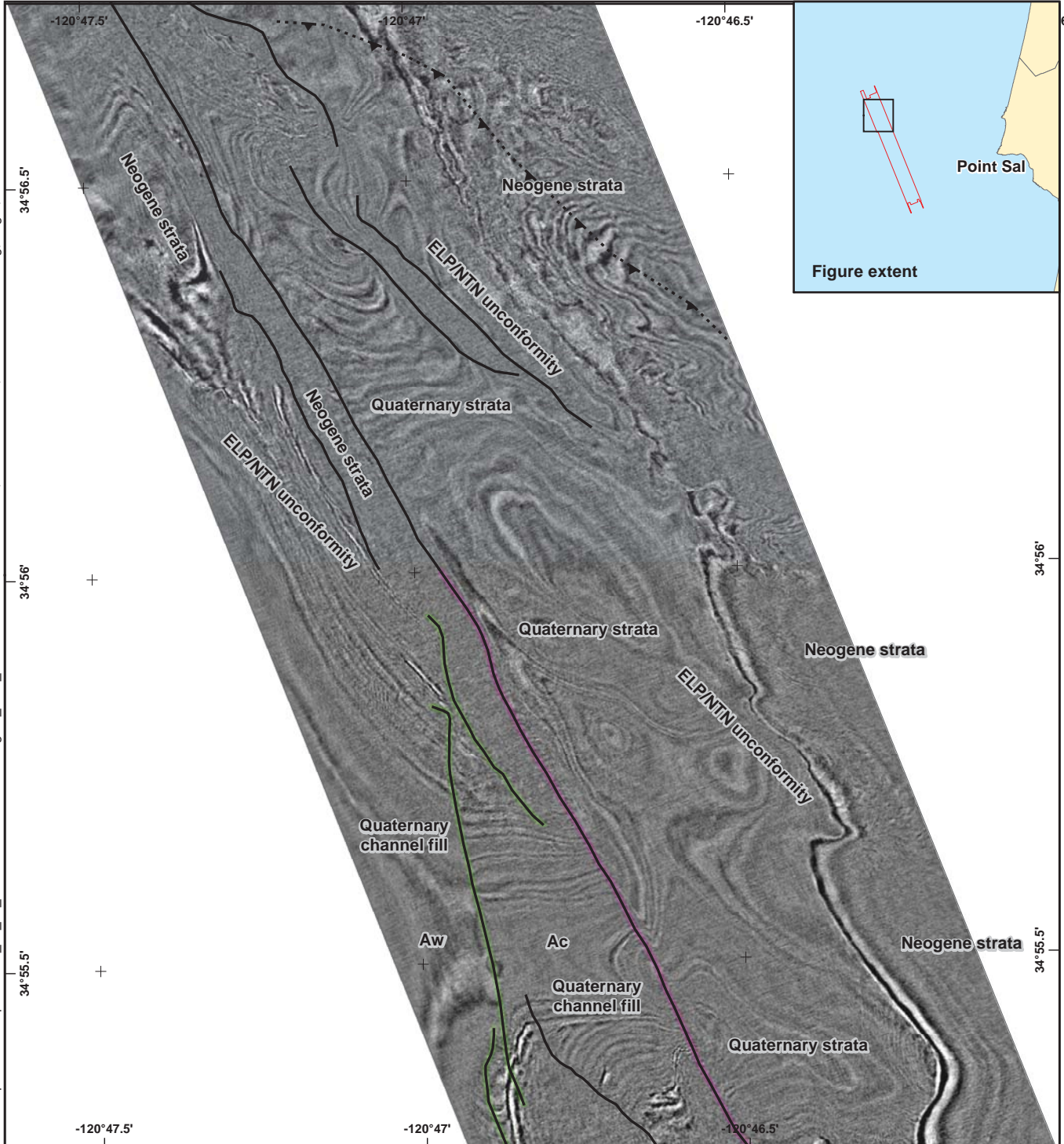


Figure **6-24**

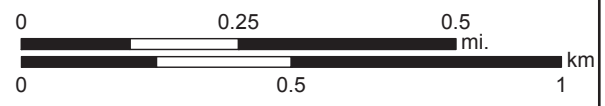


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-25\_TimeSlice213LionsHeadN.mxd; Date: 5/16/2014; User: Ranon Dulberg, Fugro; Rev.3



**EXPLANATION**

- Fault
- ▲ Reverse fault concealed
- Hosgri eastern strand
- Hosgri western strand
- 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:14,000

**Time Slice at 213 ms in Northern Part of Point Sal Study Area**

**OFFSHORE LESS STUDIES**

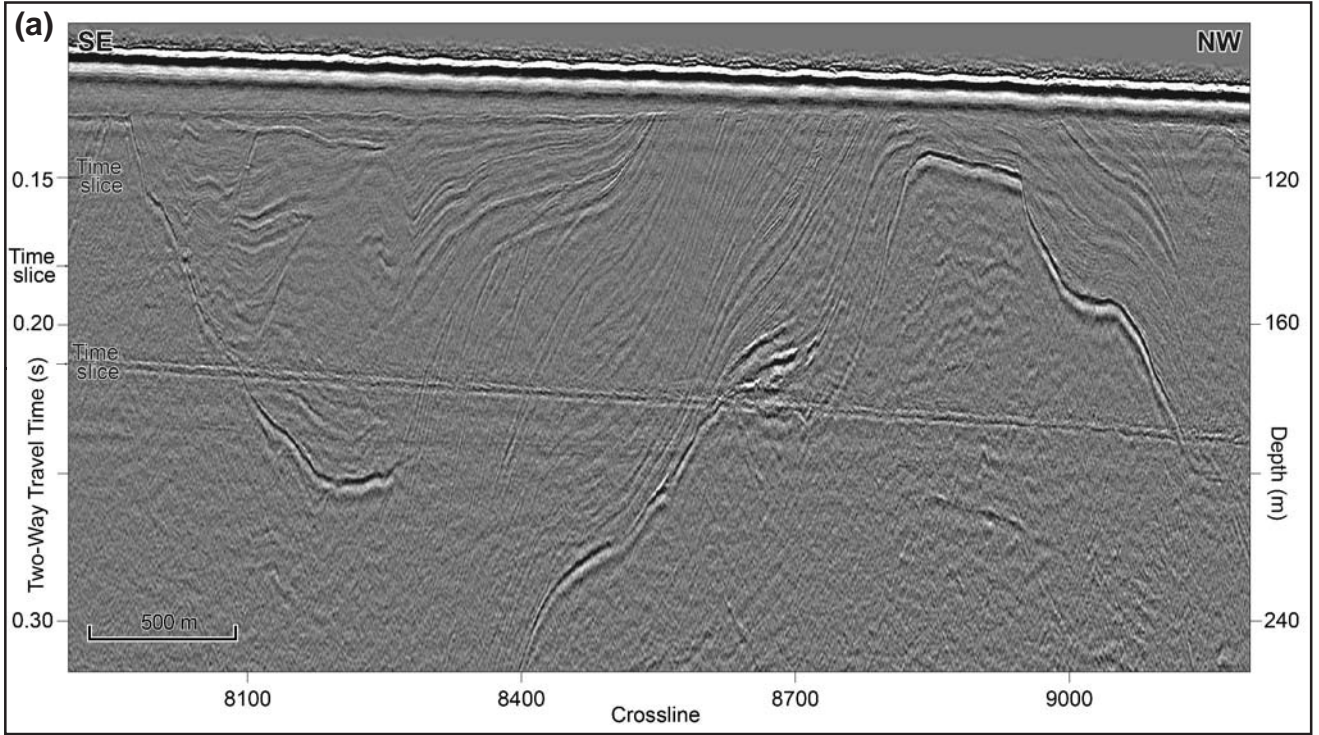


Pacific Gas and Electric Company

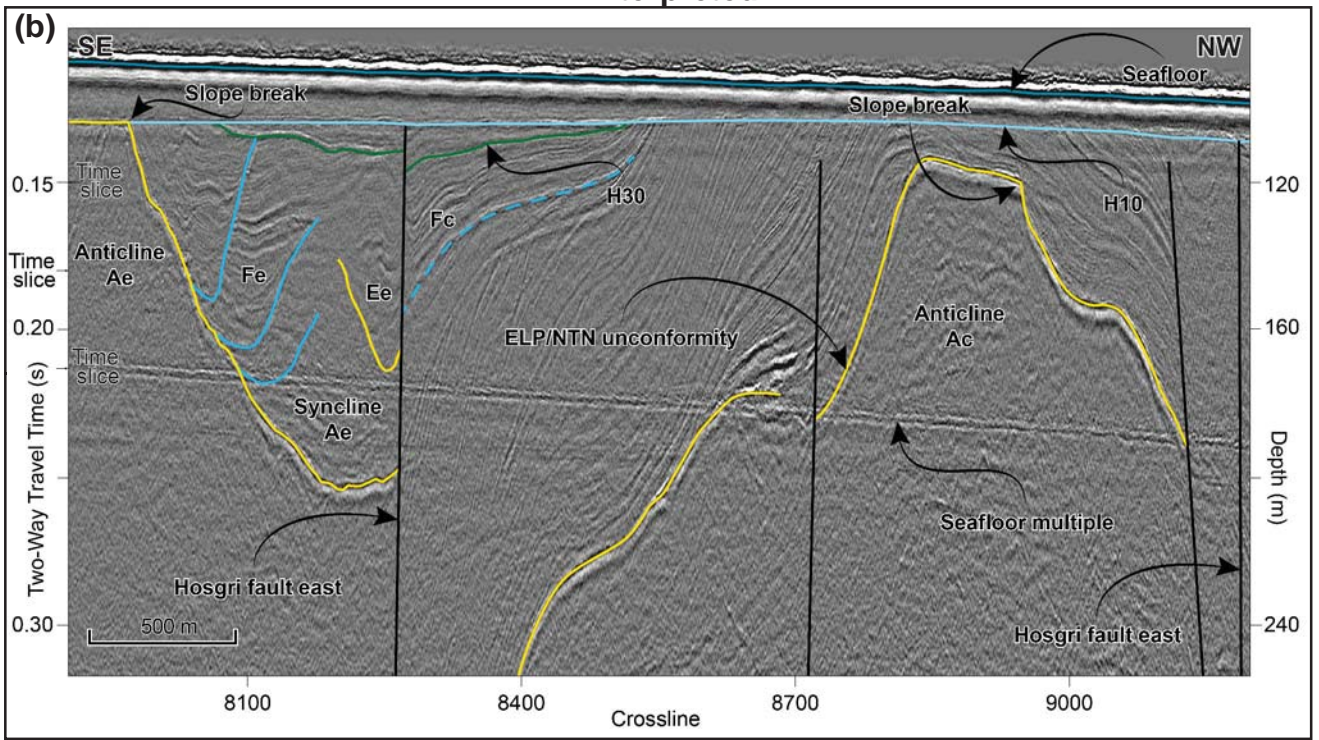
Figure **6-25**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Output\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-26\_Line1240.mxd; Date: 6/10/2014; User: Raron Dulberg, Fugro, Rev. 3

### Uninterpreted



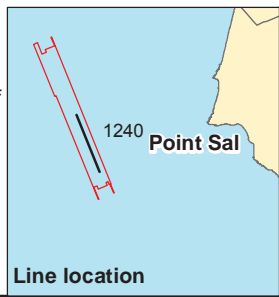
### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/ near top of Neogene unconf. (ELP/NTN)
- Channel E margins
- Channel F margins
- Fault
- Point Sal 3D high-resolution survey extent 2012

Note: See Figure 6-27 for line location.



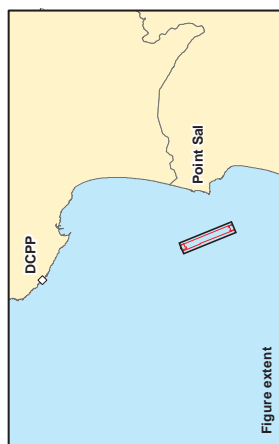
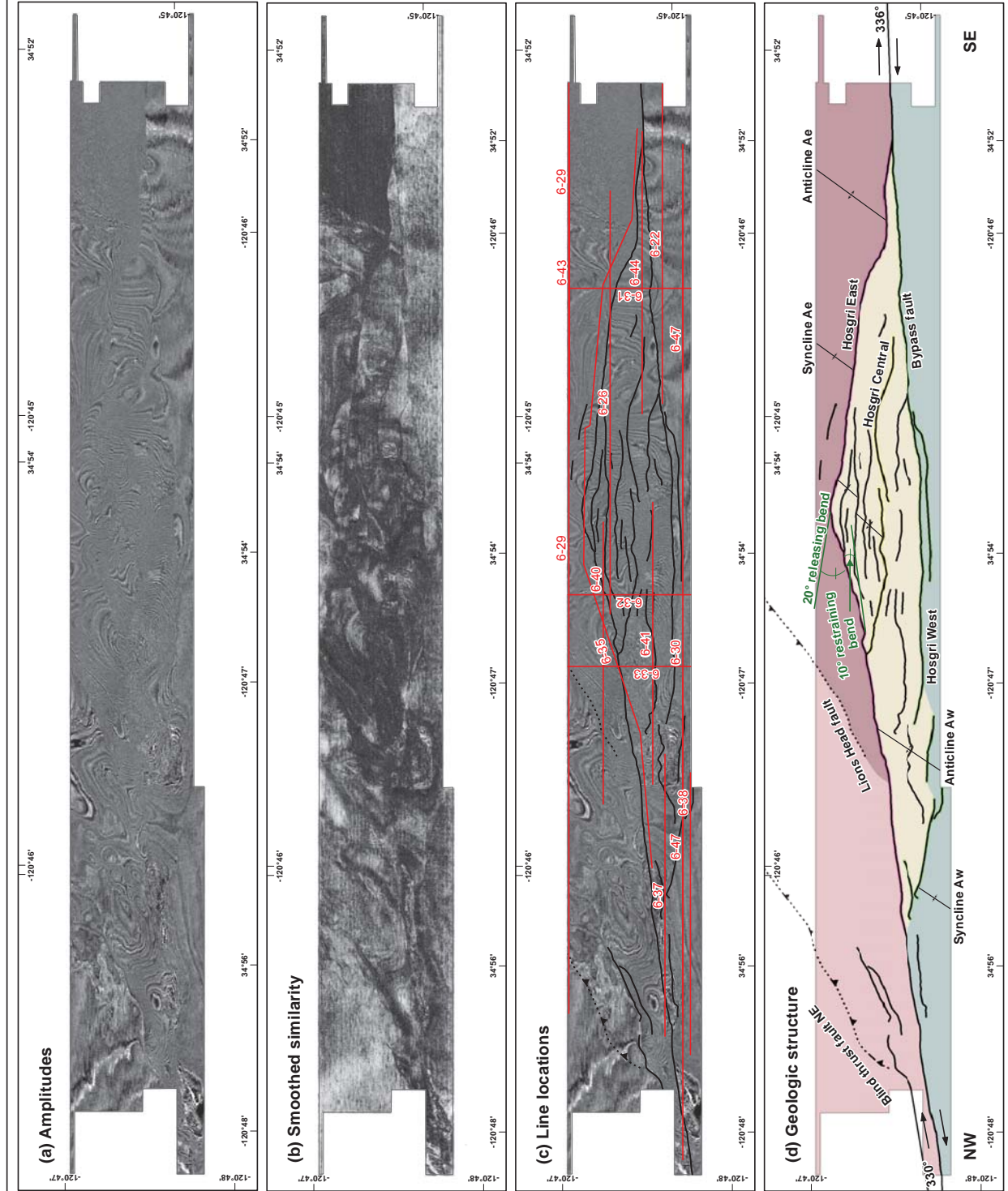
**Line 1240 Showing ELP/NTN and H10 and H30 Unconformities and Channel Deposits**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company

Figure **6-26**

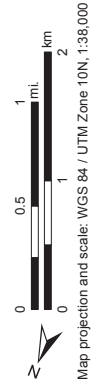




**EXPLANATION**

- ? --- Quaternary fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- ? --- Reverse fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand
- 6-37 Line location and figure number
- Central block
- Eastern block south
- Eastern block north
- Western block (Santa Maria Basin)
- 2012 Point Sal 3D high-resolution survey extent

Note: Maps are rotated 68.02 degrees to the northwest.



**Amplitude and Similarity Time Slices at 160 ms, Point Sal**

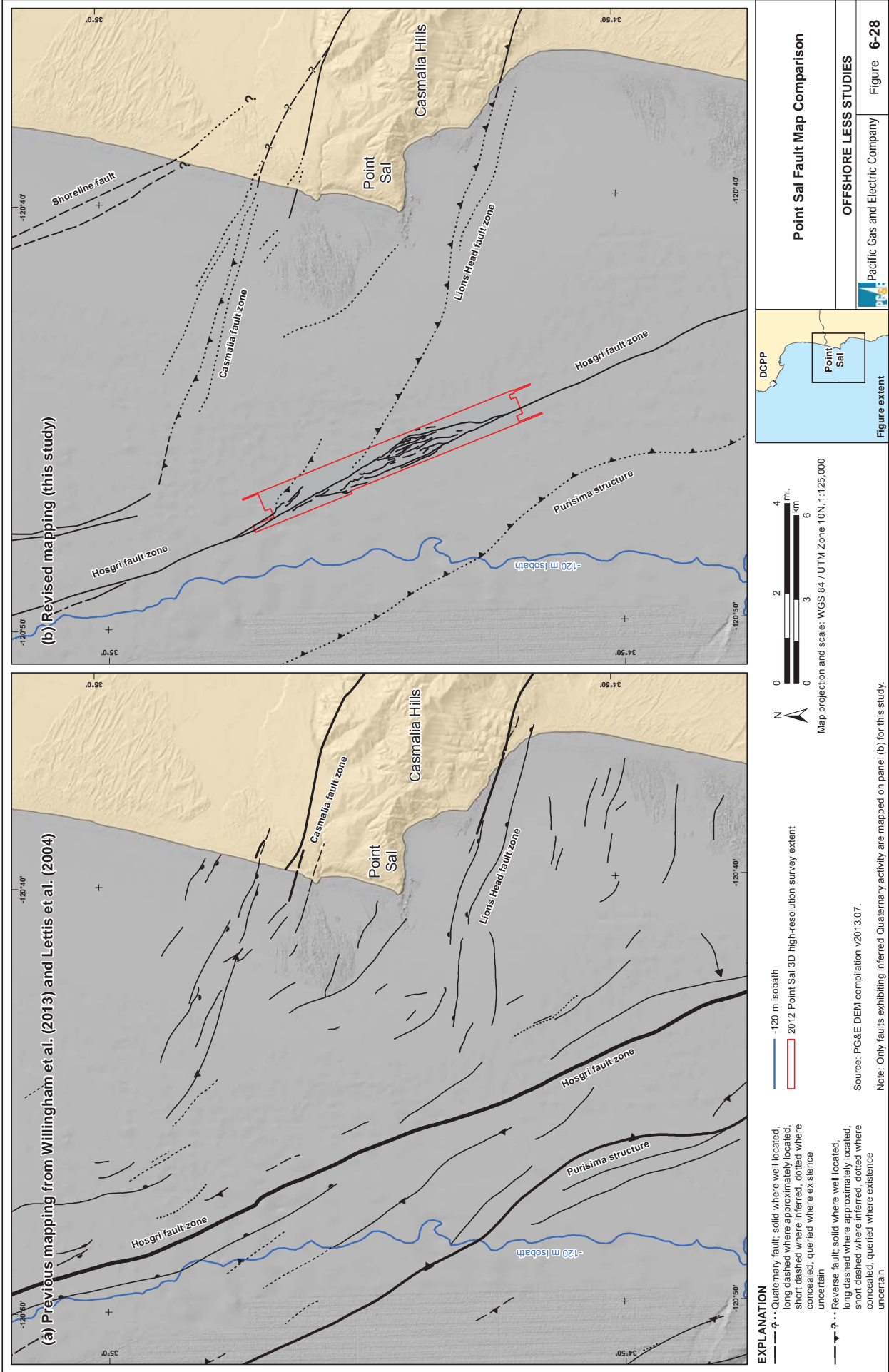
OFFSHORE LESS STUDIES	
Pacific Gas and Electric Company	Figure 6-27

(a) Amplitudes

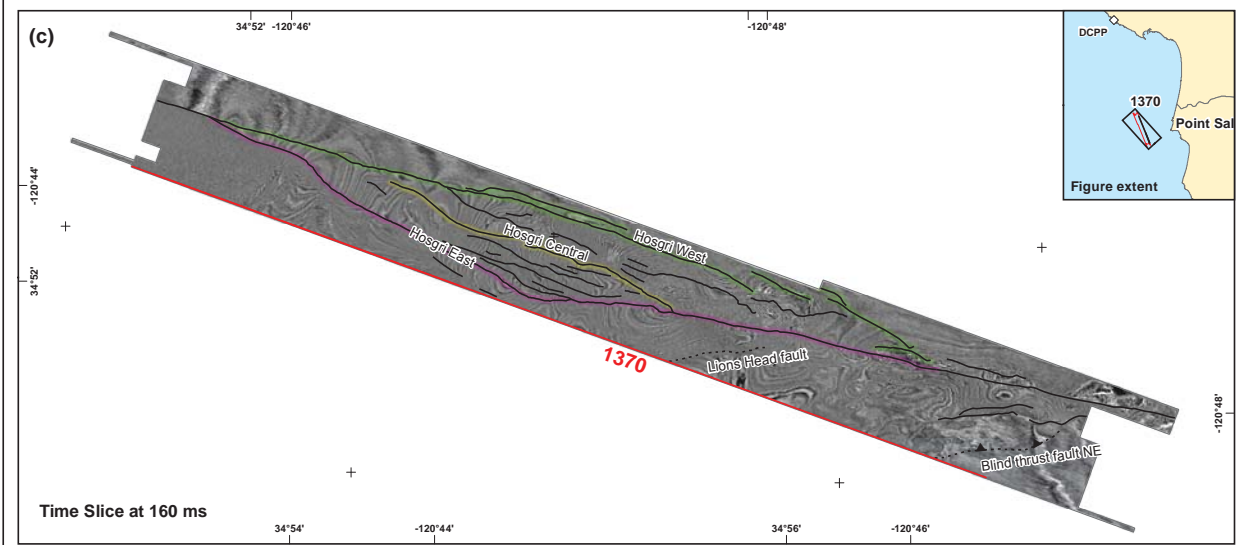
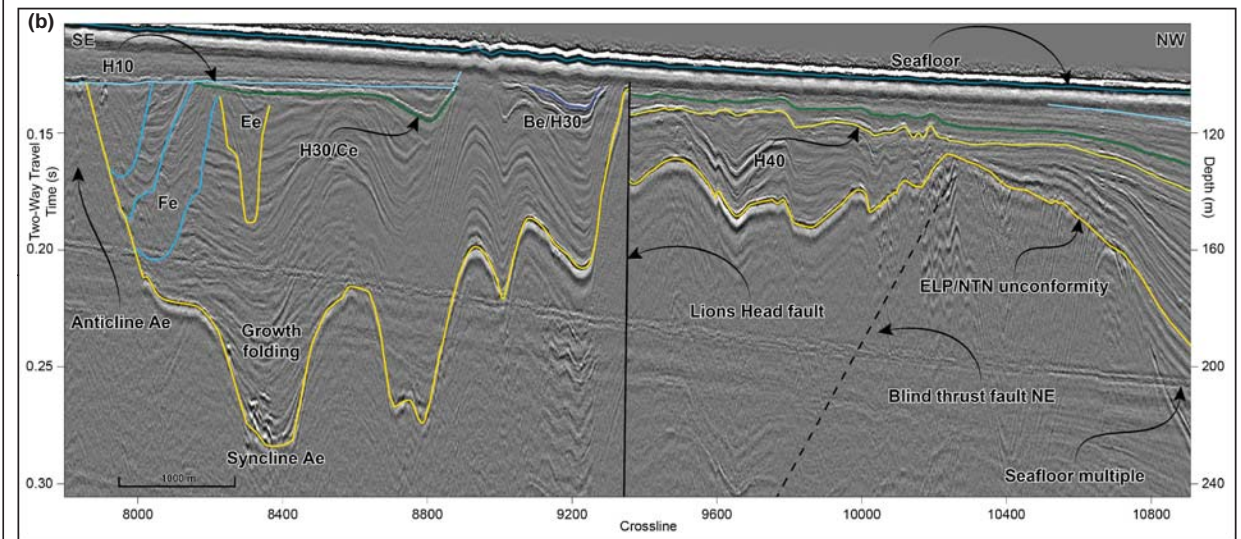
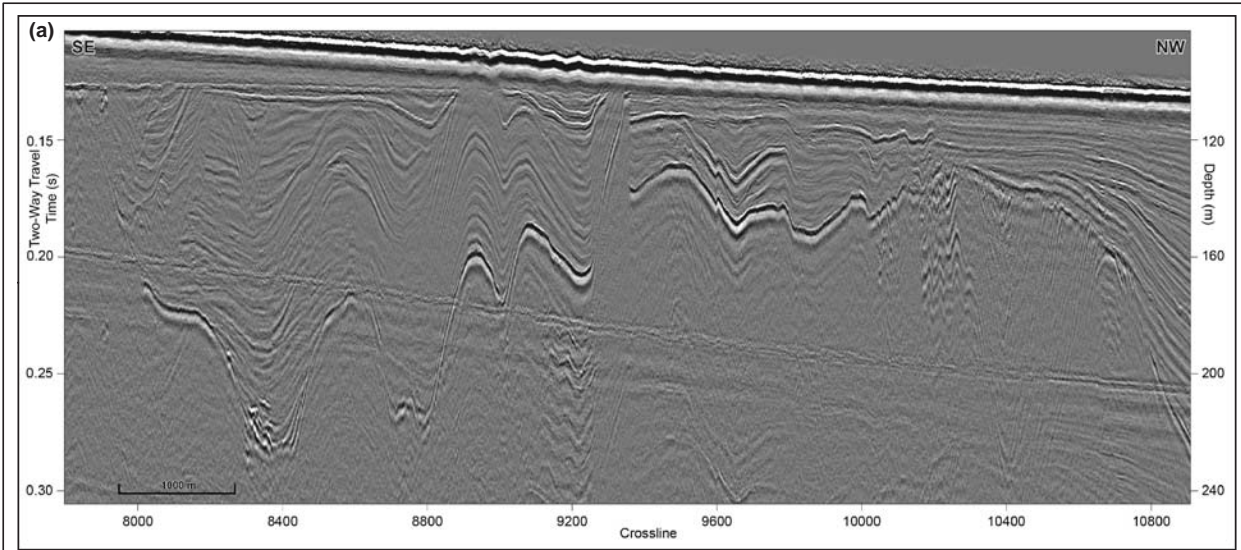
(b) Smoothed similarity

(c) Line locations

(d) Geologic structure



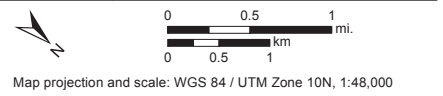




**EXPLANATION**

- |   |                       |   |
|---|-----------------------|---|
| Seafloor  | Channel B margin      | Quaternary fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain |
| H10 unconformity  | Channel C margin      | Reverse fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain    |
| H30 unconformity  | Channel E margin      |   |
| H40 unconformity  | Channel F margin      |   |
| Early-late Pliocene/near top Neogene unconformity (ELP/NTN) | Hosgri central strand |   |
| Inline 1370   | Hosgri eastern strand |   |
|   | Hosgri western strand |   |

Notes:  
 1. Map is rotated 132 degrees to the northeast.  
 2. See Figure 6-27 for line location.

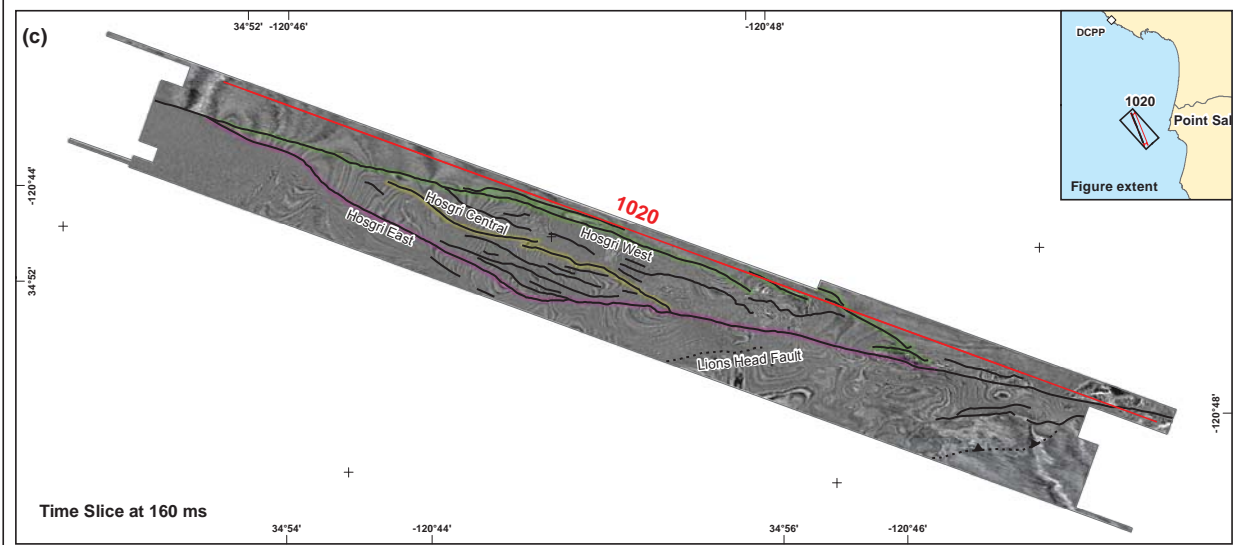
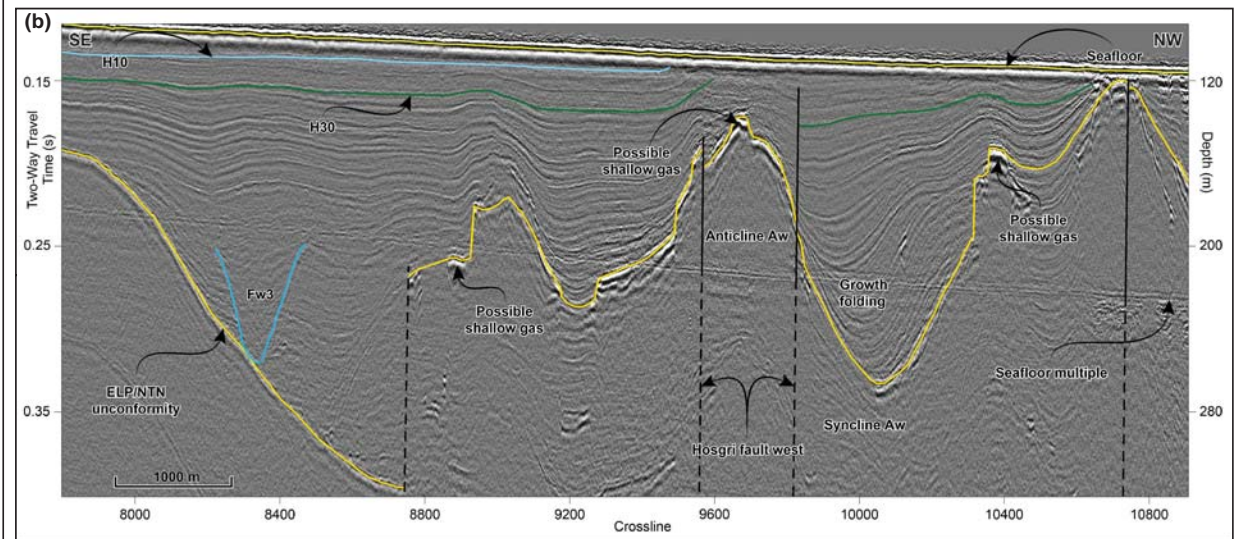
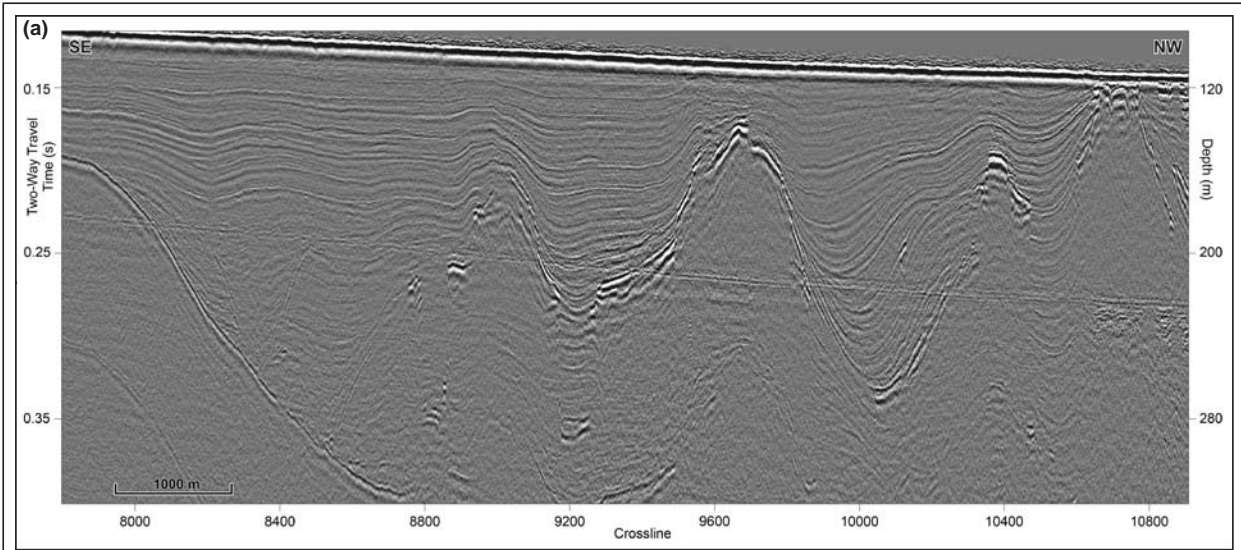


**Inline 1370 East of the HFZ, Uninterpreted and Interpreted Showing ELP/ NTN Unconformity, Point Sal**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company **Figure 6-29**

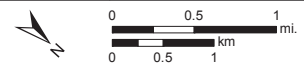
File Path: N:\Projects\04\_2013\04\_7\_922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev2\med\Figure\_6-29\_Line1370.mxd; Date: 7/17/2014; User: Ramon Dullberg, F. Agor, Rev.3



**EXPLANATION**

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/ near top of Neogene unconformity (ELP/NTN)
- Channel F margins
- Inline 1020
- 2012 Point Sal 3D high-resolution survey extent
- · · · · · Quaternary fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- · · · · · Reverse fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand

Notes:  
 1. Map is rotated 132 degrees to the northeast.  
 2. See Figure 6-27 for line location.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:48,000

**Inline 1020 West of the HFZ,  
 Uninterpreted and Interpreted,  
 Showing ELP/NTN Unconformity and Faults**

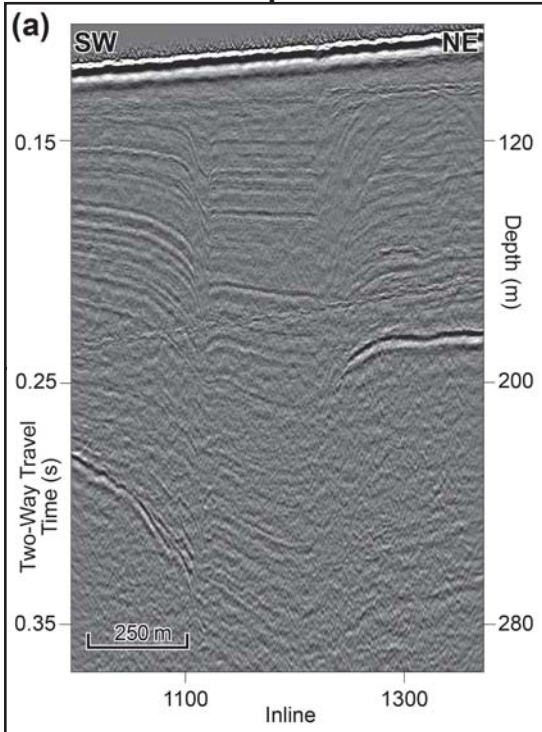
**OFFSHORE LESS STUDIES**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGES\seismic\3D\Interpretation\Output\182014\_04\_20\_LESS\Studies\Rev3\mxd\Figure\_6-30\_Line1020.mxd; Date: 7/17/2014; User: Ramon Dulberg; Fugro; Rev: 3

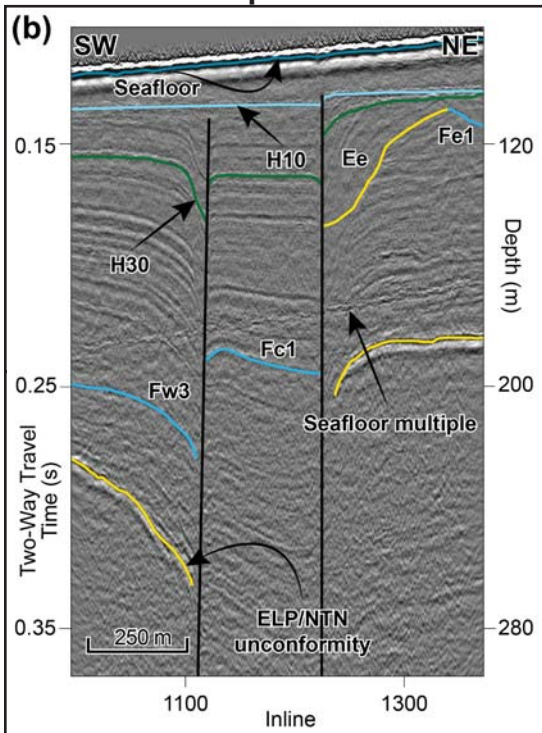


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-31\_Crossline8200.mxd; Date: 6/12/2014; User: Ranan Dulberg, Fugro; Rev: 3

### Uninterpreted

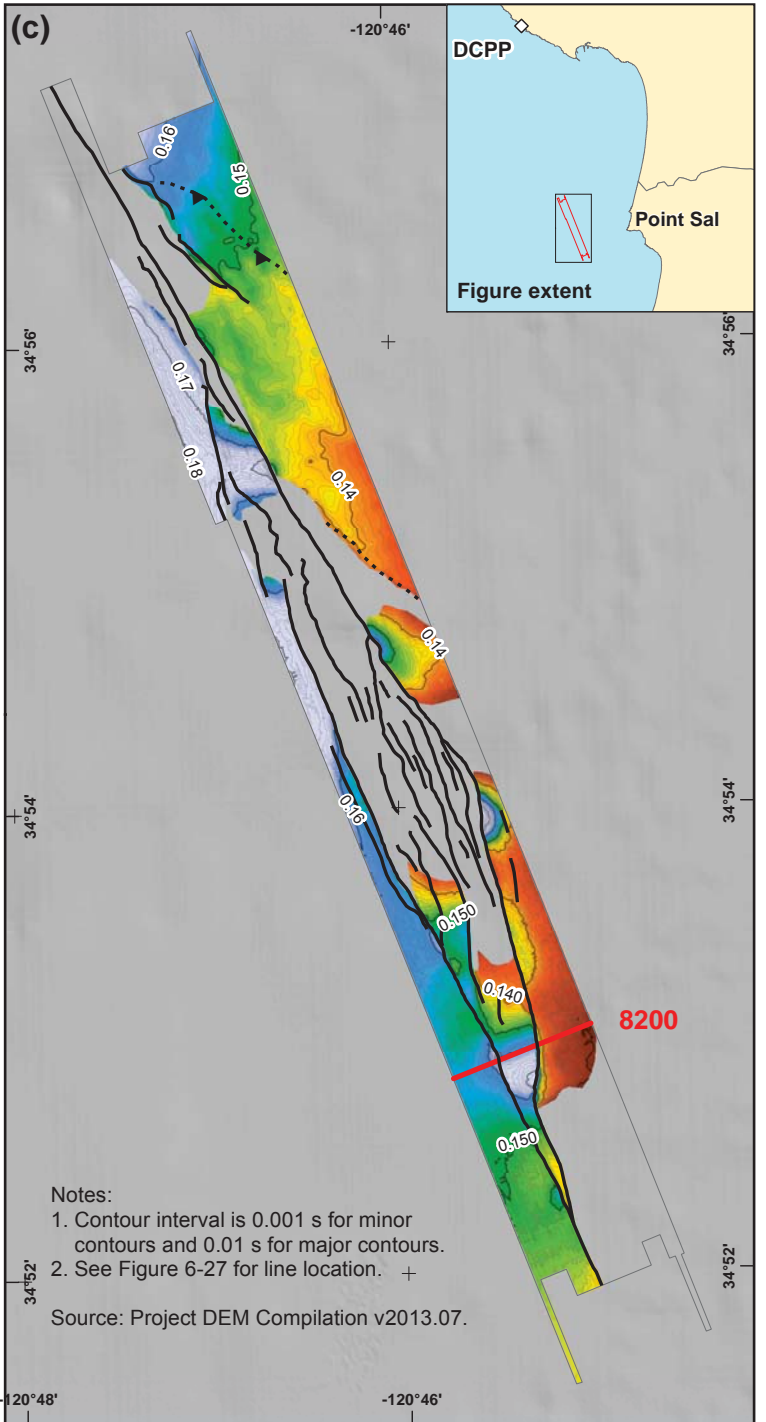


### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/ near top of Neogene (ELP/NTN) unconformity
- Channel F margin
- Fault, dashed where inferred
- - - Reverse fault, dashed where inferred
- Crossline 8200
- 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:60,000

## Crossline 8200, Uninterpreted and Interpreted, with H30 Surface, Point Sal

### OFFSHORE LESS STUDIES

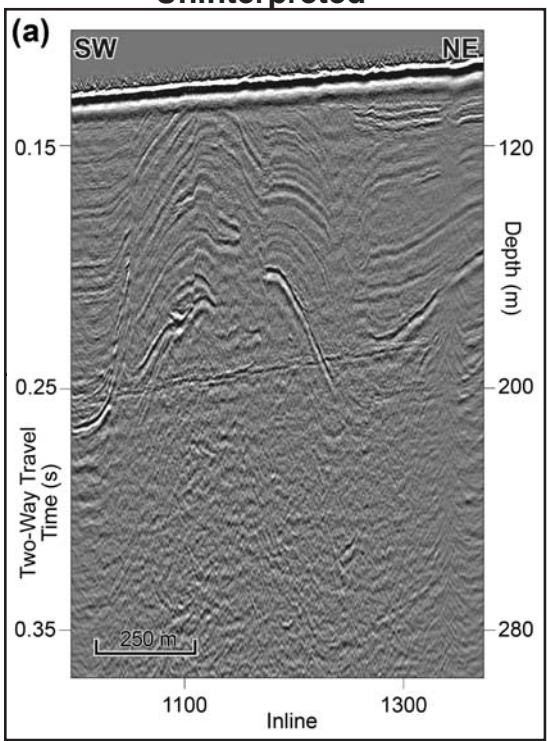


Pacific Gas and Electric Company

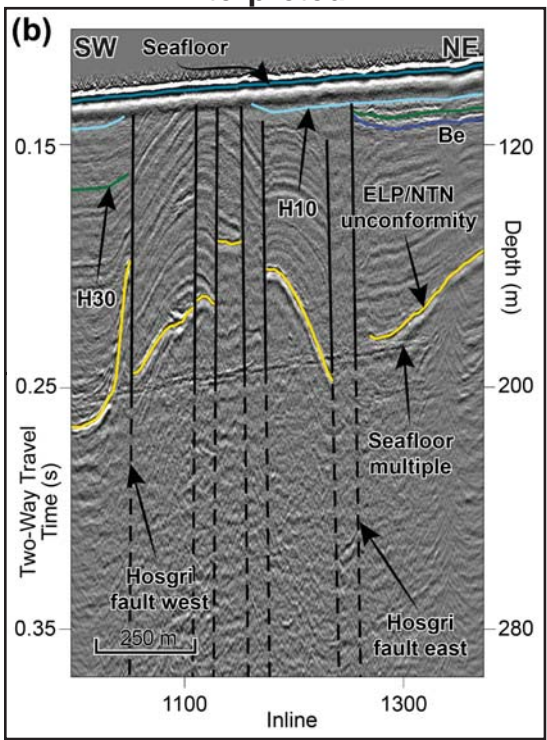
Figure **6-31**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-32\_Crossline9140.mxd; Date: 5/16/2014; User: Ramon Dulberg, Fugro; Rev: 3

### Uninterpreted

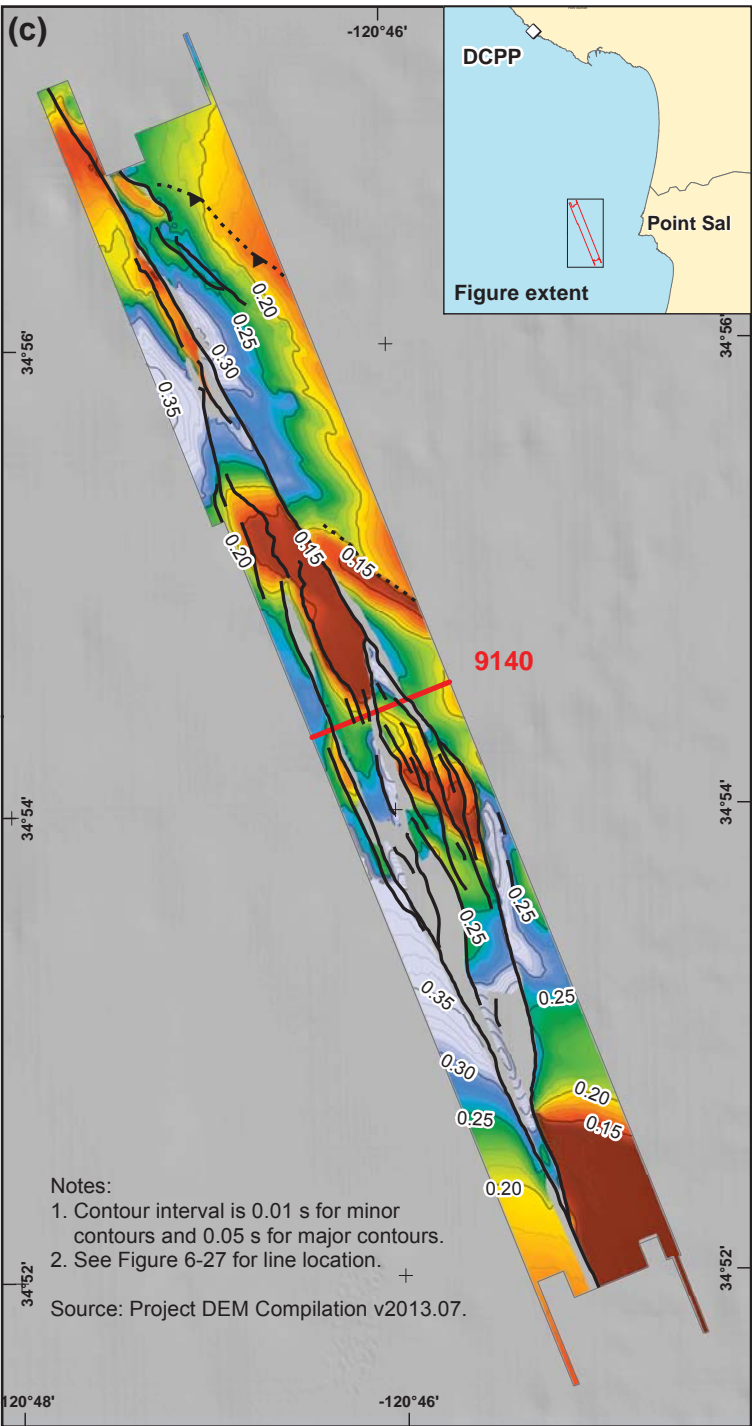


### Interpreted

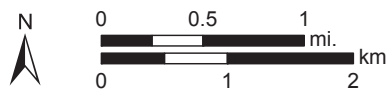


#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/ near top of Neogene (ELP/NTN) unconformity
- Channel B margin
- - - Fault, dashed where inferred
- ... ▾ Reverse fault, dashed where inferred
- Crossline 9140
- 2012 Point Sal 3D high-resolution survey extent



Notes:  
 1. Contour interval is 0.01 s for minor contours and 0.05 s for major contours.  
 2. See Figure 6-27 for line location.  
 Source: Project DEM Compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:60,000

## Crossline 9140, Uninterpreted and Interpreted, with ELP/NTN Unconformity Surface, Point Sal

### OFFSHORE LESS STUDIES

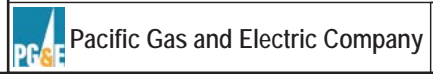
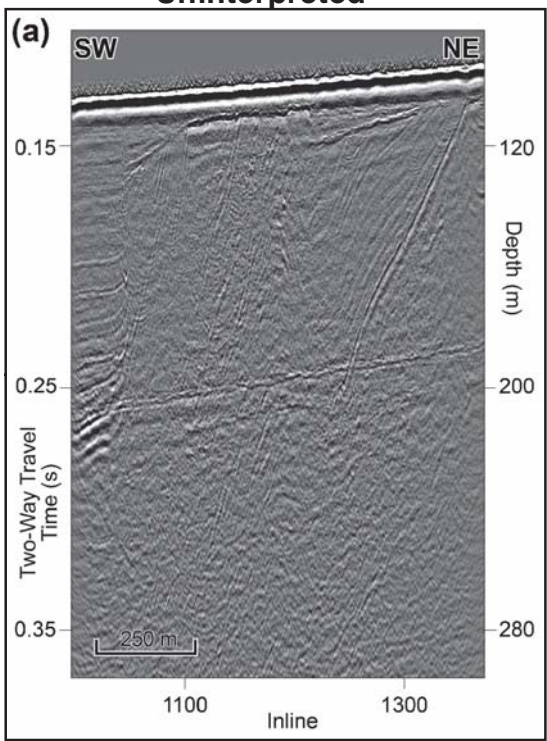


Figure 6-32

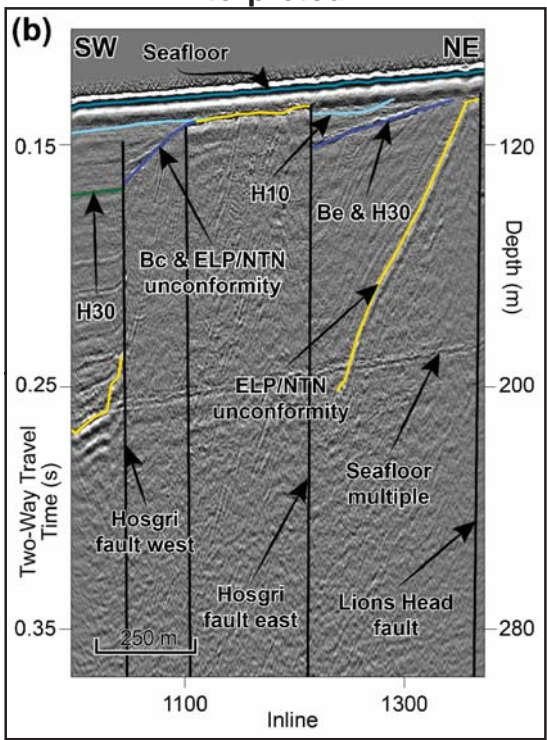


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-33\_Crossline9360.mxd; Date: 7/17/2014; User: Ranon Dulberg, Fugro; Rev: 3

### Uninterpreted

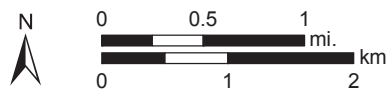
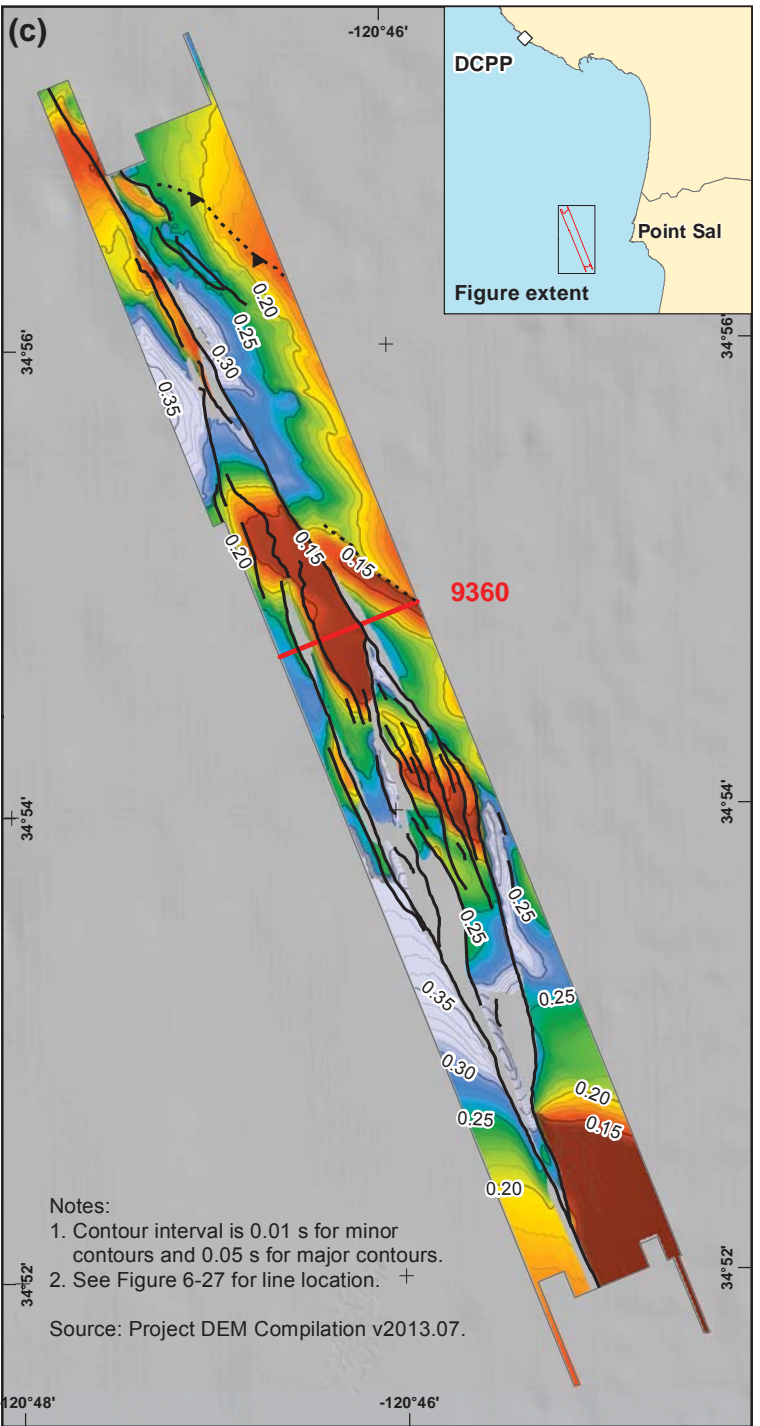


### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene/ near top of Neogene (ELP/NTN) unconformity
- Channel B margin
- - - Fault, dashed where inferred
- ▲ Reverse fault, dashed where inferred
- Crossline 9360
- 2012 Point Sal 3D high-resolution survey extent

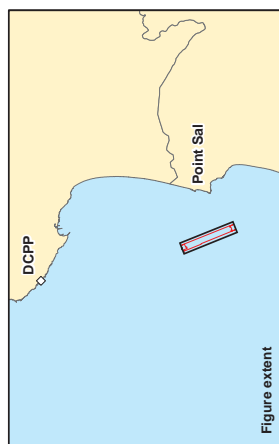
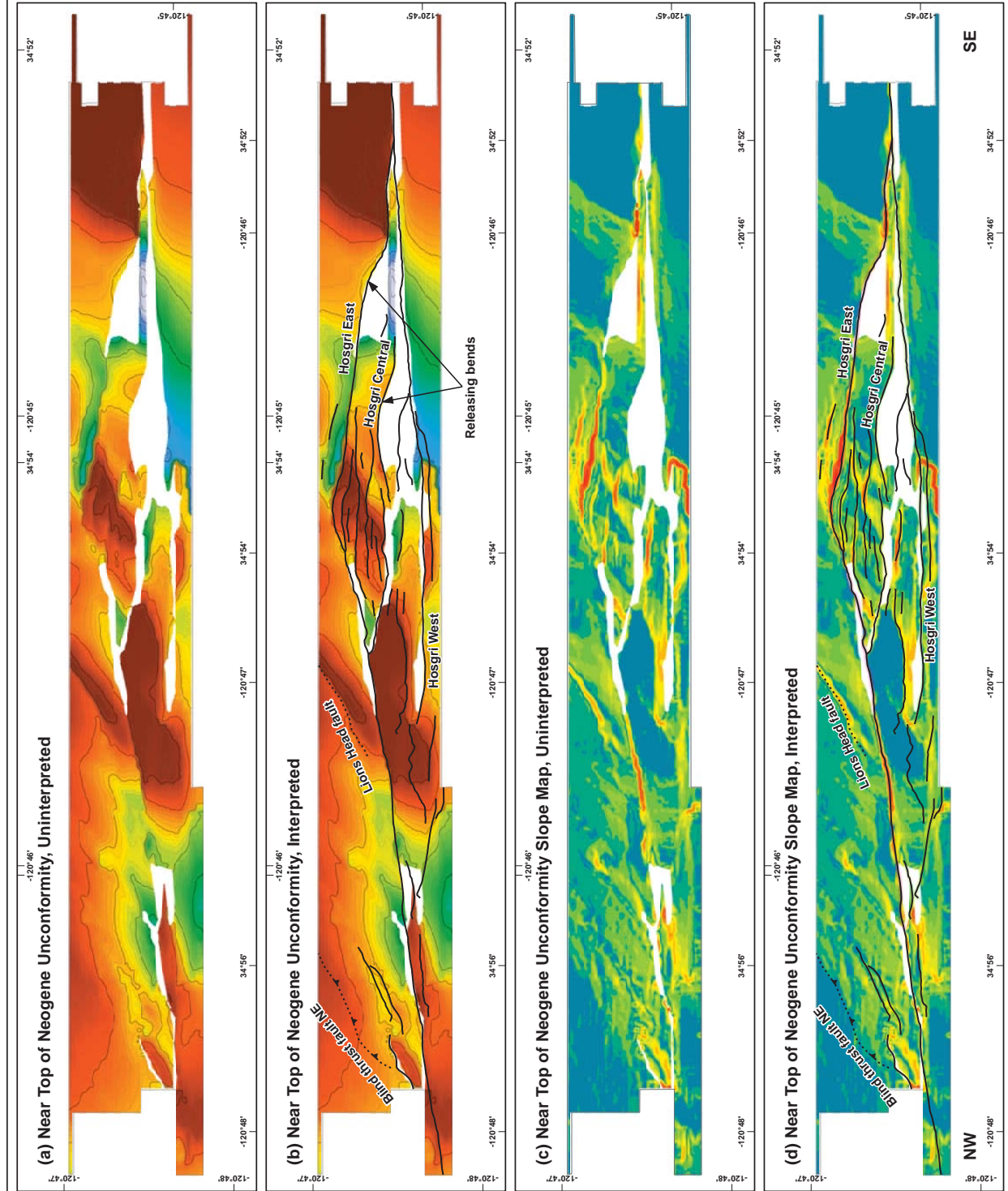


Map projection and scale: WGS 84 / UTM Zone 10N, 1:60,000

## Crossline 9360, Uninterpreted and Interpreted, with ELP/NTN Unconformity Surface, Point Sal

### OFFSHORE LESS STUDIES

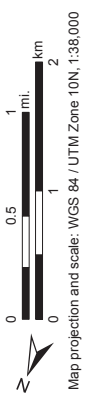
Pacific Gas and Electric Company Figure **6-33**



**EXPLANATION**

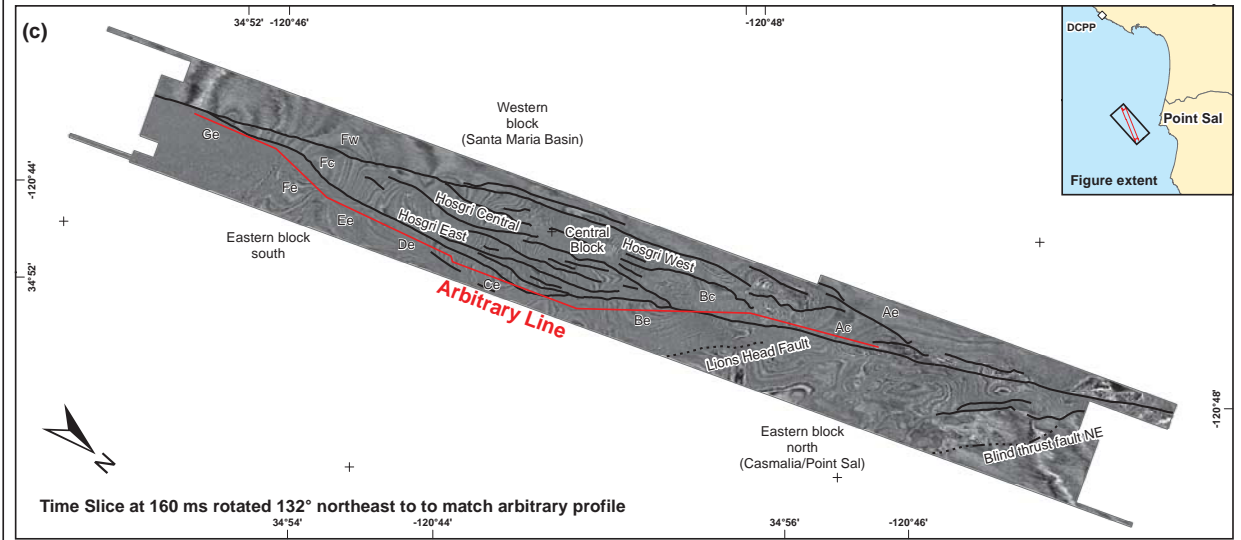
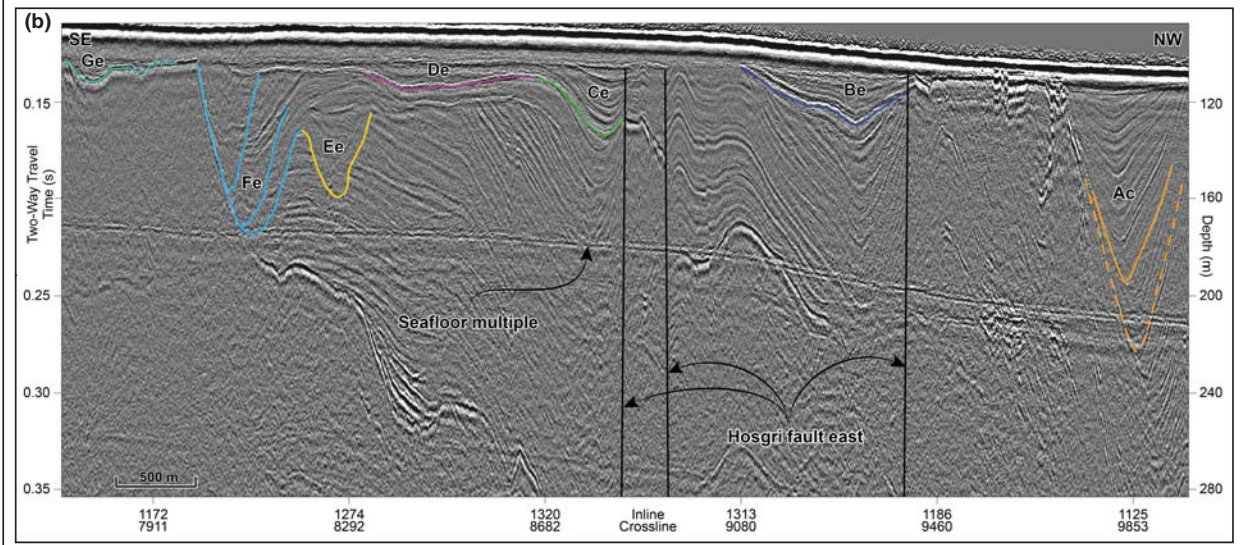
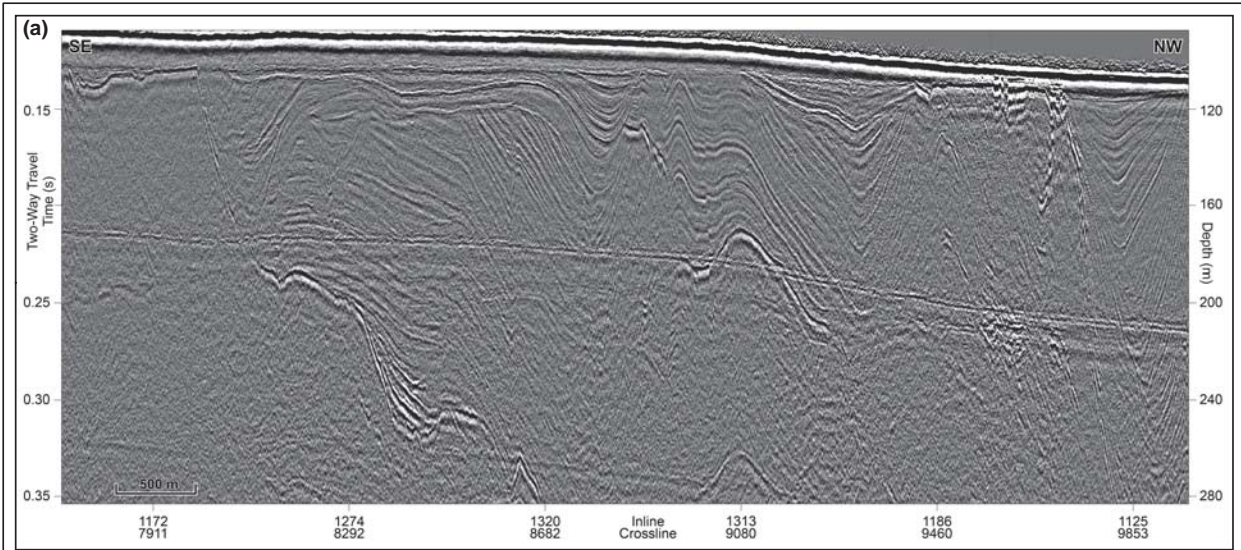
- Fault, dashed where inferred
  - · - · - Reverse fault, dashed where inferred
  - ▭ 2012 Point Sal 3D high-resolution survey extent
- | Two-way Travel Time (seconds) | Neogene Slope (degrees) |
|-------------------------------|-------------------------|
| 0.12 (s)                      | 0-5                     |
|                               | 5-10                    |
|                               | 10-15                   |
|                               | 15-20                   |
|                               | 20-25                   |
|                               | 25-30                   |
| 0.56 (s)                      | 30-40                   |
|                               | 40-50                   |
|                               | 50-60                   |
|                               | 60-70                   |
|                               | 70-80                   |
|                               | 80-90                   |

Notes:  
 1. Contour interval is 0.01 ms for minor contours and 0.05 ms for major contours.  
 2. Maps are rotated 66.02 degrees to the northwest.



**Near Top of Neogene Unconformity Contoured in Time and Slope Map, Uninterpreted and Interpreted, Point Sal**





**EXPLANATION**

- Seafloor
- Channel A margin
- Channel B margin
- Channel C margin
- Channel D margin
- Channel E margin
- Channel F margin
- Channel G margin
- Fault, dashed where inferred
- ▲ Reverse fault, dashed where inferred
- Arbitrary Line
- 2012 Point Sal 3D high-resolution survey extent

Notes:  
 1. Map is rotated 132 degrees to the northeast to best match arbitrary profile.  
 2. See Figure 6-27 for line location.

Map projection and scale: WGS 84 / UTM Zone 10N, 1:48,000

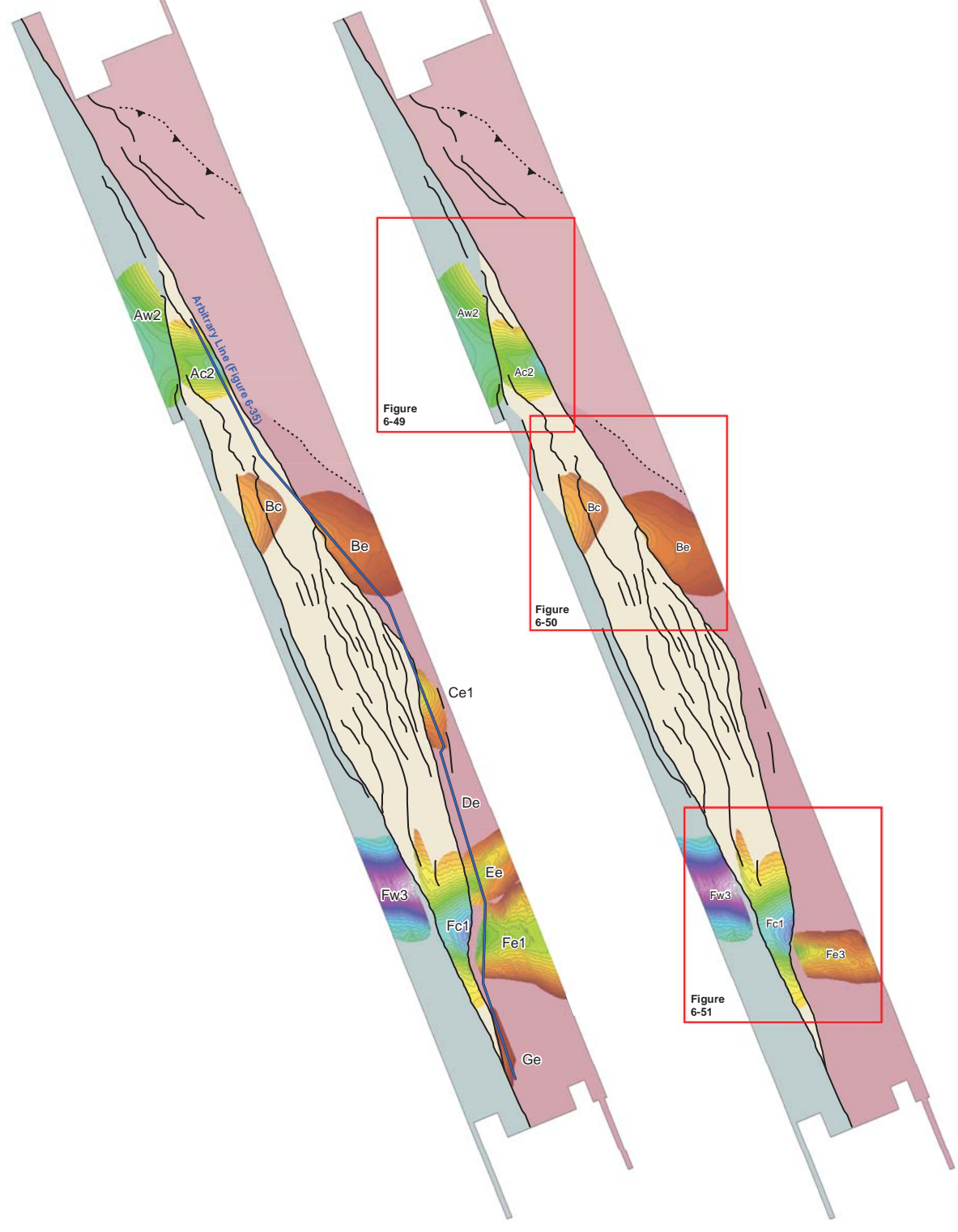
**Arbitrary Amplitude Section Showing Channels A–G, Uninterpreted and Interpreted, with Labeled Channels**

OFFSHORE LESS STUDIES

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PCESeismicData\Interpretation\Output\2014\_04\_20\_LESSStudiesRev3.mxd\Figure\_6-35\_ArbitraryLine.mxd; Date: 7/16/2014; User: R. Dame, Fugro, Rev3

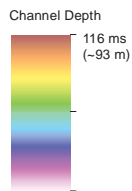
(a) Paleochannels

(b) Paleochannels used as piercing points

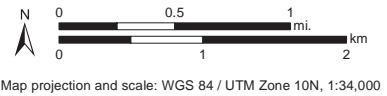
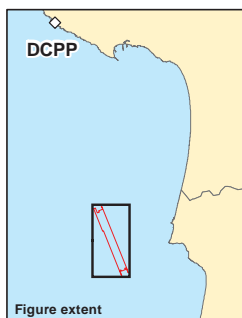


**EXPLANATION**

- Fault, dashed where inferred
- ▲ Reverse fault, dashed where inferred
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand
- Arbitrary line
- Western block
- Central block
- Eastern block north (Point Sal block)
- Eastern block south
- 2012 Point Sal 3D high-resolution survey extent



Source: Project DEM compilation v2013.01.



**Gridded (Time) Paleochannels with Piercing Point Figure Locations**

**OFFSHORE LESS STUDIES**

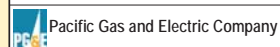


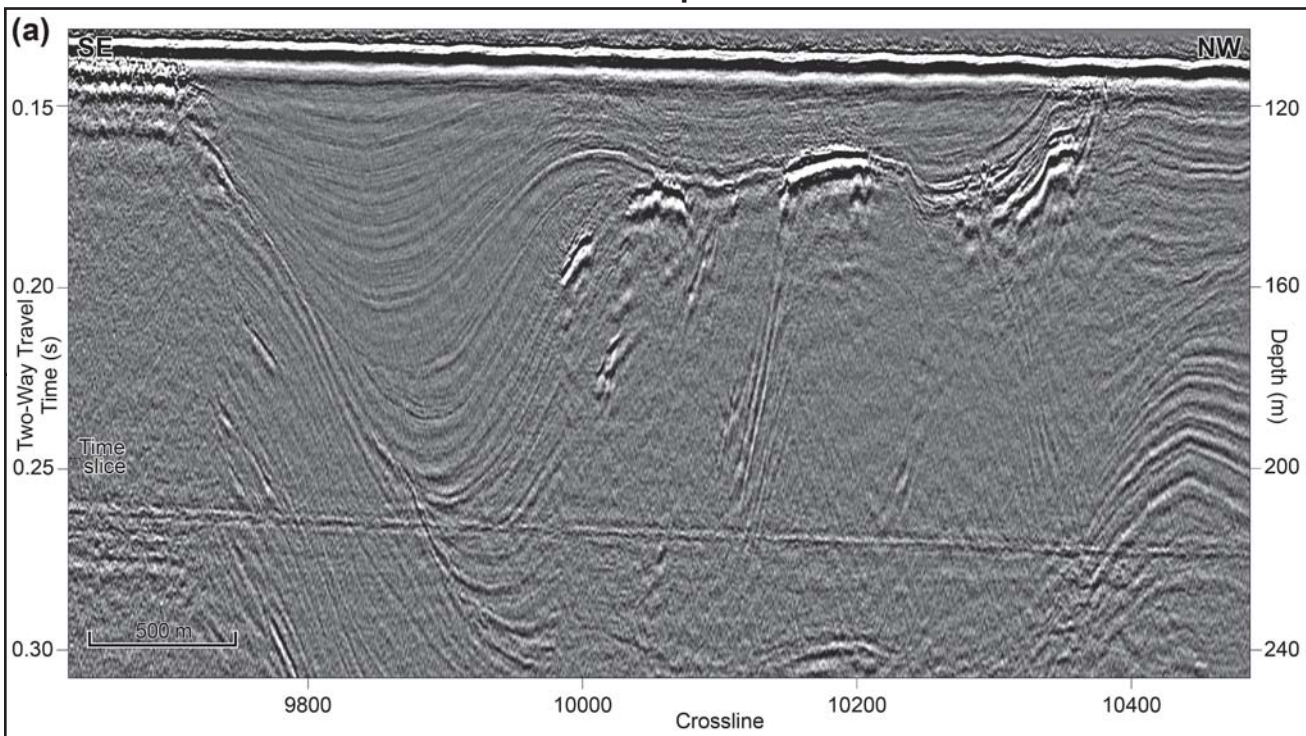
Figure 6-36

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESseismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-36\_GriddedPChan.mxd; Date: 7/17/2014; User: Ranon Dulberg; Fugro; Rev. 3

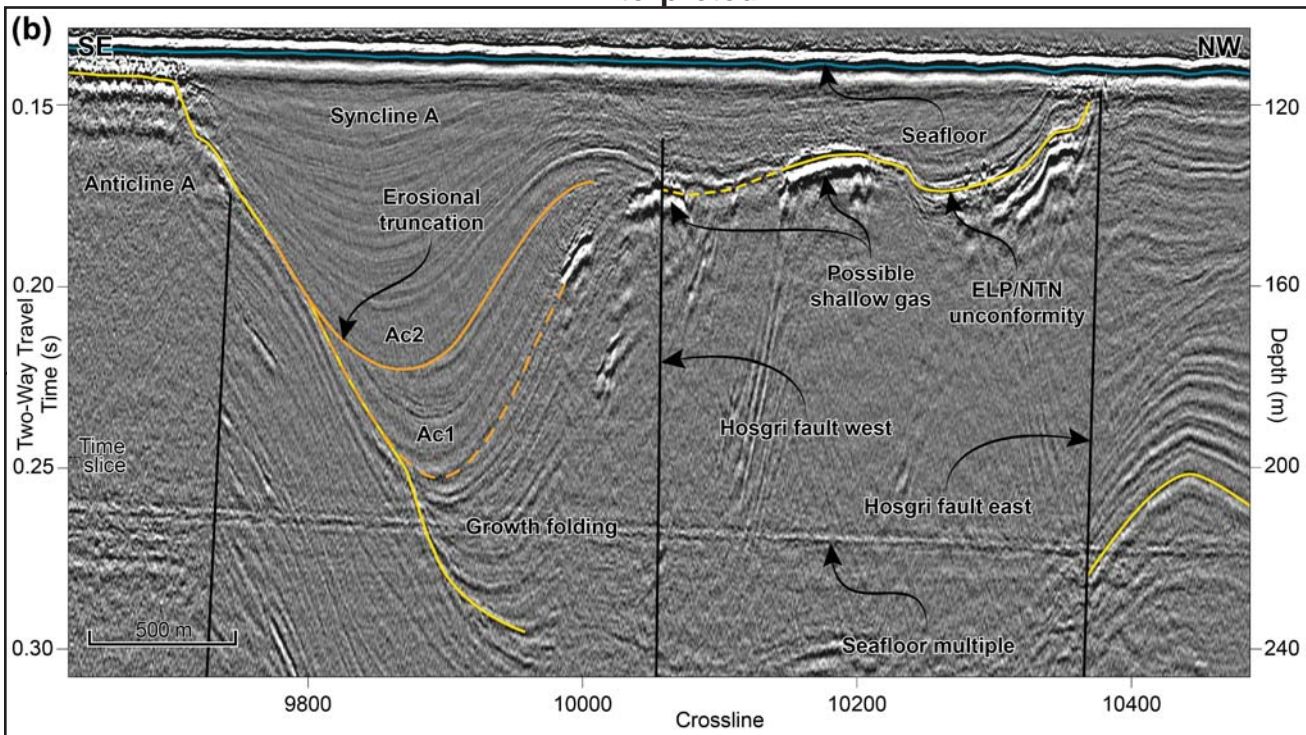


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-37\_Line1075.mxd; Date: 6/10/2014; User: Ranon Dulberg, Figuro; Rev:3

### Uninterpreted



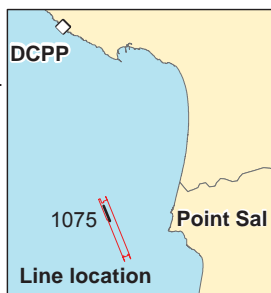
### Interpreted



#### EXPLANATION

- Seafloor
- Early-late Pliocene / near top of Neogene (ELP/NTN) unconf.
- Channel A margin
- Fault
- 2012 Point Sal 3D high-resolution survey extent

Note: See Figure 6-27 for line location.



### Line 1075 Syncline/Channel A Amplitude Section Central Block of Hosgri, Uninterpreted and Interpreted, with Labeled Channels

#### OFFSHORE LESS STUDIES



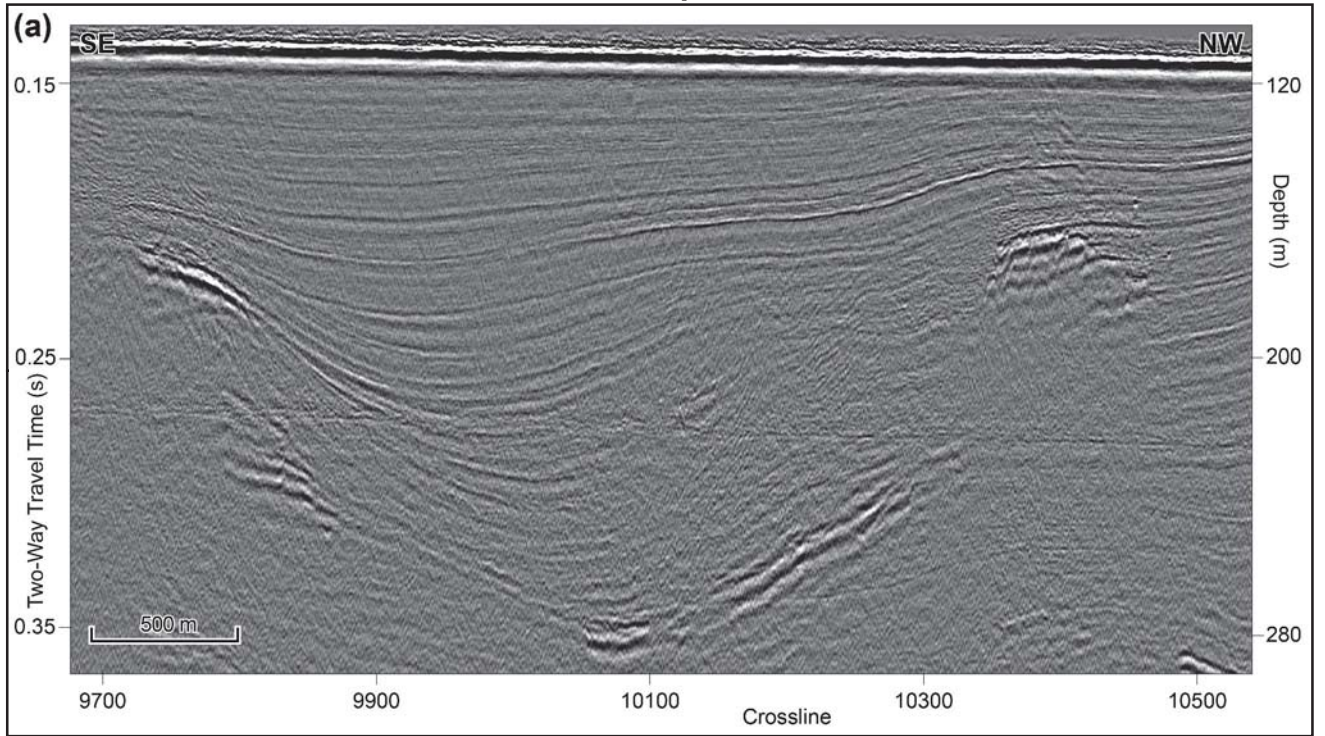
Pacific Gas and Electric Company

Figure **6-37**

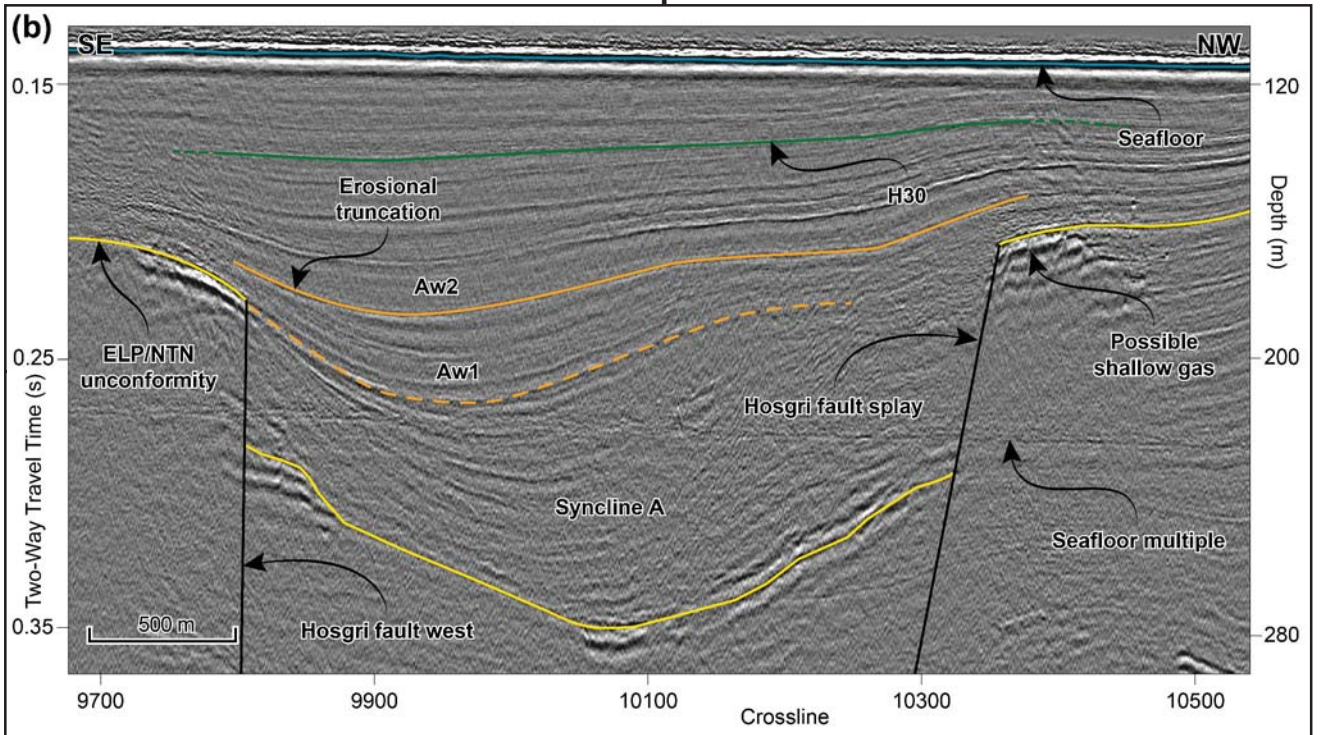


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-38\_Line997.mxd; Date: 7/18/2014; User: Bryan Bergkamp; Fugro; Rev.3

### Uninterpreted



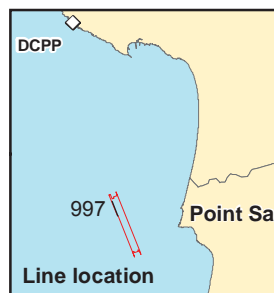
### Interpreted



#### EXPLANATION

- Seafloor
- Early-late Pliocene / near top of Neogene (ELP/NTN) unconf.
- H30
- - - Channel A margin
- Fault
- Point Sal 3D high-resolution survey extent (2012)

Note: See Figure 6-27 for line location.



### Line 997 Syncline/Channel A Amplitude Section, West of HFZ, Uninterpreted and Interpreted, with Labeled Channels

#### OFFSHORE LESS STUDIES

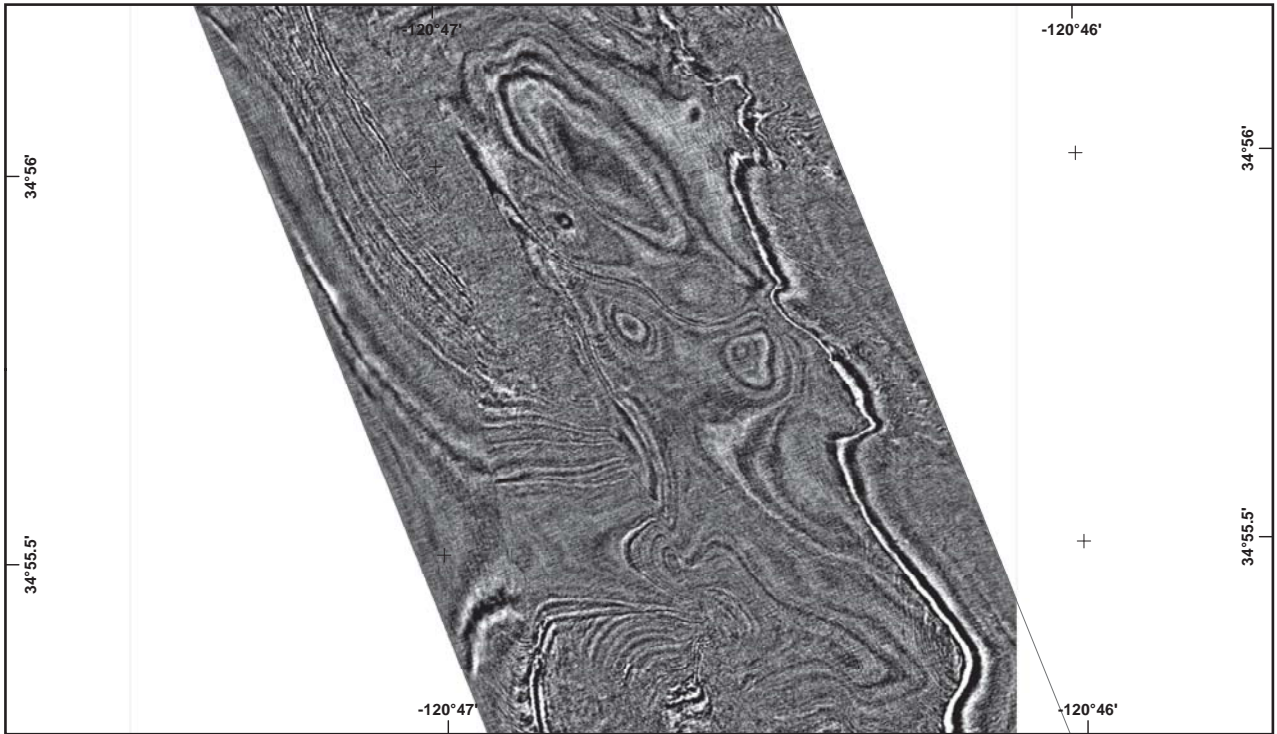


Pacific Gas and Electric Company

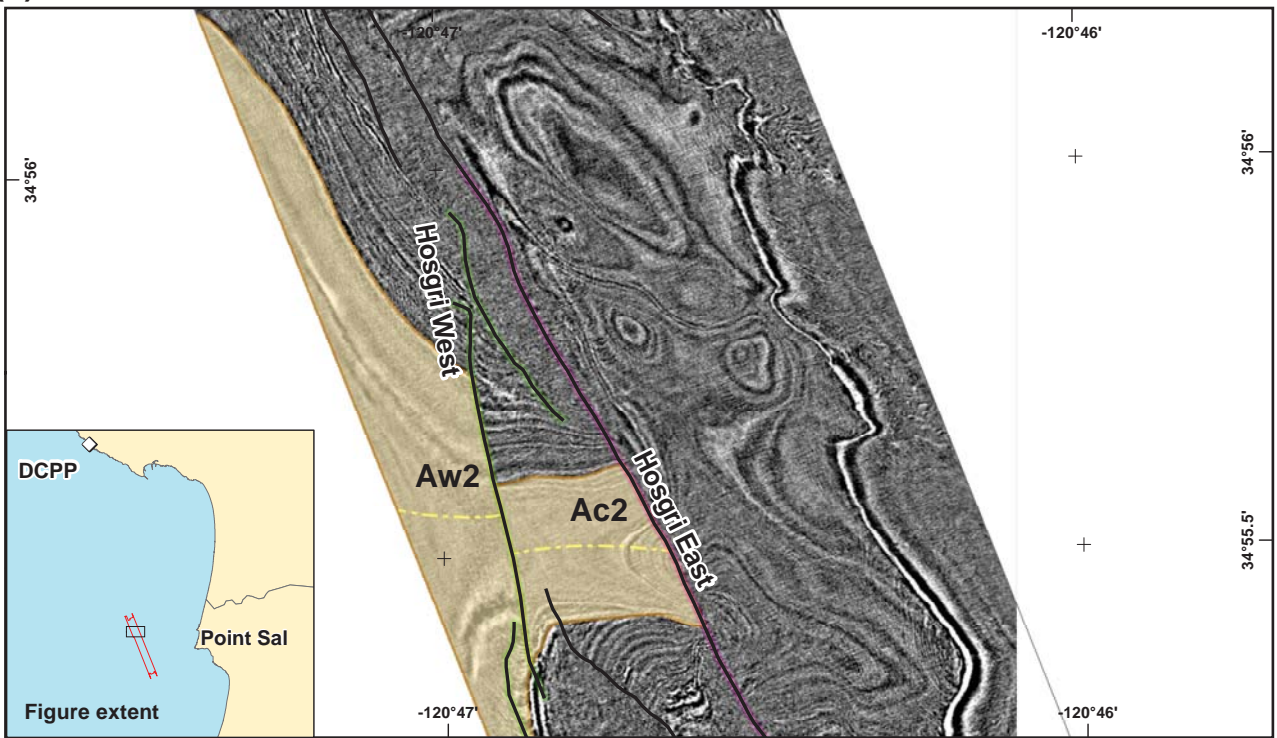
Figure **6-38**



**(a) Uninterpreted**



**(b) Interpreted**



**EXPLANATION**

- Fault
- Hosgri eastern strand
- Hosgri western strand
- 2012 Point Sal 3D high-resolution survey extent
- Inferred Channel A
- Channel thalweg mapped from seismic-reflection data



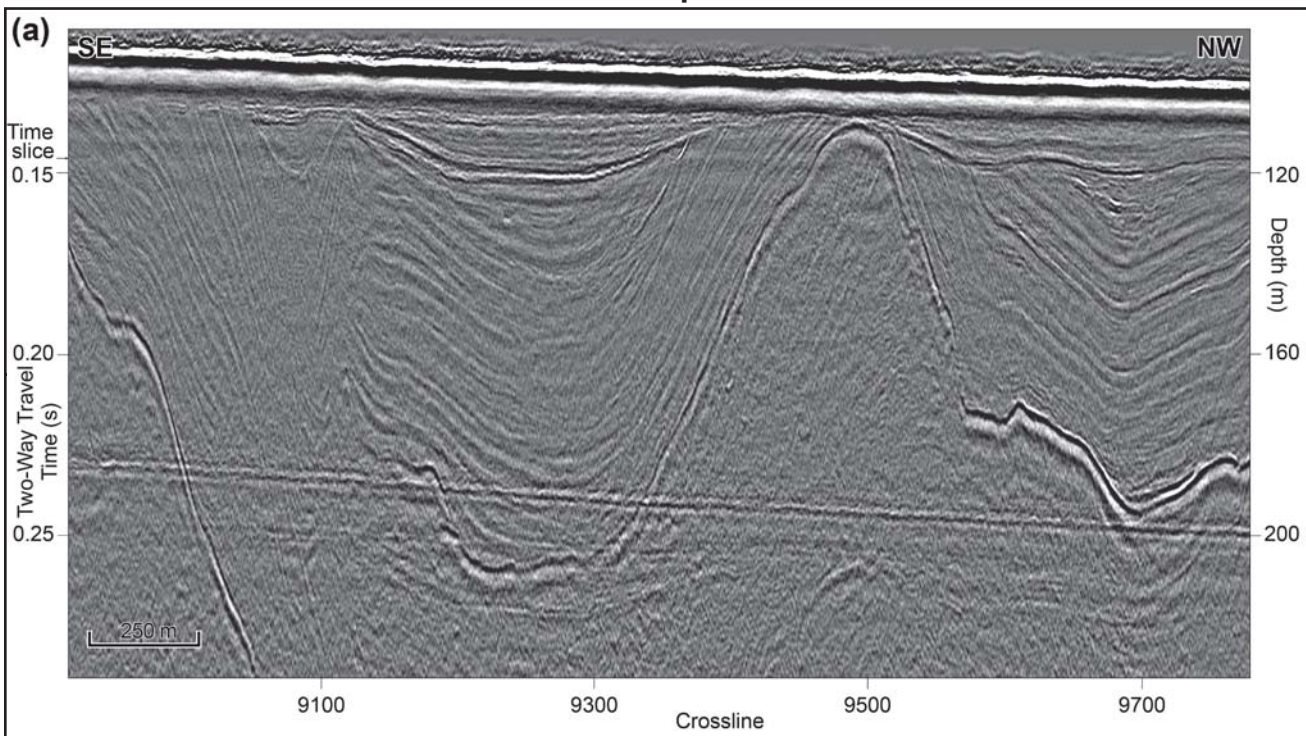
Map projection and scale: WGS 84 / UTM Zone 10N, 1:18,000

**Channel A Time Slice at 247 ms  
West of HFZ Uninterpreted and Interpreted,  
with Labeled Channels**

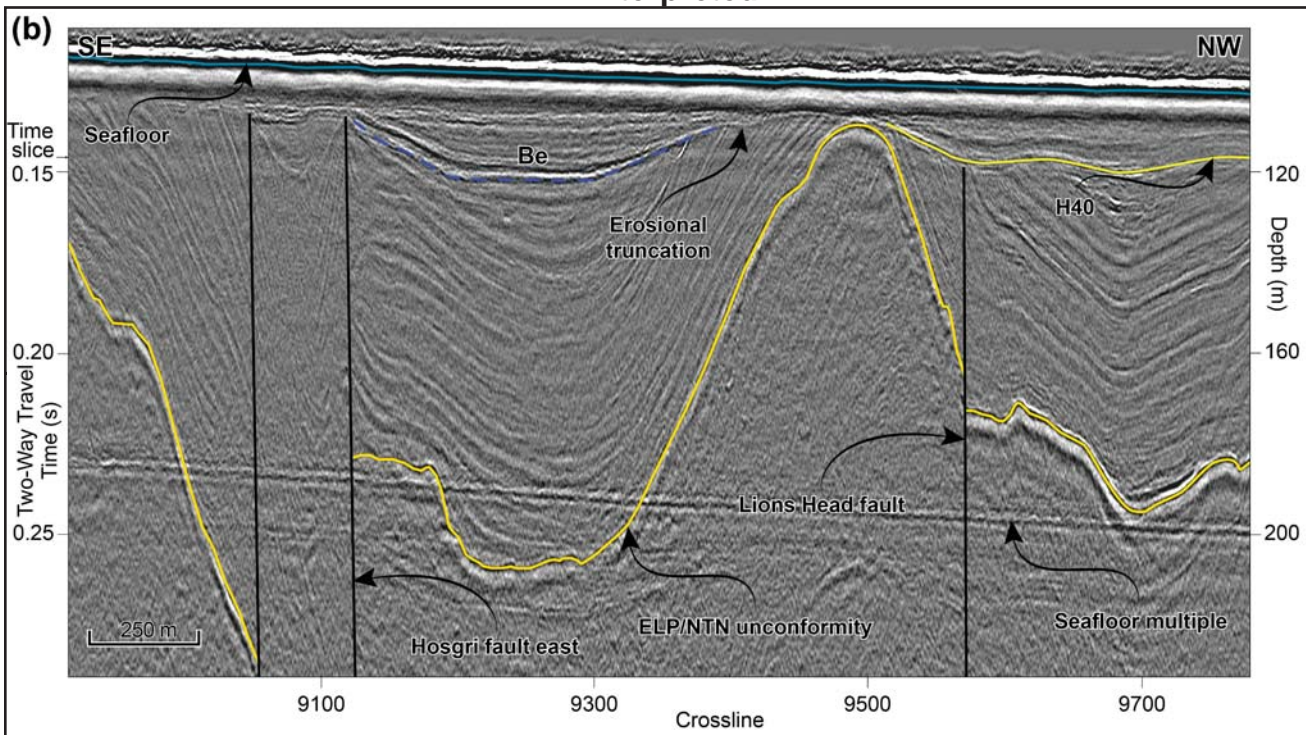
**OFFSHORE LESS STUDIES**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-40\_Line1264.mxd; Date: 6/10/2014; User: Ranon Dulberg, Fugro; Rev. 3

### Uninterpreted



### Interpreted



#### EXPLANATION

- Seafloor
- H40 unconformity
- Early-late Pliocene / near top of Neogene (ELP/NTN) unconf.
- Channel B margin
- Fault
- 2012 Point Sal 3D high-resolution survey extent

Note: See Figure 6-27 for line location.



**Line 1264 Channel B Amplitude Section East of the HFZ, Uninterpreted and Interpreted. with Labeled Channel**

**OFFSHORE LESS STUDIES**

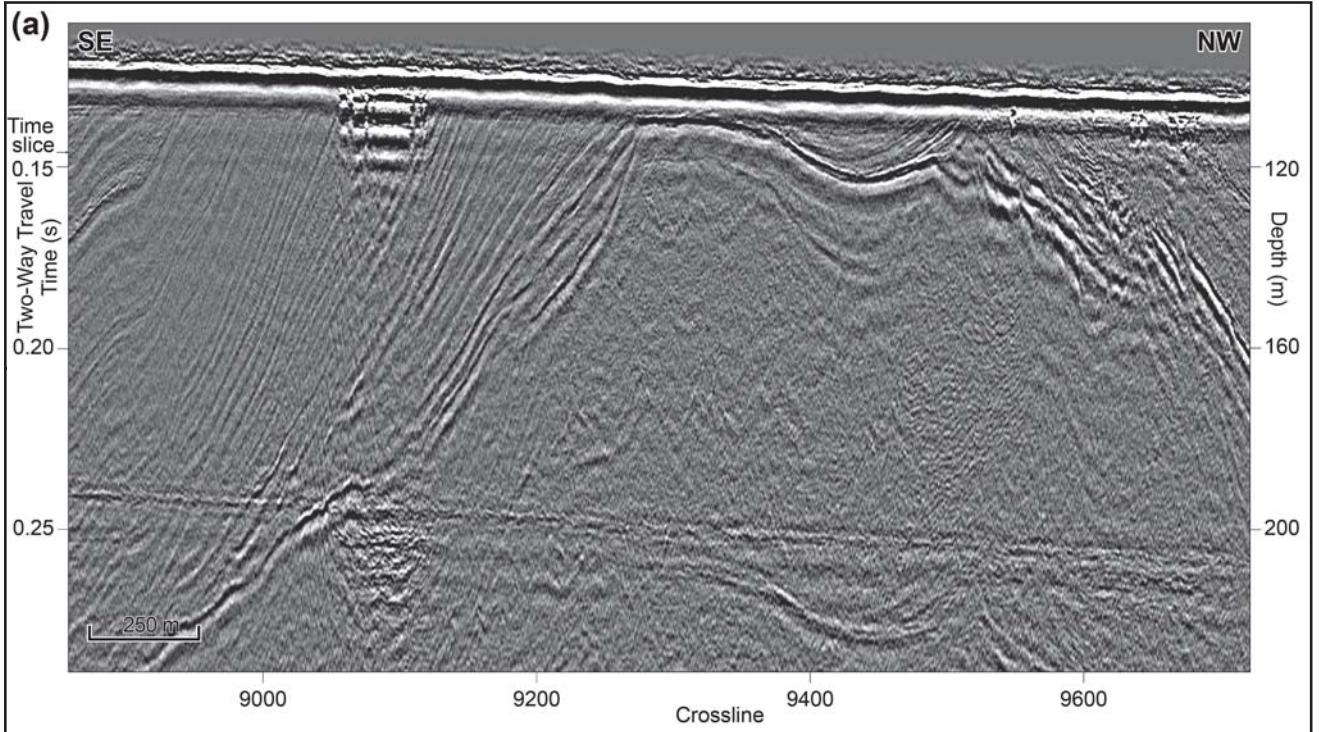


Pacific Gas and Electric Company

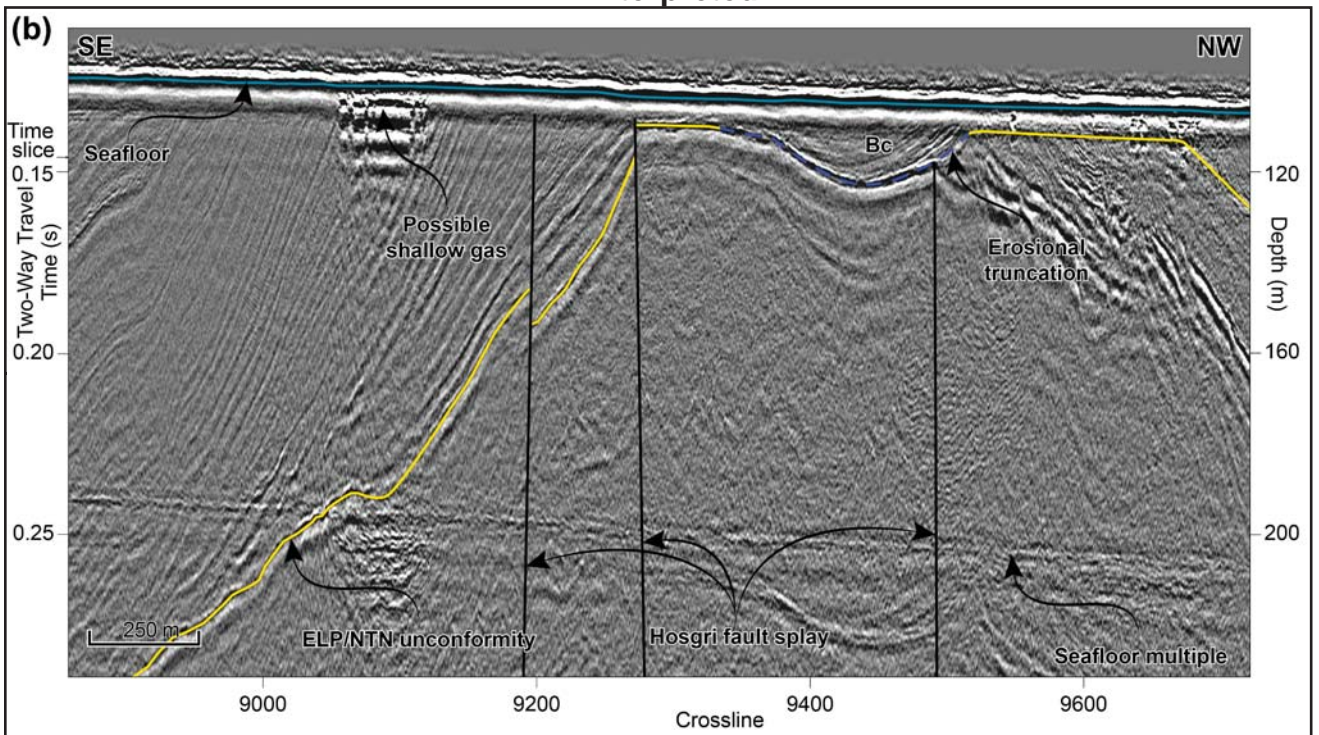
Figure **6-40**



### Uninterpreted



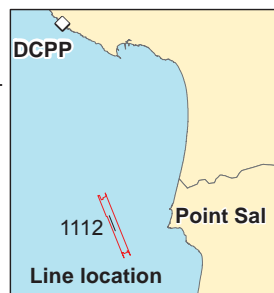
### Interpreted



#### EXPLANATION

- Seafloor
- Early-late Pliocene / near top of Neogene (ELP/NTN) unconf.
- Channel B margin
- Fault
- 2012 Point Sal 3D high-resolution survey extent

Note: See Figure 6-27 for line location.



**Line 1112 Channel B Amplitude Section Central Block, Uninterpreted and Interpreted, with Labeled Channel**

**OFFSHORE LESS STUDIES**



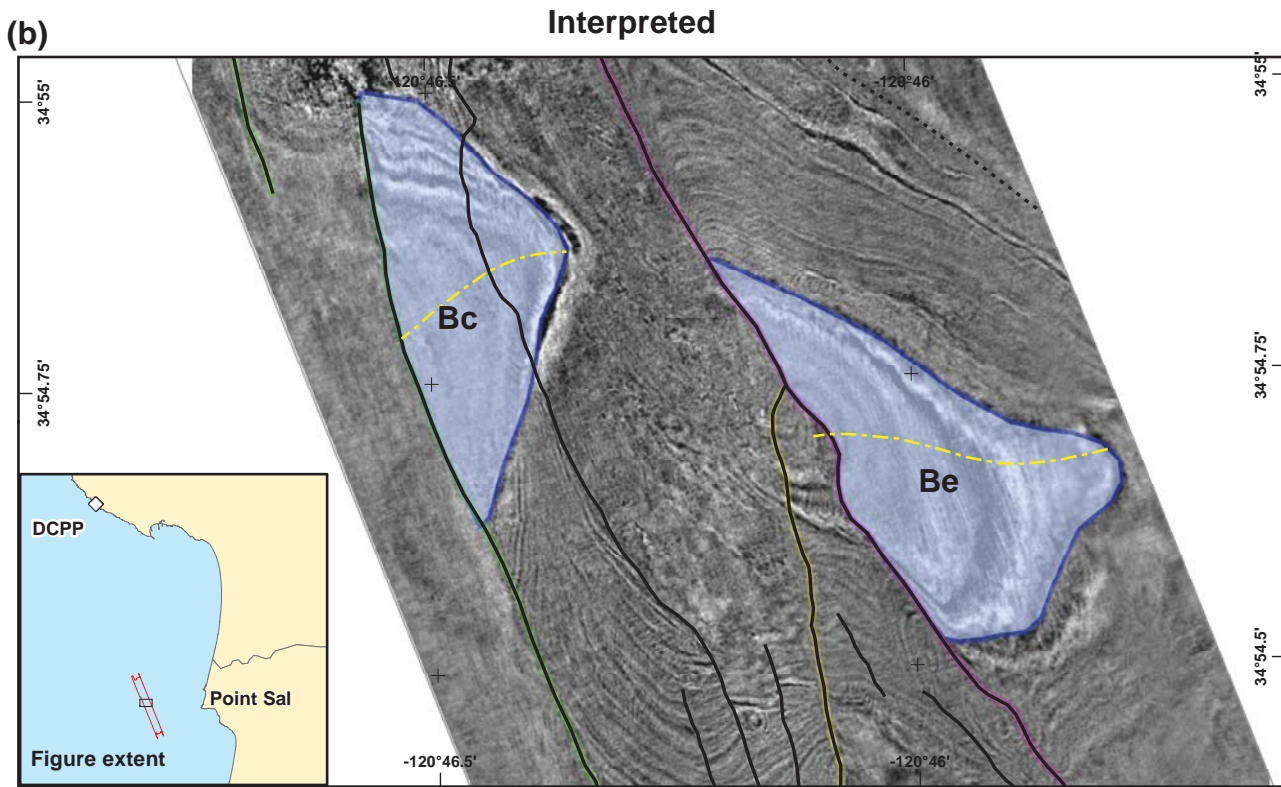
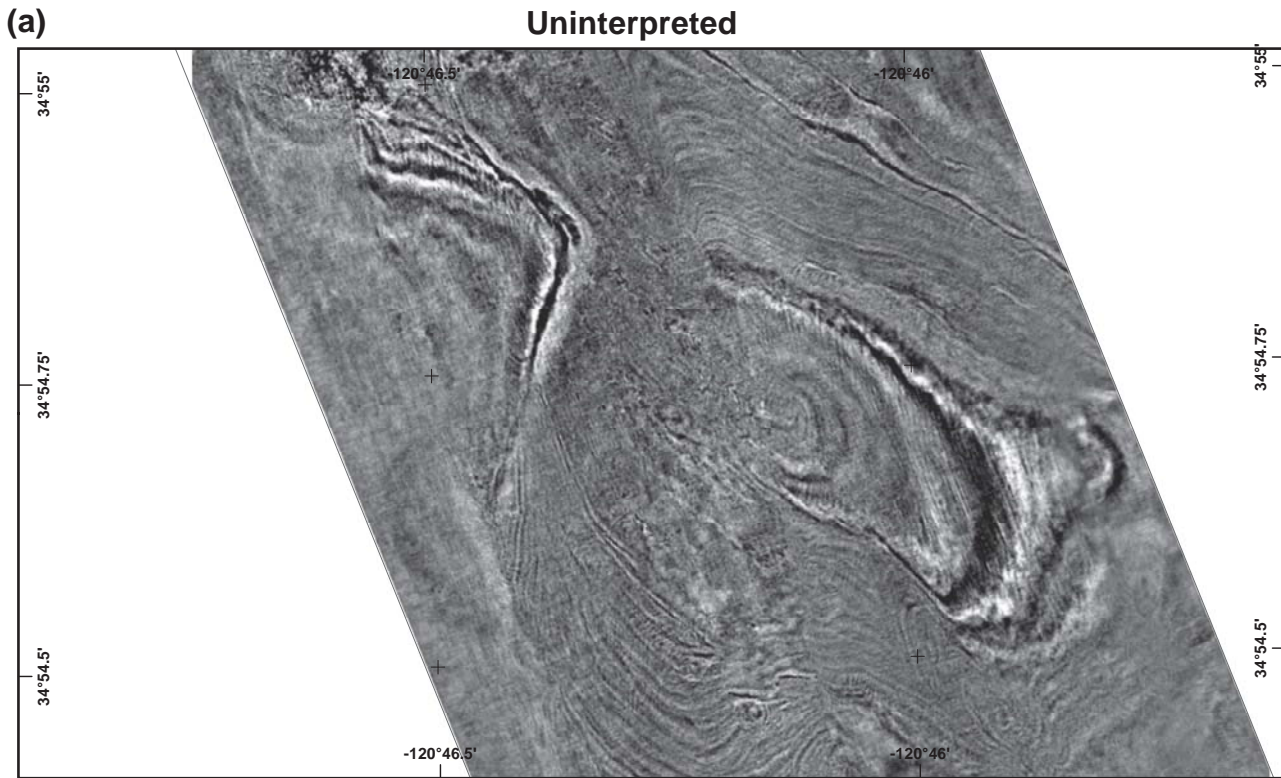
Pacific Gas and Electric Company

Figure **6-41**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-41\_Line1112.mxd; Date: 6/10/2014; User: Ranon Dulberg, Figuro; Rev:3

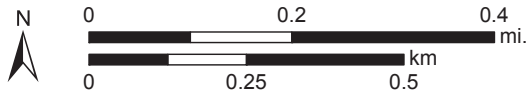


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-42\_TimeSlice\_0146.mxd; Date: 6/10/2014; User: Ranon Dulberg, Fugro; Rev:3



**EXPLANATION**

- Fault
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand
- Channel B
- - - Channel thalweg mapped from seismic-reflection data
- 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:12,000

**Channel B Time Slice at 146 ms Central Block, Uninterpreted and Interpreted, with Labeled Channels**

**OFFSHORE LESS STUDIES**

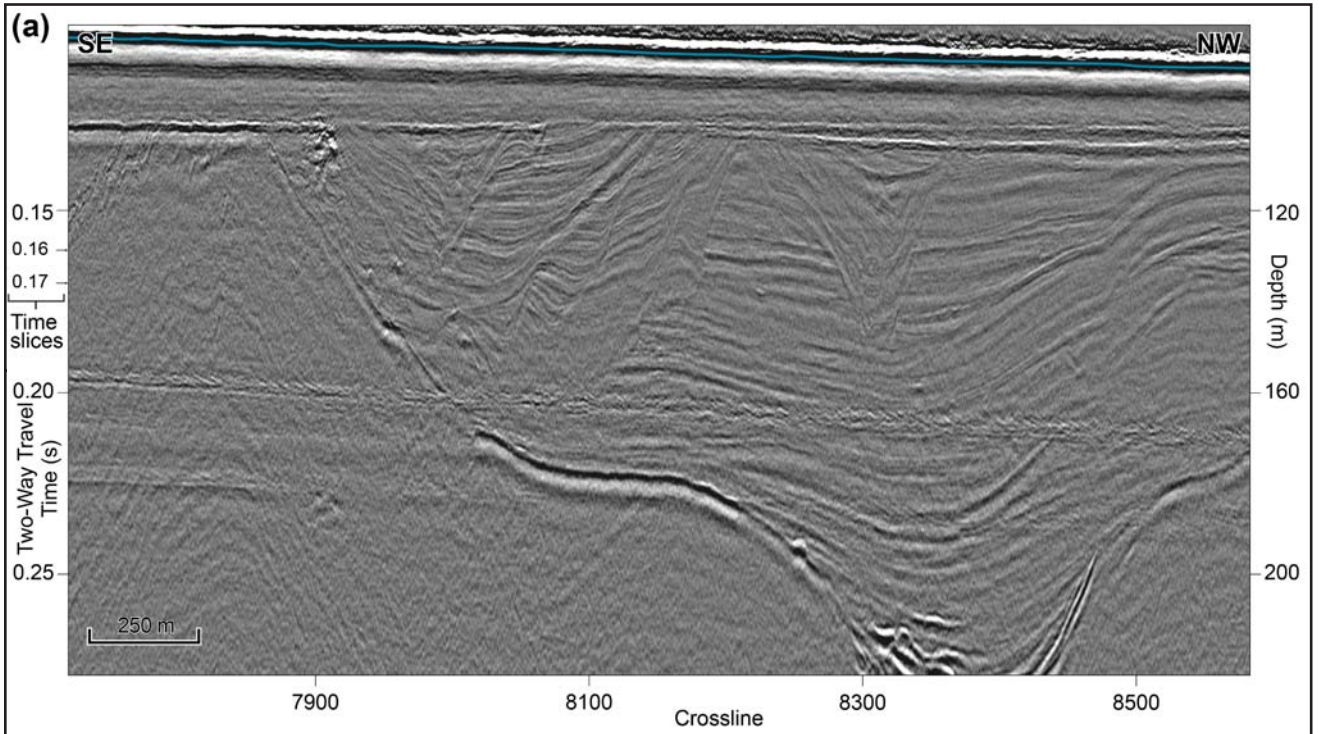
Pacific Gas and Electric Company

Figure **6-42**

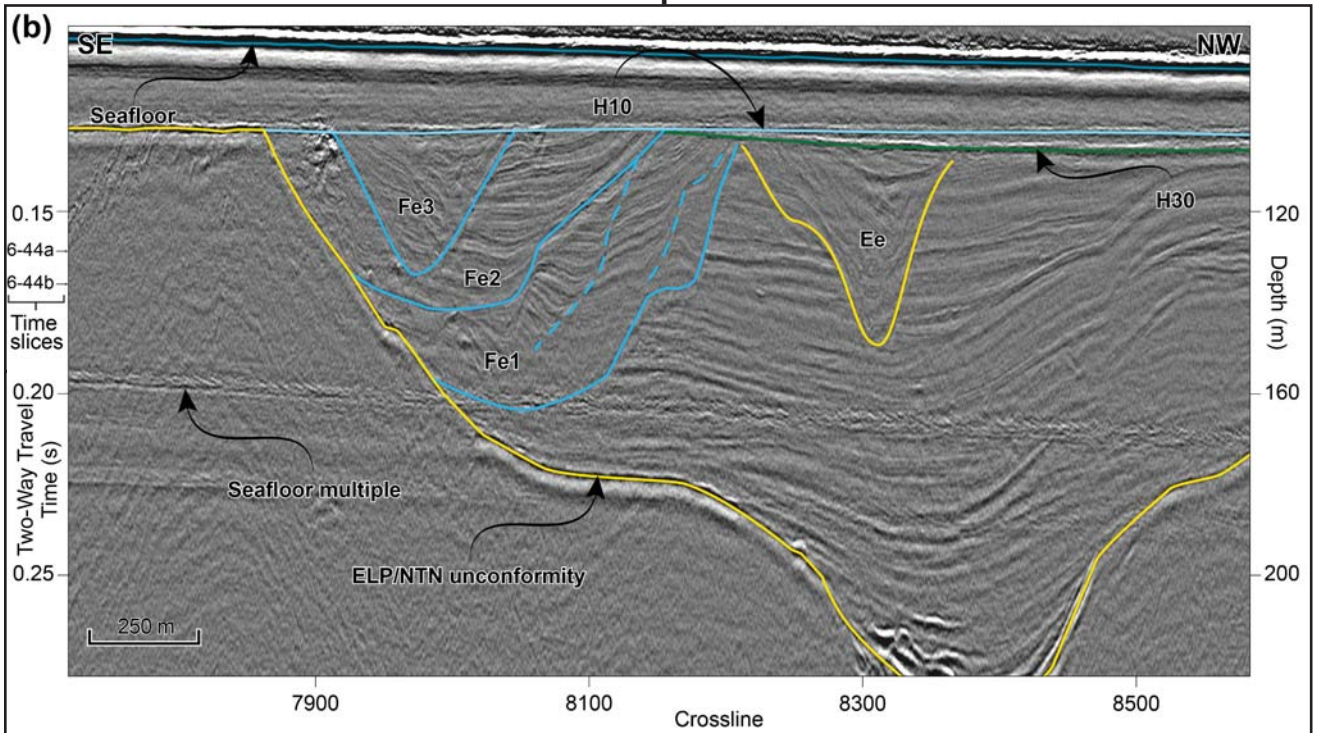


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-43\_Line1368.mxd; Date: 6/12/2014; User: Raron Dulberg; Figuro, Rev.3

### Uninterpreted



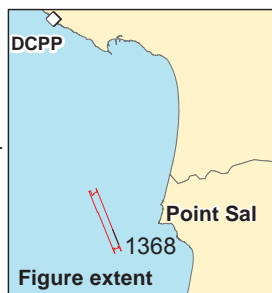
### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene / near top of Neogene (ELP/NTN) unconf.
- Channel E margin
- Channel F margin
- 2012 Point Sal 3D high-resolution survey extent

Note: See Figure 6-27 for line location.



**Line 1368 Channel F Amplitude Section East of HFZ, Uninterpreted and Interpreted, with Labeled Channel Fe1-3**

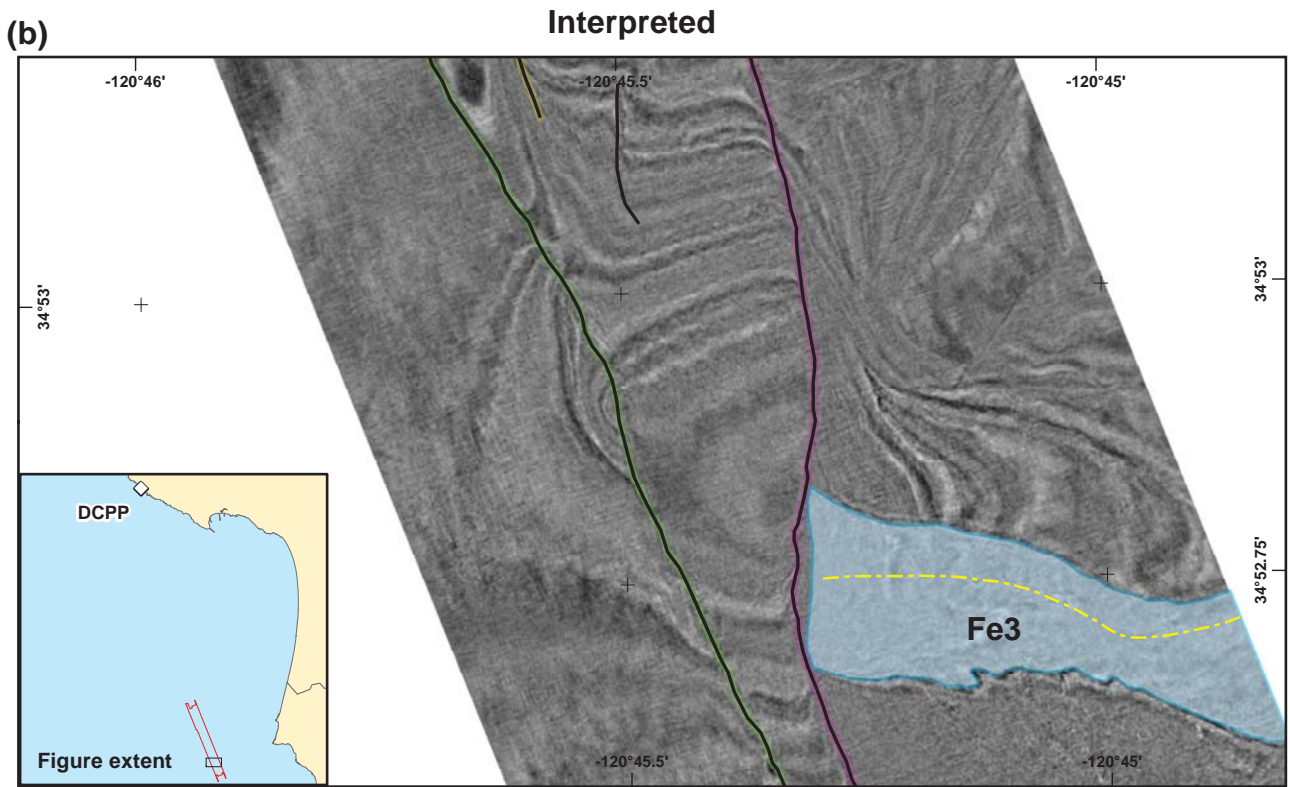
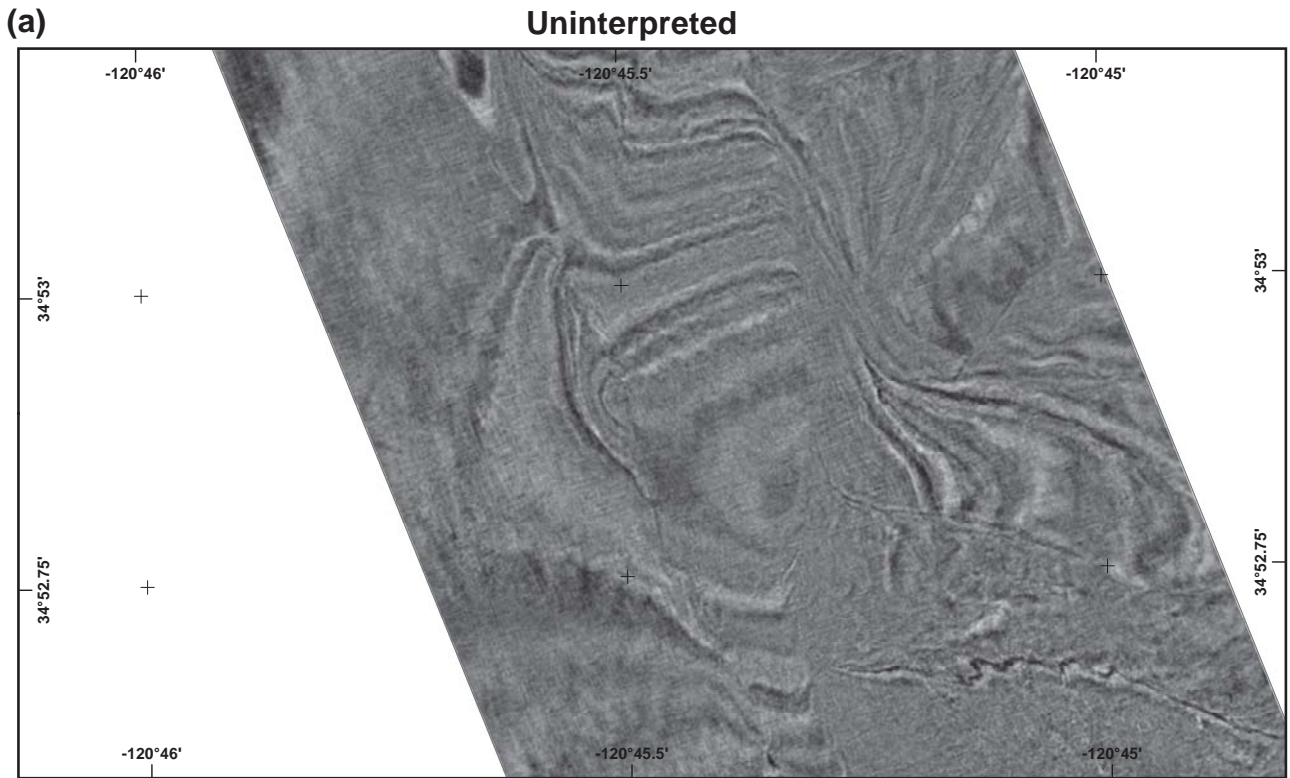
**OFFSHORE LESS STUDIES**



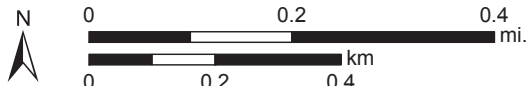
Pacific Gas and Electric Company

Figure **6-43**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicDataInterpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-44a\_TimeSlice\_0160.mxd; Date: 6/11/14; User: Ranon Dulberg, Fugro; Rev:3



- EXPLANATION**
- Fault
  - Hosgri central strand
  - Hosgri eastern strand
  - Hosgri western strand
  - Channel F
  - Channel thalweg mapped from seismic-reflection data
  - 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:12,000

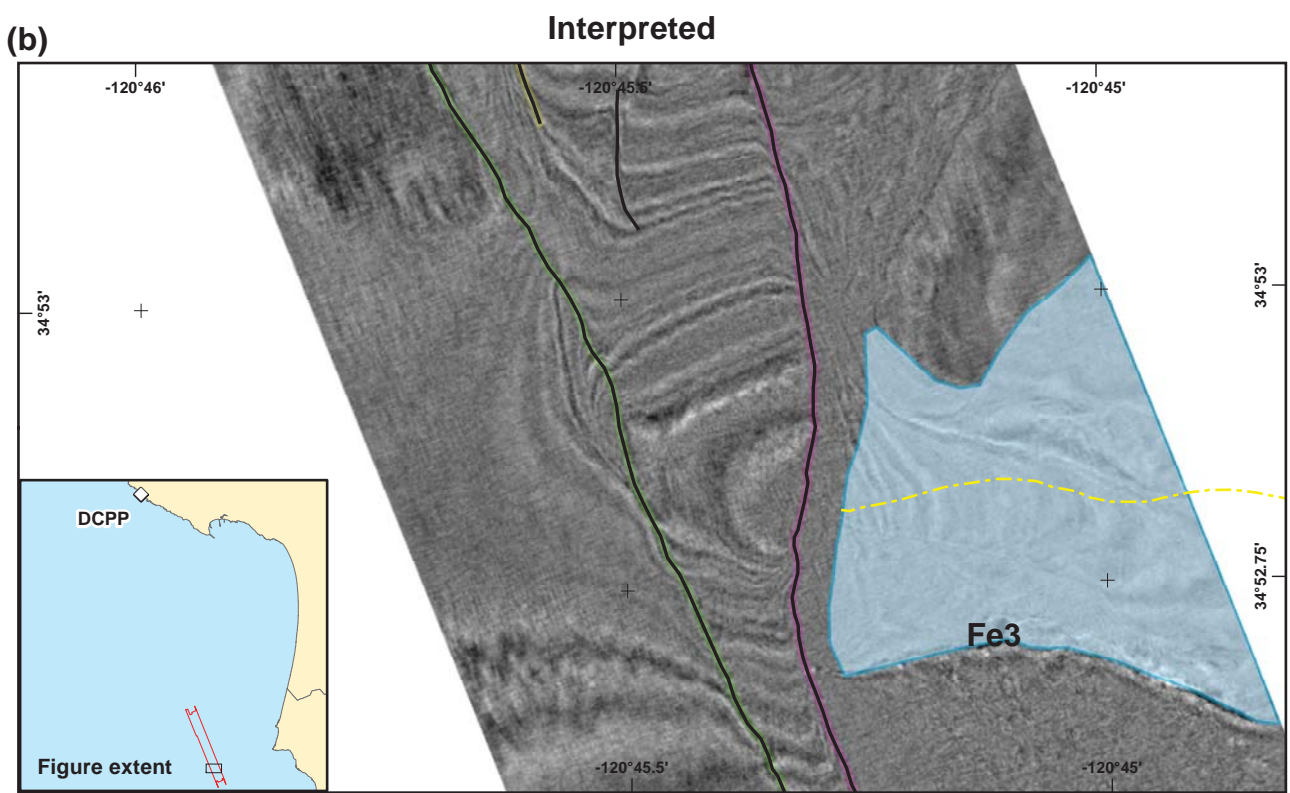
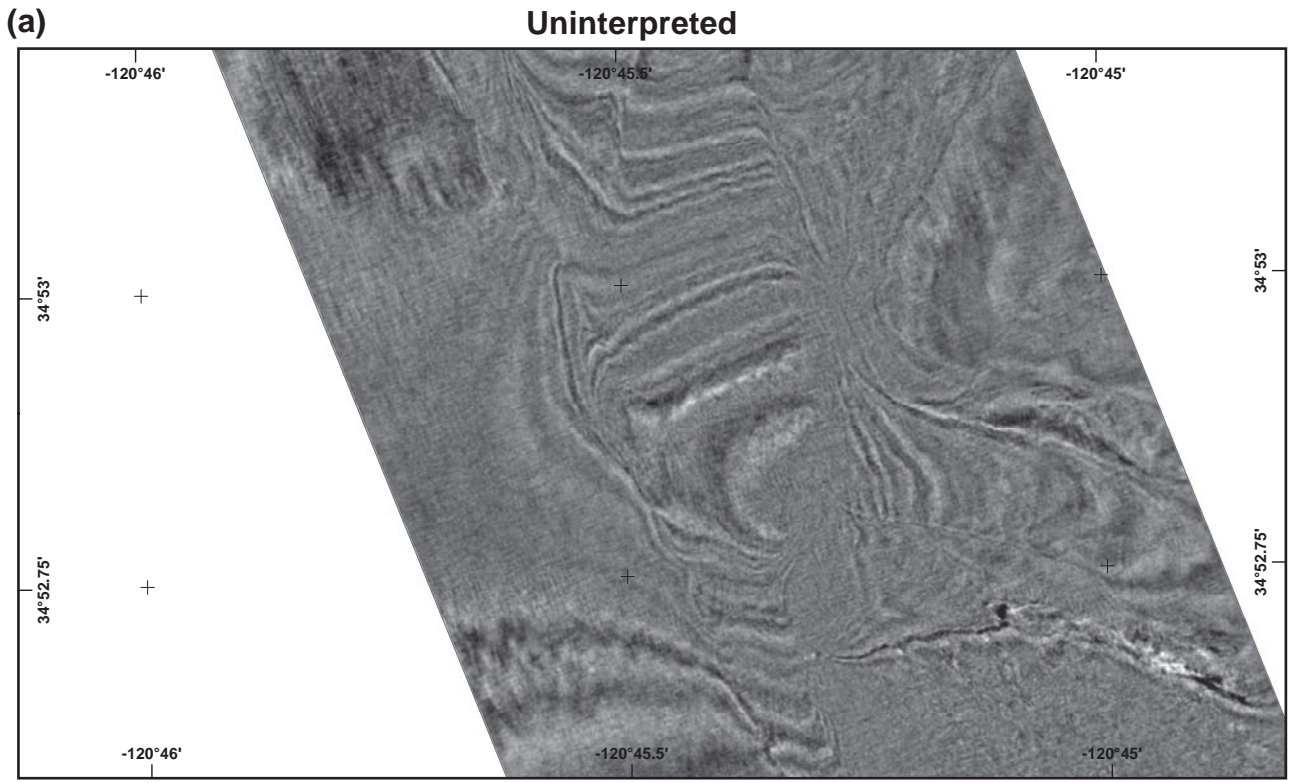
**Channel F Time Slice at 160 ms  
East of the HFZ, Uninterpreted and  
Interpreted, with Labeled Channel**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company	Figure <b>6-44a</b>
----------------------------------	---------------------



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicDataInterpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-44b\_TimeSlice\_0170.mxd; Date: 6/11/14; User: Ramon Dulberg, Fugro; Rev:3



**EXPLANATION**

- Fault
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand
- Channel F
- Channel thalweg mapped from seismic-reflection data
- 2012 Point Sal 3D high-resolution survey extent

Map projection and scale: WGS 84 / UTM Zone 10N, 1:12,000

**Channel F Time Slice at 170 ms East of the HFZ,  
Uninterpreted and Interpreted,  
with Labeled Channel**

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**OFFSHORE LESS STUDIES**

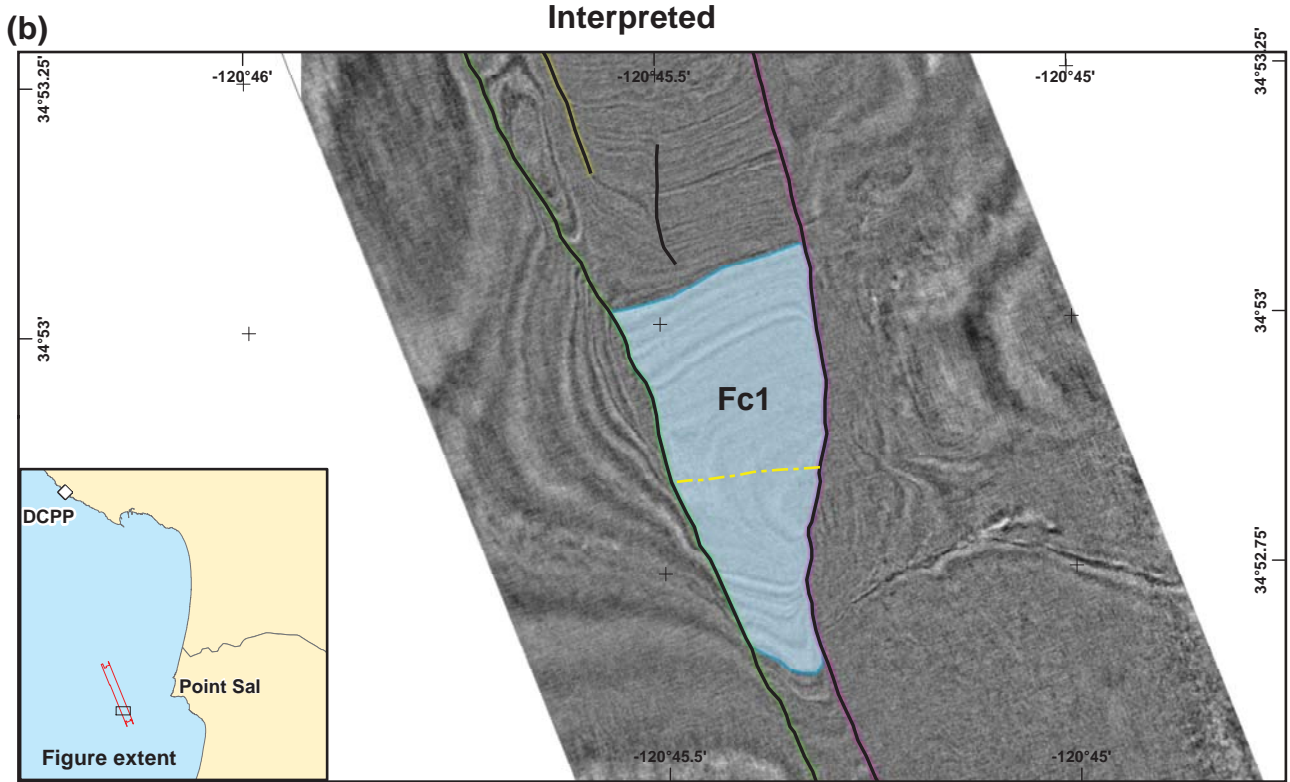
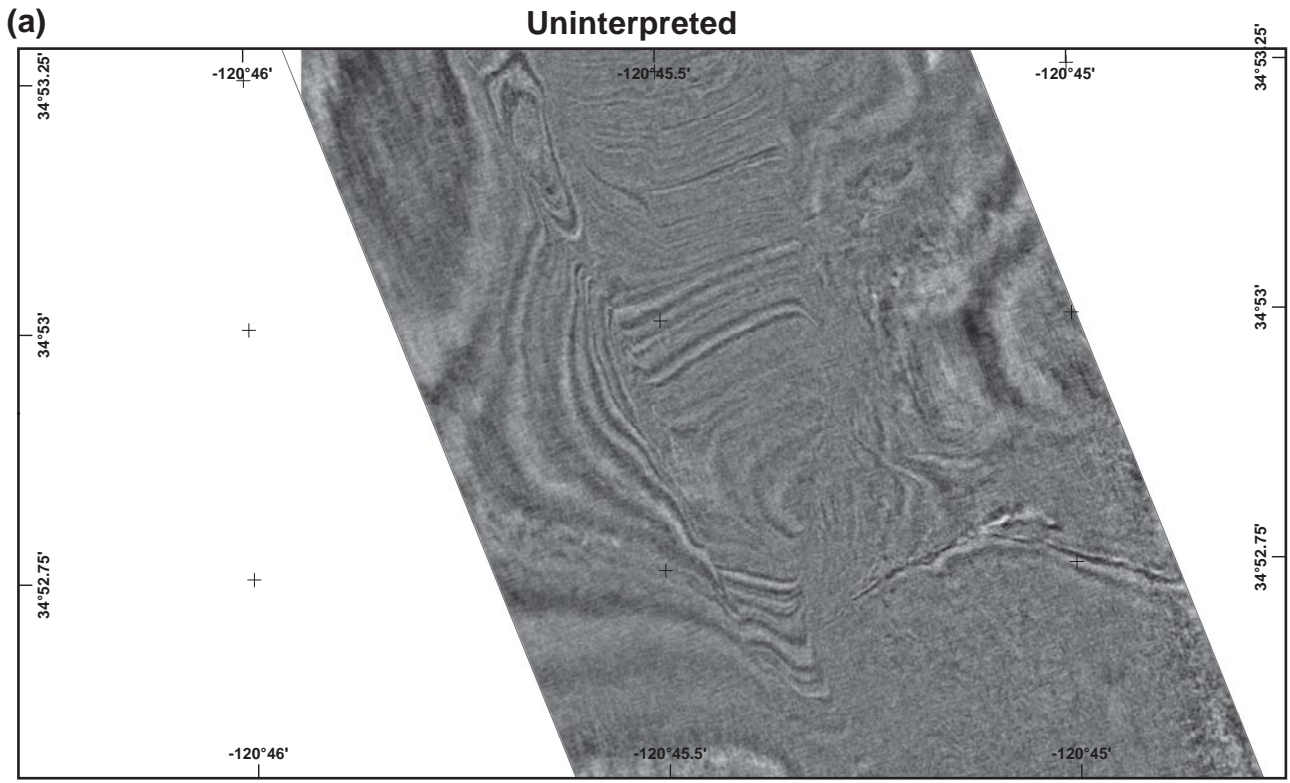
---

Pacific Gas and Electric Company
 Figure **6-44b**





File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-46\_TimeSlice\_0200.mxd; Date: 6/10/2014; User: Raron Dulberg, Fugro; Rev: 3



**EXPLANATION**

- Fault
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand
- Channel F
- Channel thalweg mapped from seismic-reflection data
- 2012 Point Sal 3D high-resolution survey extent

N

0 0.2 0.4 mi.

0 0.25 0.5 km

Map projection and scale: WGS 84 / UTM Zone 10N, 1:14,000

**Channel F Time Slice at 200 ms, Central Block, Uninterpreted and Interpreted, with Labeled Channel**

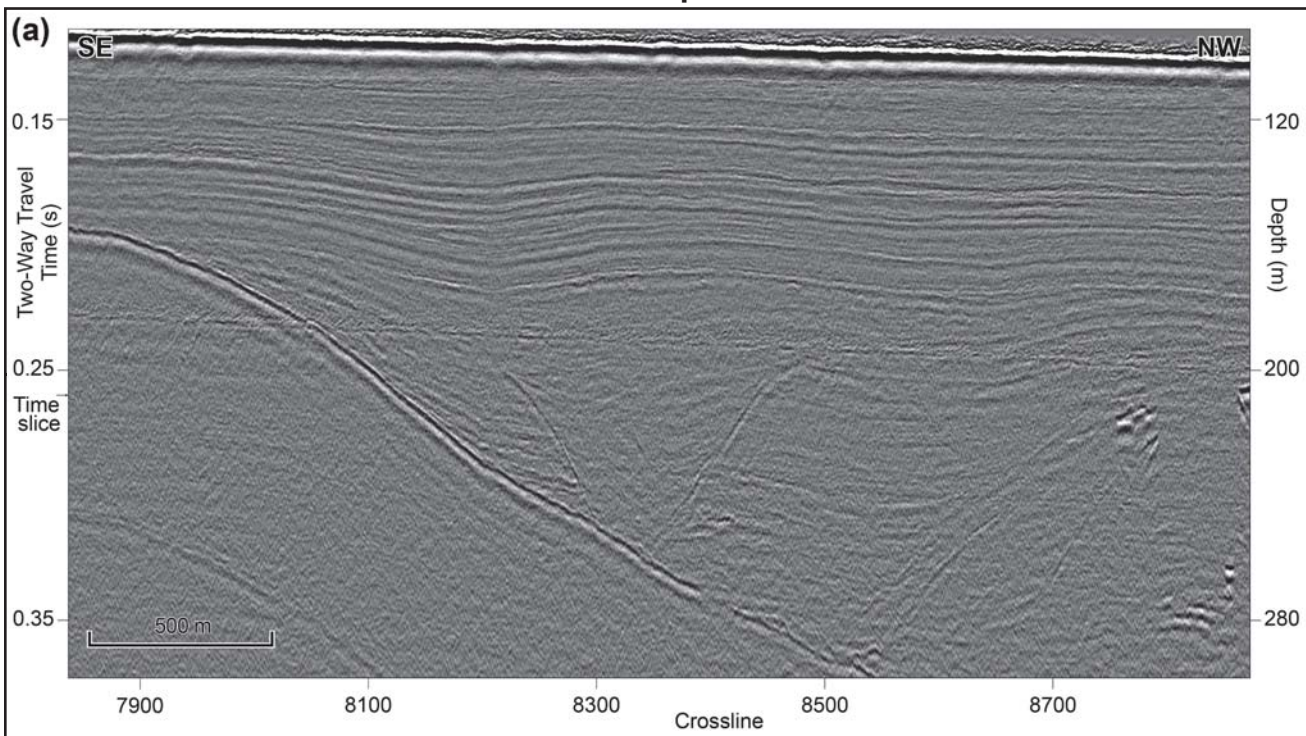
**OFFSHORE LESS STUDIES**

PGE Pacific Gas and Electric Company

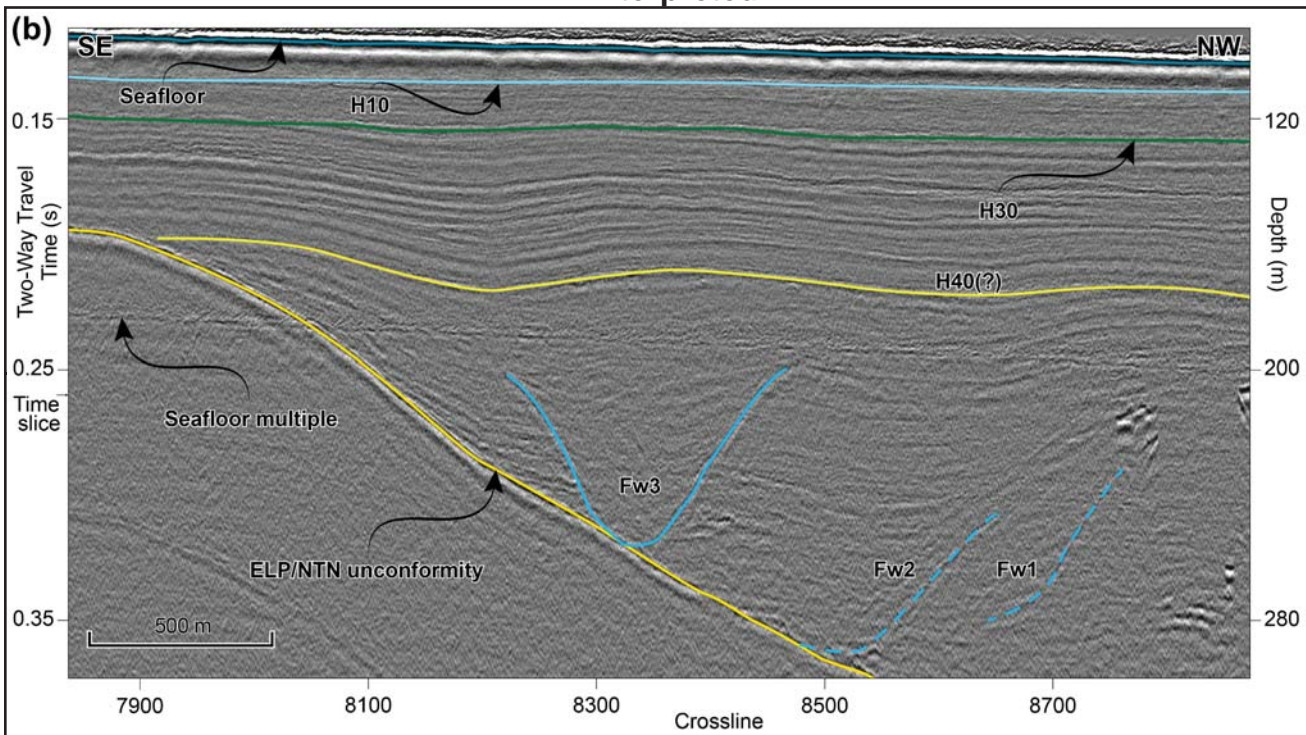
Figure **6-46**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-47\_Line1020.mxd; Date: 6/12/2014; User: Ramon Dulberg, Fugro; Rev: 3

### Uninterpreted



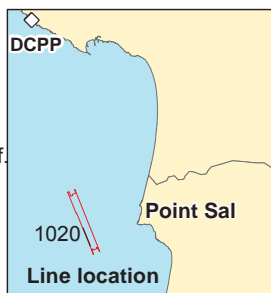
### Interpreted



#### EXPLANATION

- Seafloor
- H10 unconformity
- H30 unconformity
- Early-late Pliocene / near top of Neogene (ELP/NTN) unconf.
- - - Channel F margin
- 2012 Point Sal 3D high-resolution survey extent

Note: See Figure 6-27 for line location.



**Line 1020 Channel F Amplitude Section West of Hosgri, Uninterpreted and Interpreted with Labeled Channel Fw1-3**

**OFFSHORE LESS STUDIES**

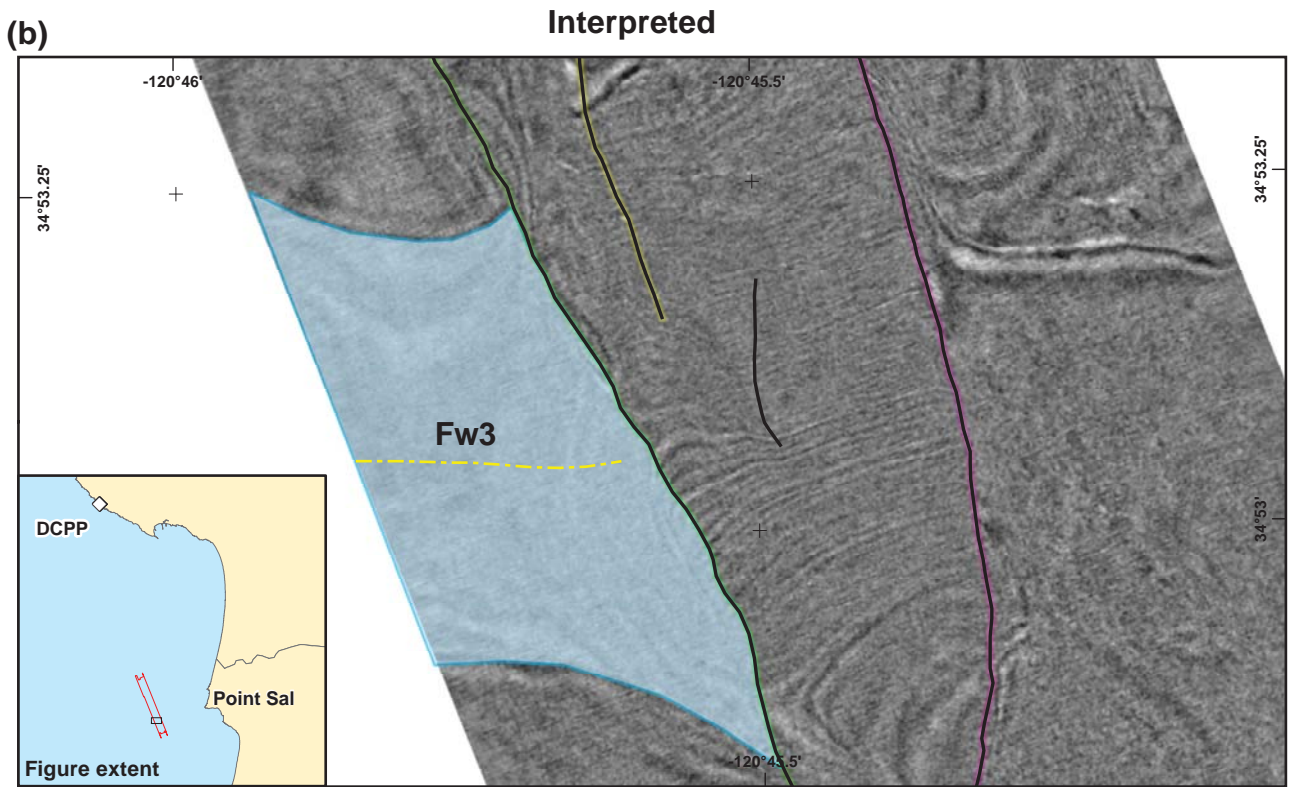
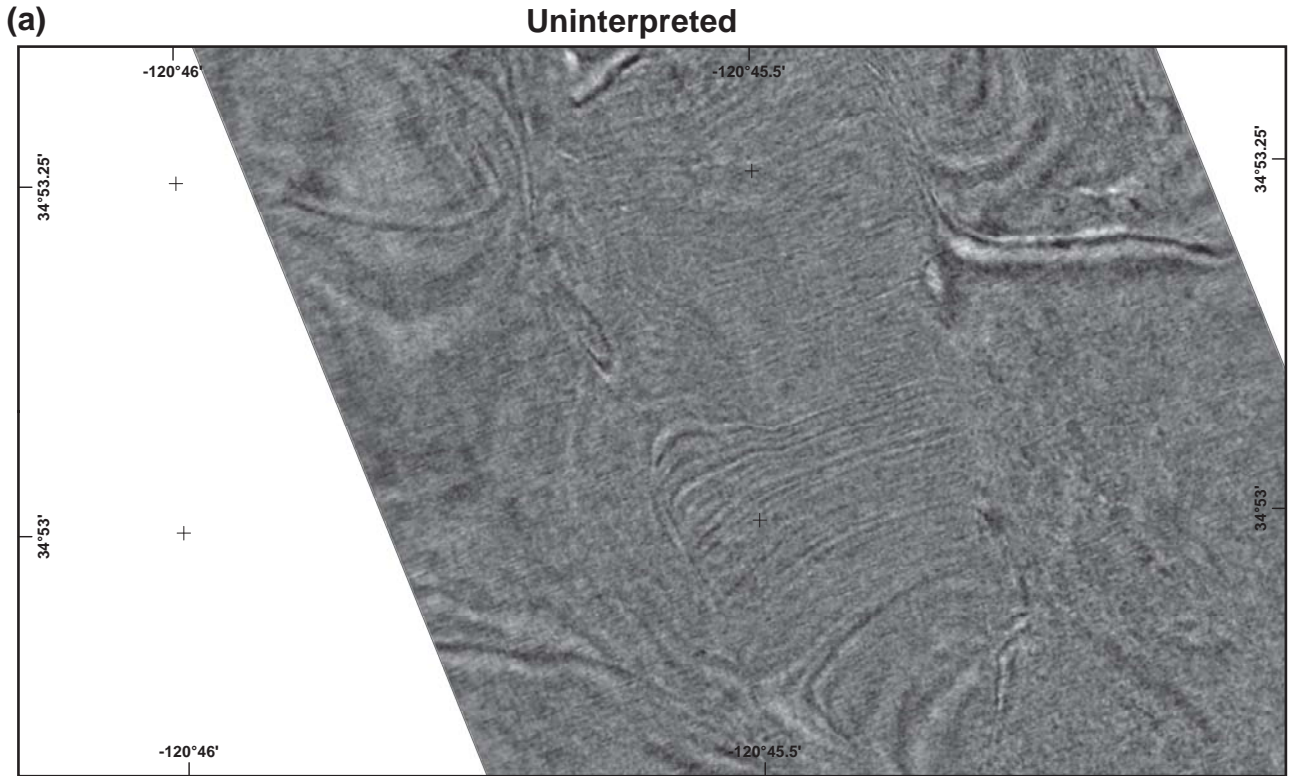


Pacific Gas and Electric Company

Figure **6-47**

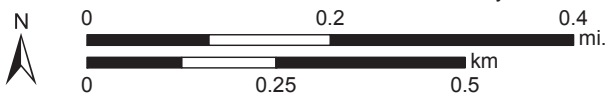


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-48\_TimeSlice\_0260.mxd; Date: 6/10/2014; User: Ranon Dulberg, Fugro; Rev: 3



**EXPLANATION**

- Fault
- Hosgri central strand
- Hosgri eastern strand
- Hosgri western strand
- Channel F
- Channel thalweg mapped from seismic-reflection data
- 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:10,000

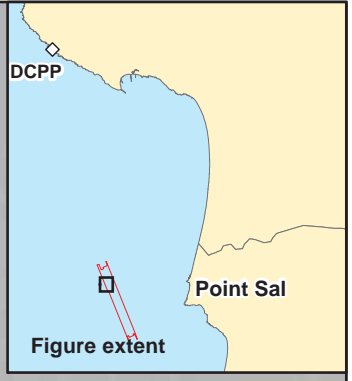
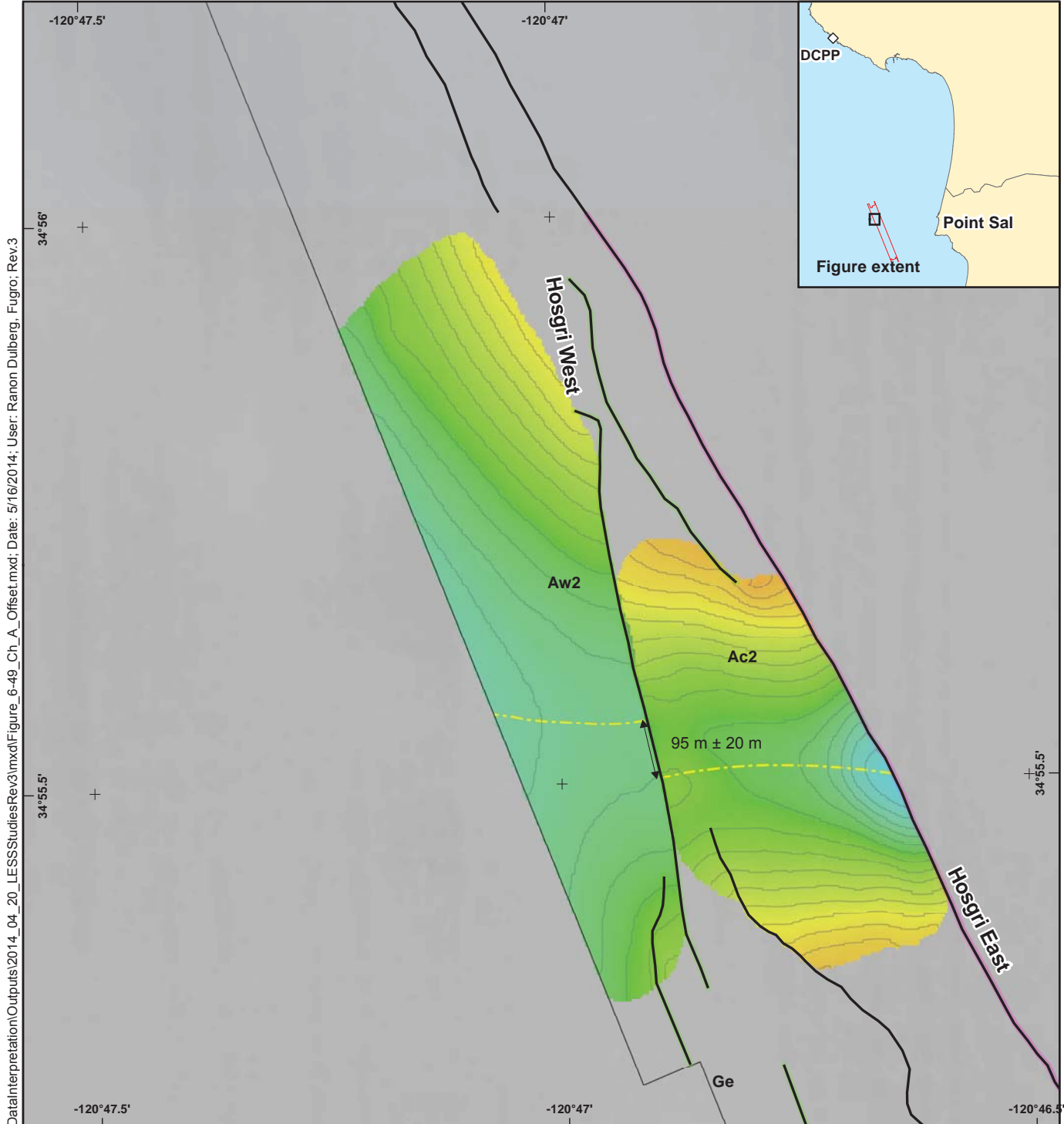
**Channel F Time Slice at 260 ms West of the HFZ, Uninterpreted and Interpreted, with Labeled Channel**

**OFFSHORE LESS STUDIES**



Pacific Gas and Electric Company

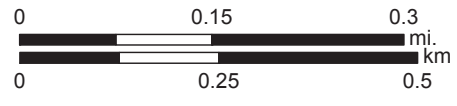
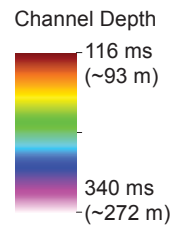
Figure **6-48**



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-49\_Ch\_A\_Offset.mxd; Date: 5/16/2014; User: Raron Dulberg, Fugro; Rev:3

**EXPLANATION**

- Fault
- Channel thalweg mapped from seismic-reflection data
- Hosgri eastern strand
- Hosgri western strand
- 2012 Point Sal 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:9,500

**Channel A Offset and Uncertainty, HFZ East and West Strands**

**OFFSHORE LESS STUDIES**

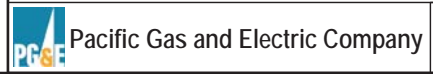
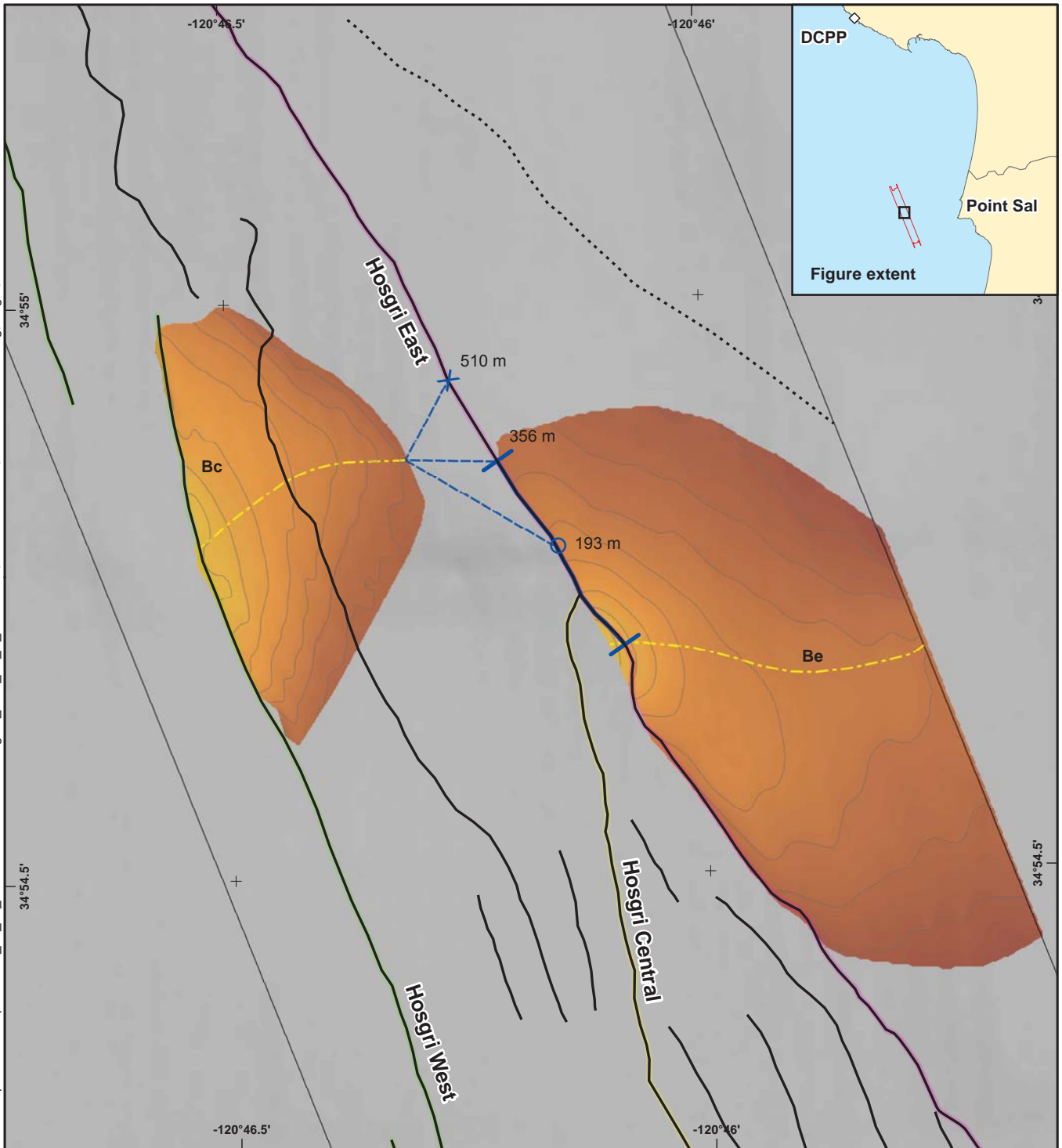


Figure **6-49**

Source: Project DEM compilation v2013.07.

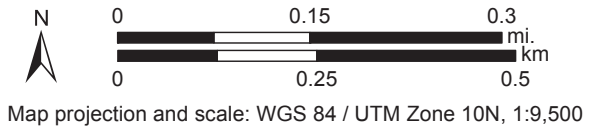


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-50\_Ch\_B\_Offset.mxd; Date: 7/16/2014; User: Raron Dulberg, Fugro; Rev:3



**EXPLANATION**

- Fault, dashed where inferred
  - - - Channel thalweg mapped from seismic-reflection data
  - Hosgri central strand
  - Hosgri eastern strand
  - Hosgri western strand
- Horizontal Offset Measurements
- T Preferred
  - X Maximum
  - ⊙ Minimum
- Channel Depth
- 116 ms (~93 m)
  - 340 ms (~272 m)
- 2012 Point Sal 3D high-resolution survey extent



**Channel B Offset and Uncertainty, HFZ East and West Strands**

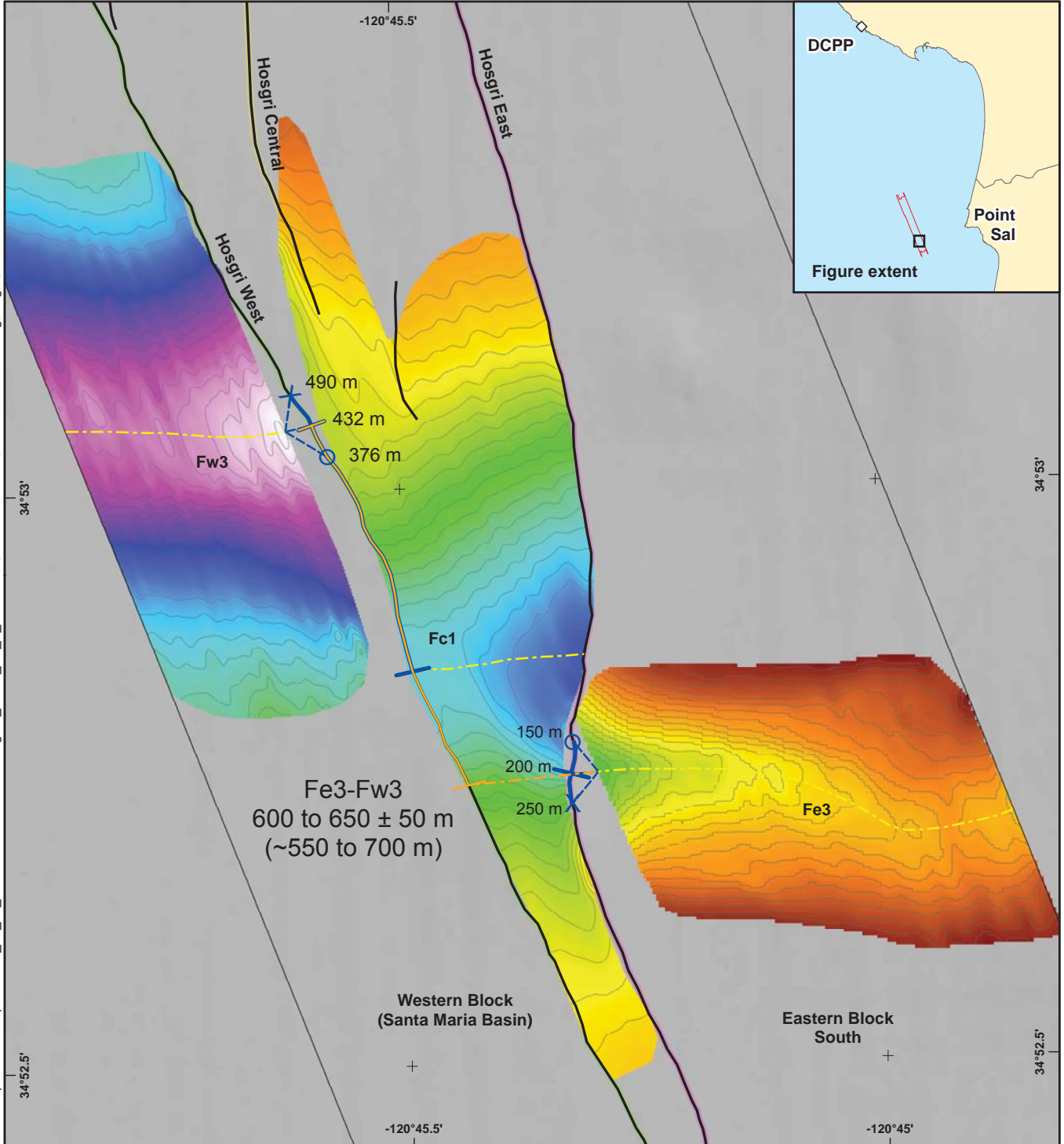
**OFFSHORE LESS STUDIES**

**PG&E** Pacific Gas and Electric Company

Figure **6-50**

Source: Project DEM compilation v2013.07.

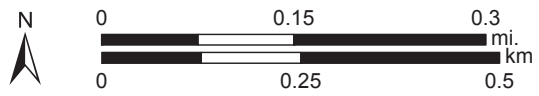
File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-51a\_Ch\_F\_Offset.mxd; Date: 6/10/2014; User: Ranan Dulberg, Fugro; Rev: 3



**EXPLANATION**

- Fault
  - - - Channel thalweg mapped from seismic-reflection data
  - - - Channel thalweg projected across Hosgri fault splays
  - Hosgri central strand
  - Hosgri eastern strand
  - Hosgri western strand
- Horizontal Offset Measurements
- T Preferred
  - X Maximum
  - O Minimum
- Channel Depth
- 126 ms (~101 m)
  - 340 ms (~272 m)
- 2012 Point Sal 3D high-resolution survey extent

Source: Project DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:9,500

**Preferred Channel F Offset and Uncertainty, HFZ East and West Strands**

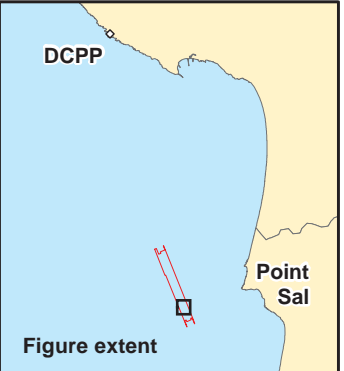
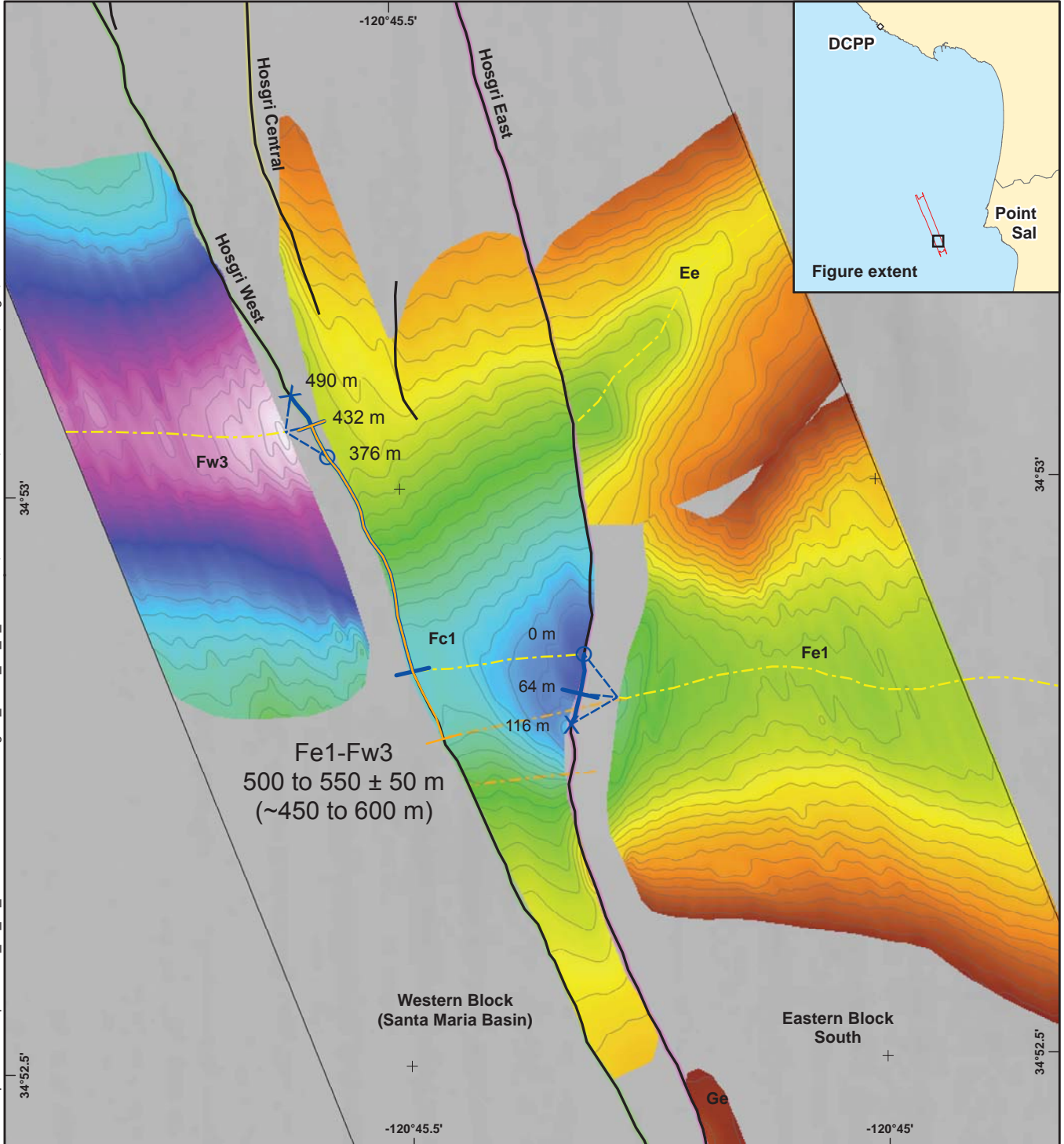
**OFFSHORE LESS STUDIES**

PG&E Pacific Gas and Electric Company

Figure **6-51a**



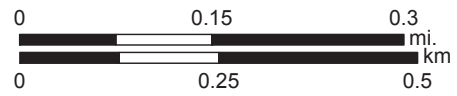
File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_6-51b\_Ch\_F\_Offset.mxd; Date: 7/17/2014; User: Robert Dame, Fugro; Rev: 3



**EXPLANATION**

- Fault
  - - - Channel thalweg mapped from seismic-reflection data
  - - - Channel thalweg projected across Hosgri fault splays
  - Hosgri central strand
  - Hosgri eastern strand
  - Hosgri western strand
- Horizontal Offset Measurements
- T Preferred
  - X Maximum
  - O Minimum
- Channel Depth
- 116 ms (~93 m)
  - 340 ms (~272 m)
- 2012 Point Sal 3D high-resolution survey extent

Source: Project DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:9,500

**Channel F Offset and Uncertainty, HFZ East and West**

**OFFSHORE LESS STUDIES**

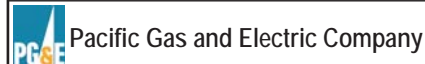
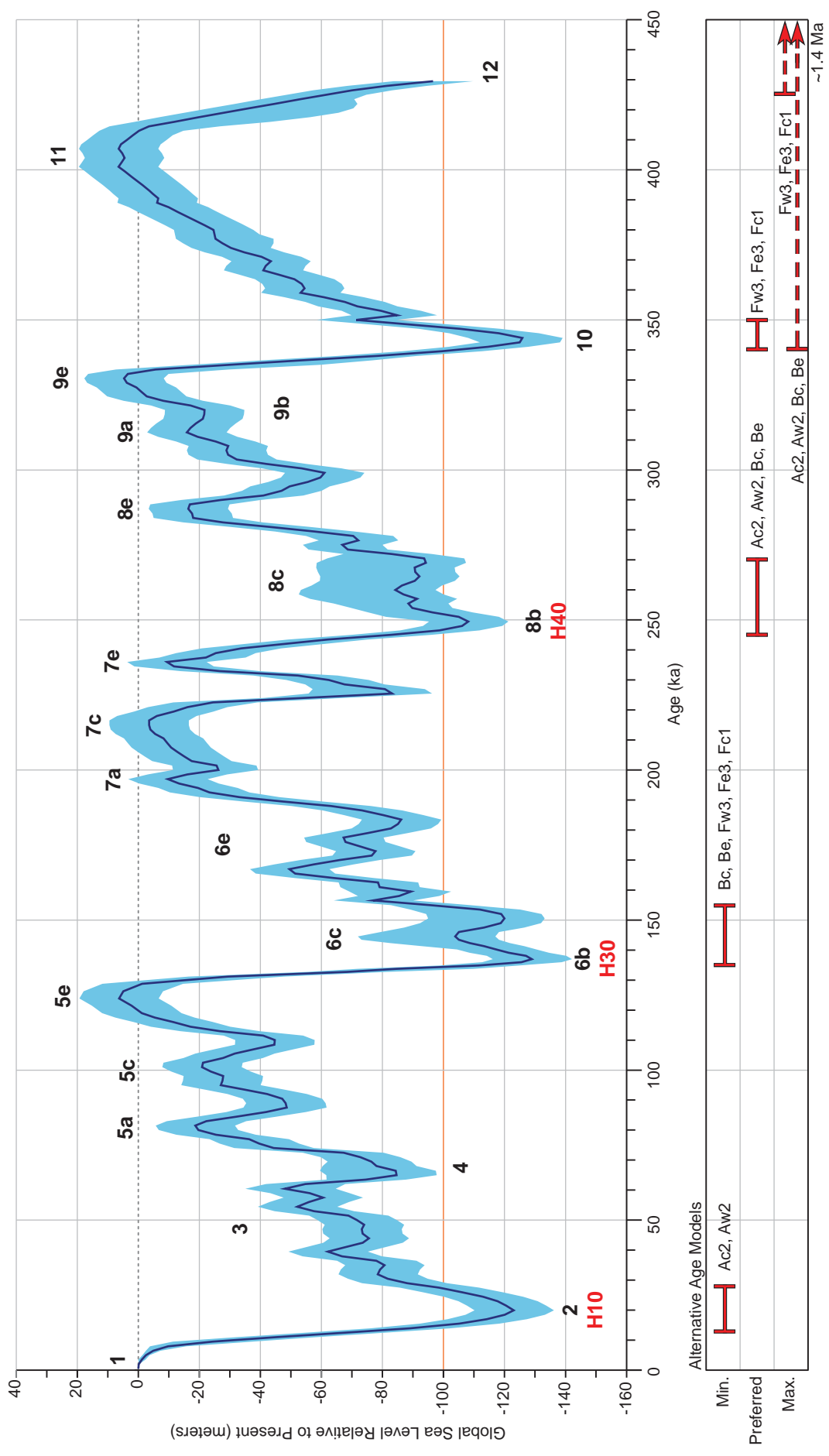


Figure **6-51b**



**EXPLANATION**

- Sea-level curve
- ▭ Uncertainty
- 5a** Marine isotope stage, substage
- ▭ Point Sal paleochannels

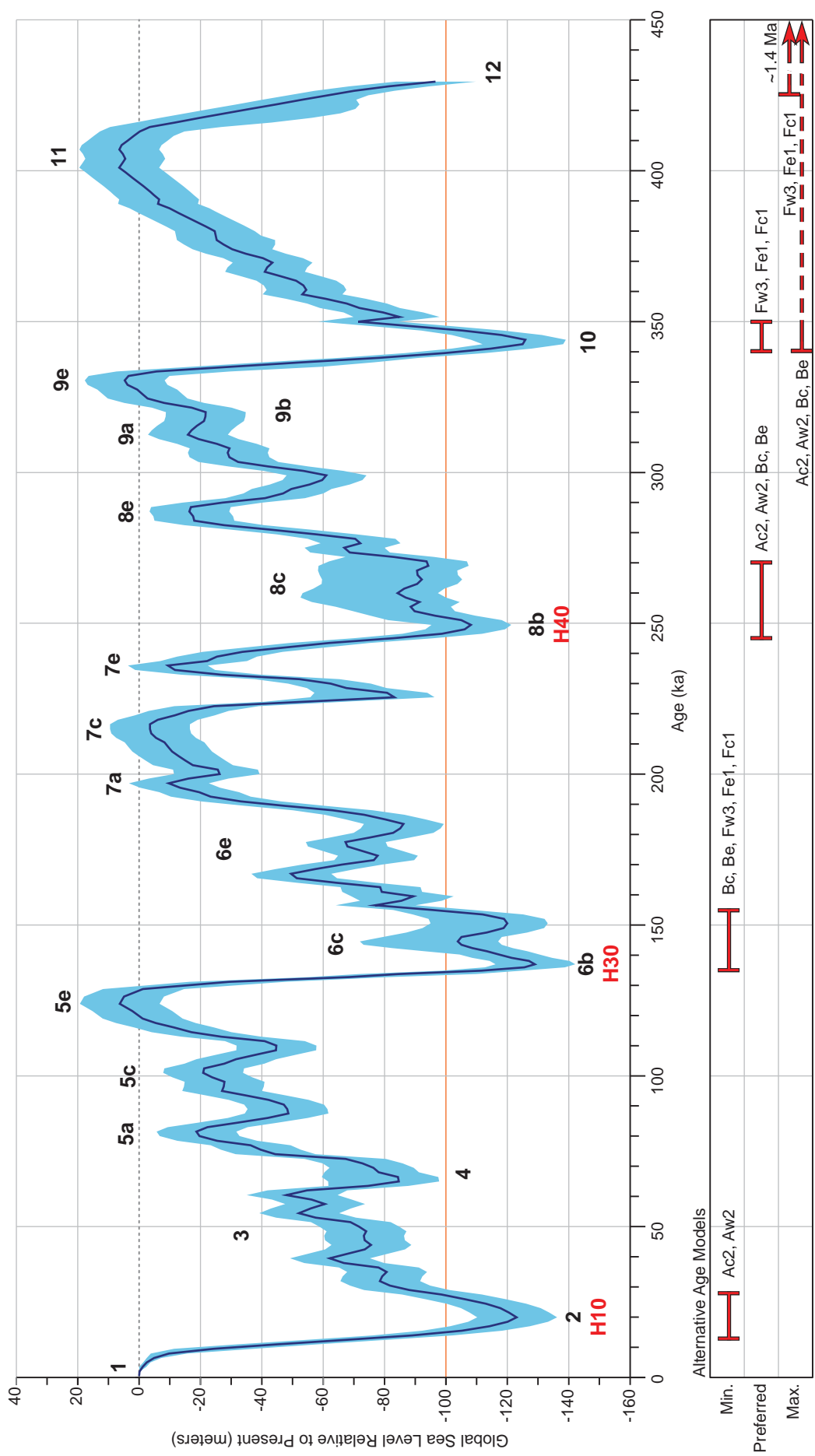
**Preferred Age Model for Paleochannels, Point Sal**

OFFSHORE LESS STUDIES

Notes:  
 1. See Figures 6-35 through 6-48 for illustrations of Point Sal paleochannels.  
 2. Sea-level curve modified from Waelbroeck et al. (2002).

Filepath: N:\Projects\04\_2013\04\_7922\_4500\_PGE\seismic\Date\Interpretation\Outputs\2014\_04\_20\_LESSStudies\Rev3\Figure\_6-52a\_PaleochannelAgeModel.al; Date: 07/23/2014; User: Bryan Bergkamp; Fugro; Rev:3





**EXPLANATION**

- Sea-level curve
- ⊂ Uncertainty
- 5a Marine isotope stage, substage
- H Point Sal paleochannels

**Notes:**

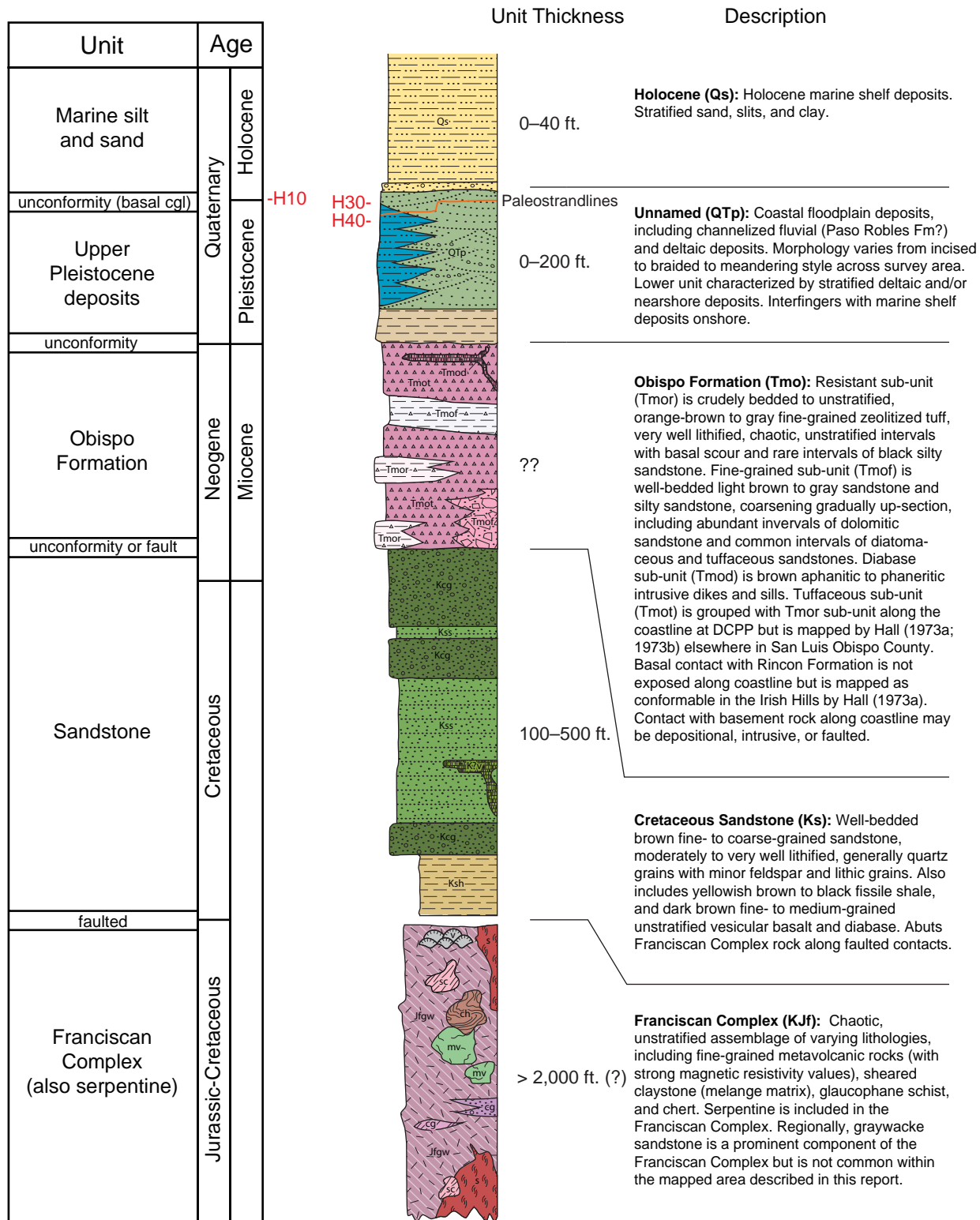
1. See Figures 6-35 through 6-48 for illustrations of Point Sal paleochannels.
2. Sea-level curve modified from Waelbroeck et al. (2002).

**Alternative Age Model for Paleochannels, Point Sal**


**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company **Figure 6-52b**

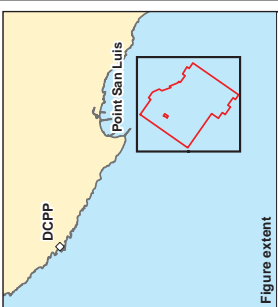
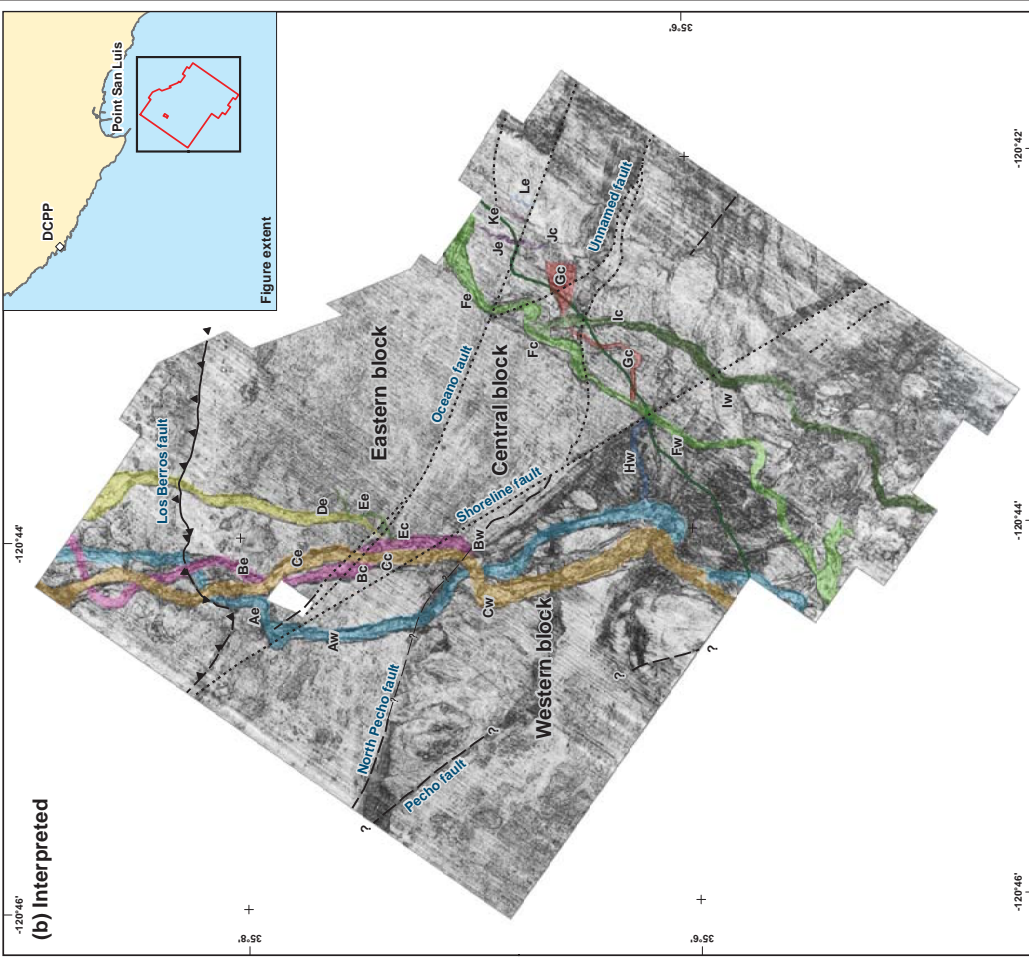
File path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\Figure\_7-1\_SLB\_OffshoreStratColumn.ai; Date: 05/11/2014; User: Bryan Bergkamp; Fugro; Rev:3



Source: Modified from Hall (1973).

<b>Stratigraphy of the Northern San Luis Obispo Bay Area</b>	
<b>OFFSHORE LESS STUDIES</b>	
 Pacific Gas and Electric Company	Figure <b>7-1</b>





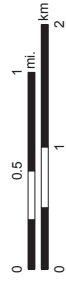
**EXPLANATION**

**Bedrock Source Channel Complexes**

Complex 1 San Luis Obispo Creek Initial Channel Incision	Complex 2 Pismo Creek Initial Channel Incision	Complex 3 Overflow or Locally Sourced Initial Channel Incision	Younger	Older
A, B, C, D, E	F, G, H, I	J, K, L		
Reoccupation	Reoccupation	Reoccupation		
A, B	F, G, H, I	J, K, L		

Fault  
 Onlap of Upper Pleistocene deposits onto bedrock surface  
 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

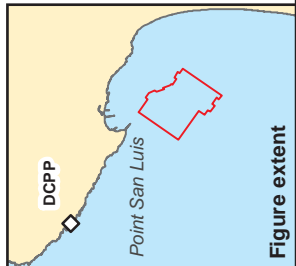
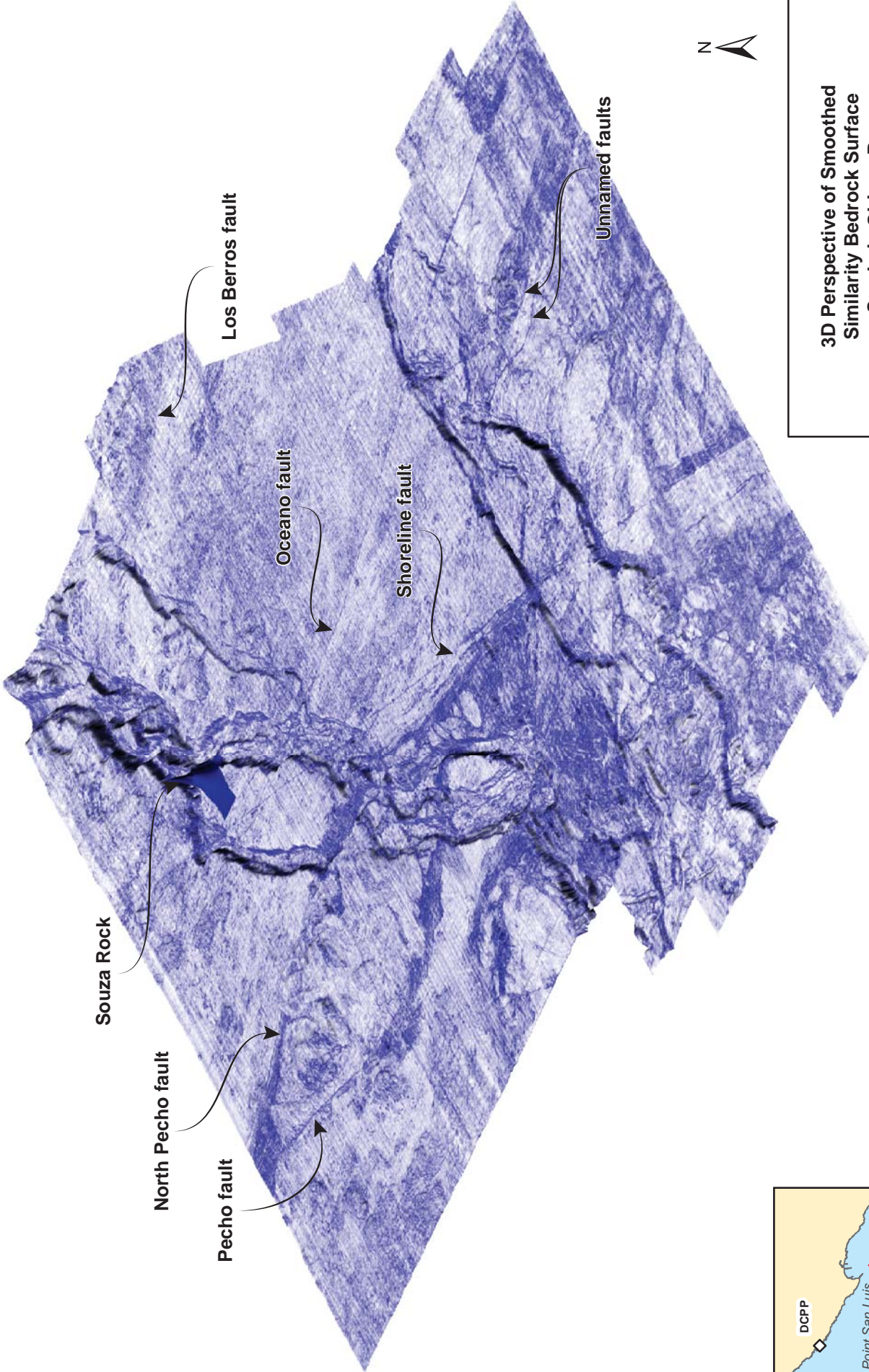
Note: Smoothed similarity attribute calculated using a 10 ms window.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:40,000

**Smoothed Similarity Bedrock Surface,  
Uninterpreted and Interpreted,  
San Luis Obispo Bay**


	<b>OFFSHORE LESS STUDIES</b>
Pacific Gas and Electric Company	Figure <b>7-2</b>



**3D Perspective of Smoothed Similarity Bedrock Surface San Luis Obispo Bay**

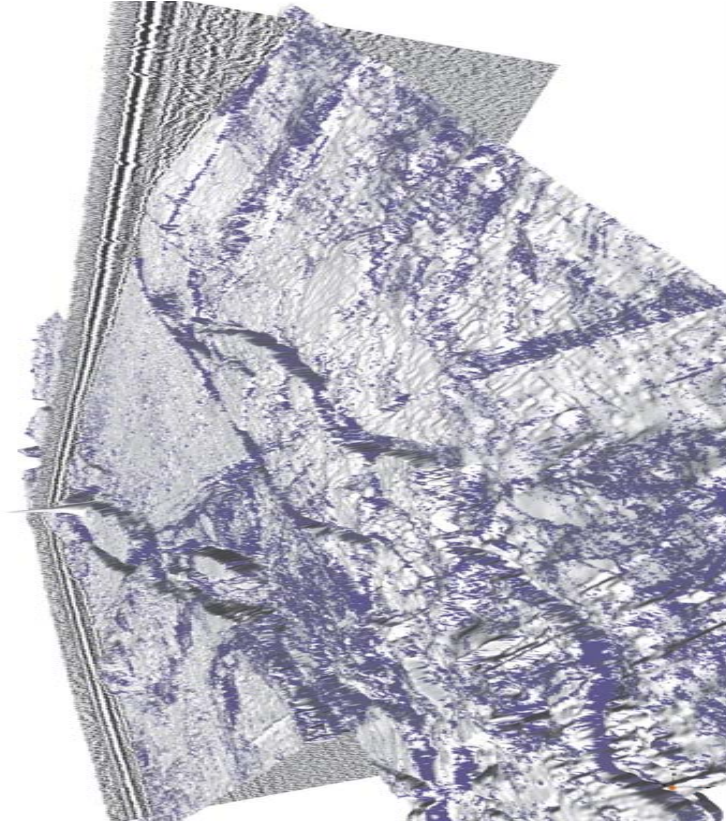
**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company **Figure 7-3**

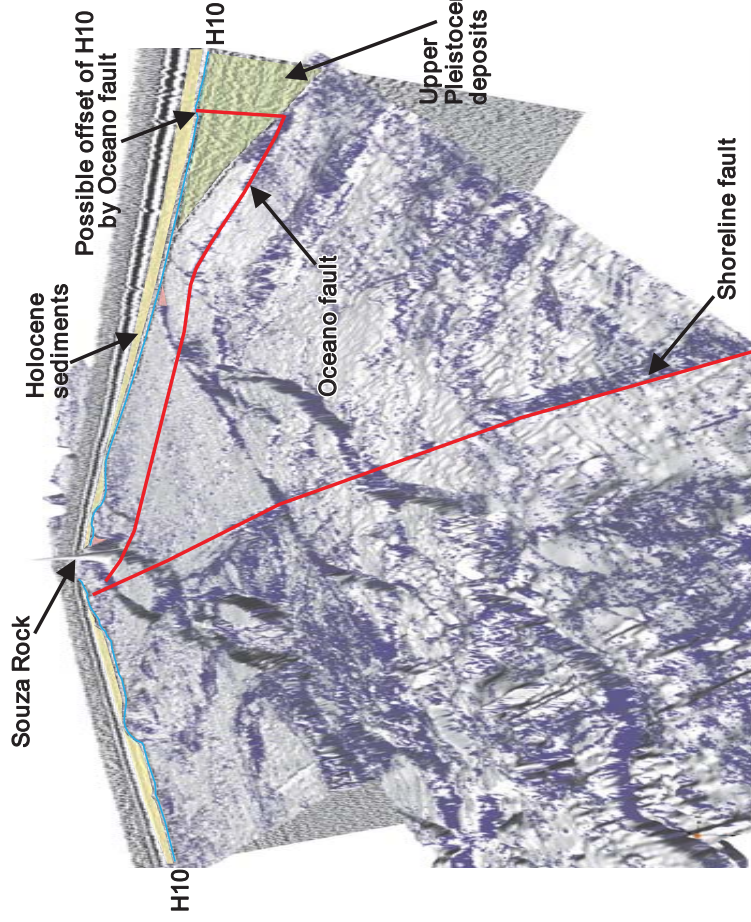




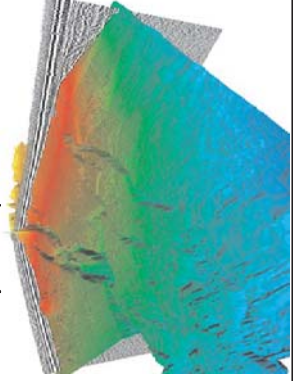
(a) Uninterpreted



(b) Interpreted

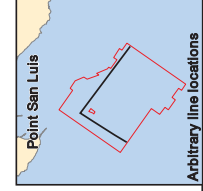


(c) 3D perspective view of shaded-relief bedrock surface and arbitrary 2D seismic profile



**EXPLANATION**

- Mapped fault splay
- Horizon H10
- Holocene sediments
- Paleochannel fill sediments
- Upper Pleistocene deposits
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



3D Perspective of Dip of Maximum Similarity  
Bedrock Surface Showing Regional  
Paleochannel and Fault Geometry  
in the San Luis Obispo Bay 3D Survey Area

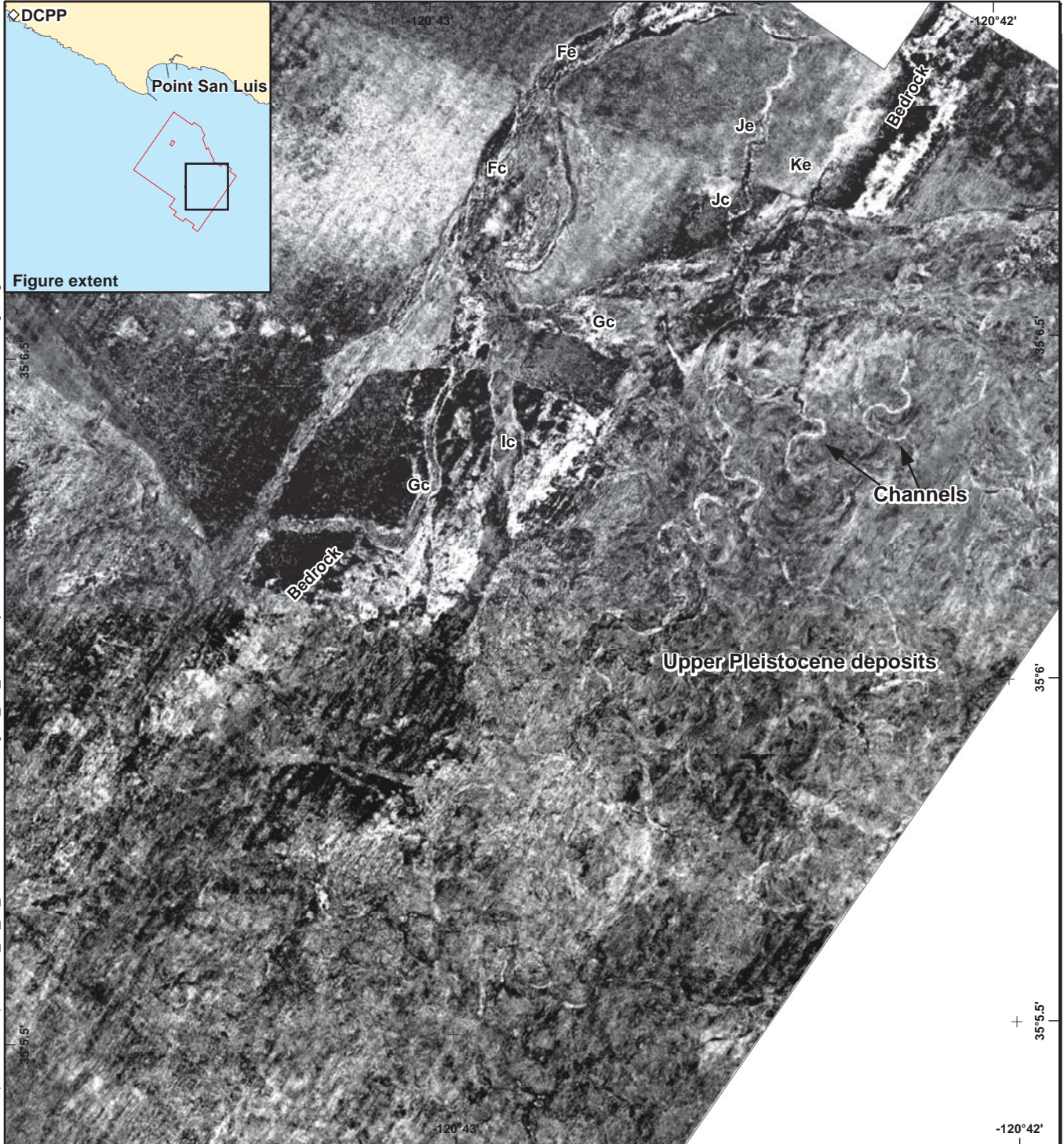
OFFSHORE LESS STUDIES




Figure 7-4

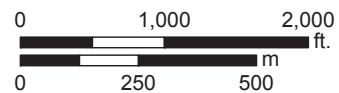


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-5\_QuaternarySlice.mxd; Date: 6/30/2014; User: Raron Dulberg, Fugro; Rev:3



**EXPLANATION**

-  2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:16,000

**Inclined Amplitudes Time Slice Showing  
Pre-Holocene Channels in  
Upper Pleistocene Deposits**

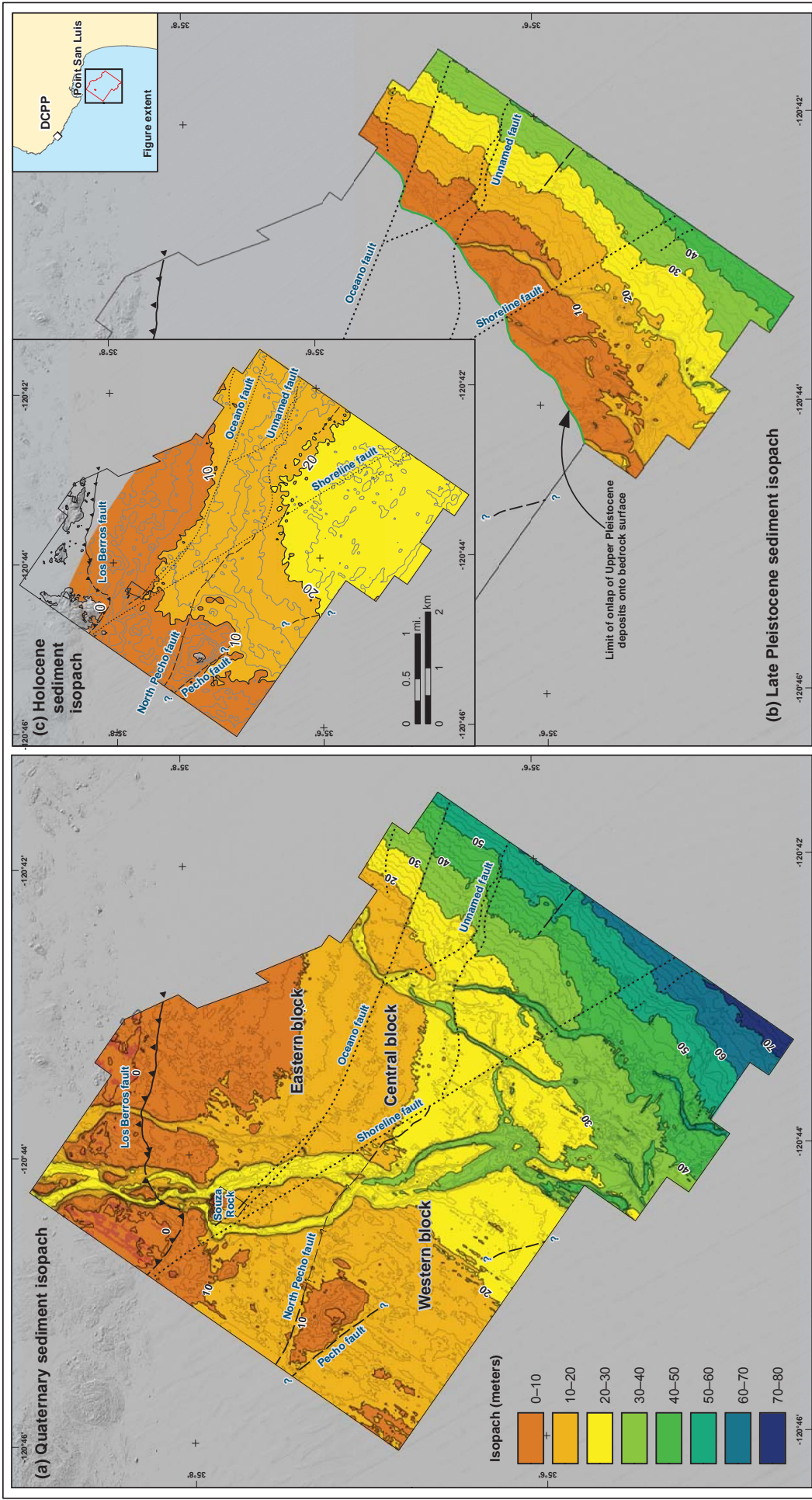
**OFFSHORE LESS STUDIES**

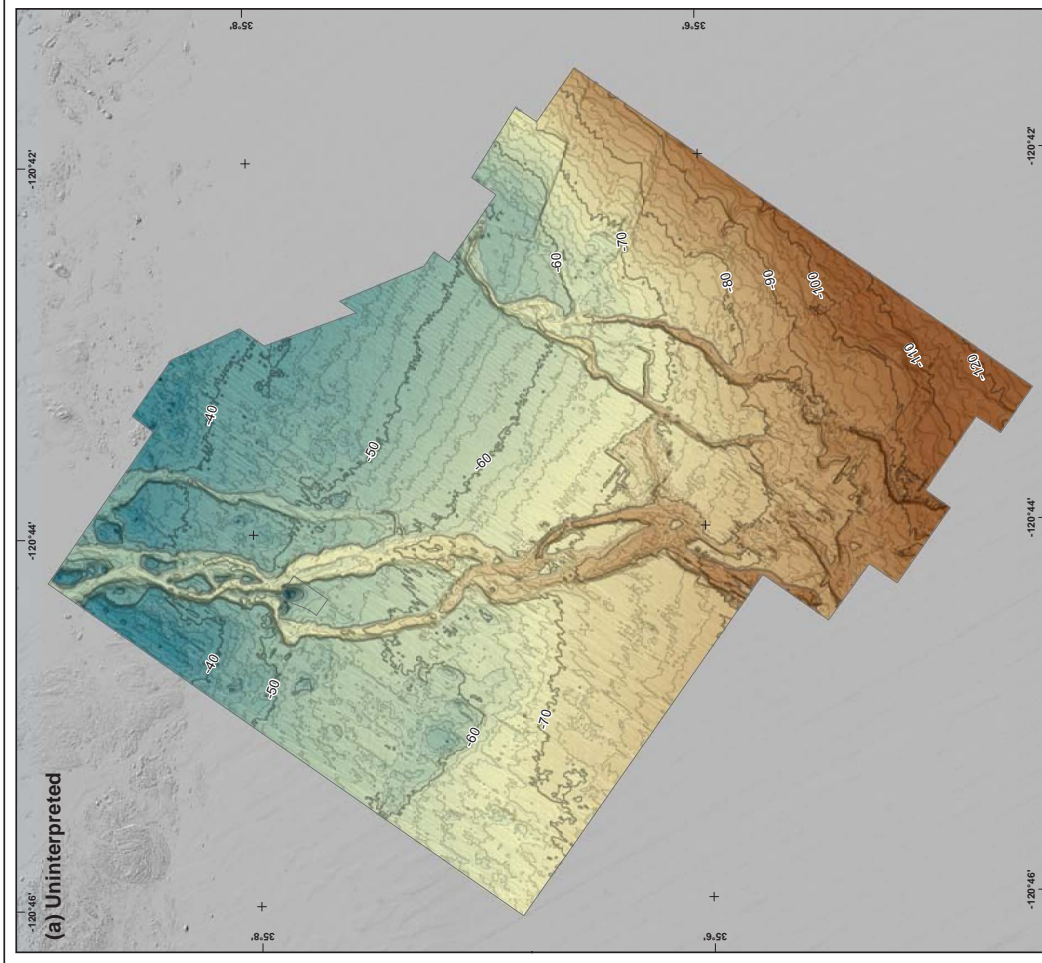
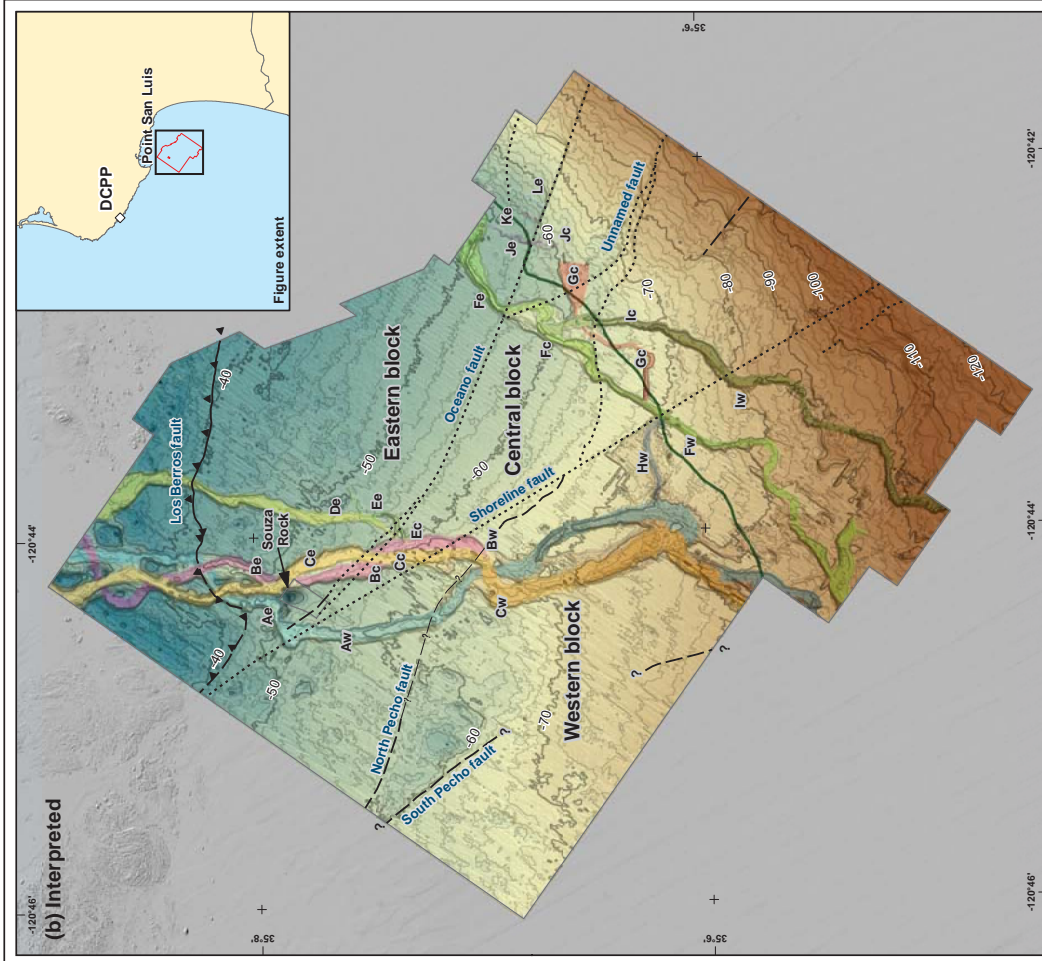


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Figure **7-5**







**EXPLANATION**

**Bedrock Source Channel Complexes**

- Complex 1: San Luis Obispo Creek (Initial Incision: A, B, C, D, E; Recaptivation: A, B)
- Complex 2: Pismo Creek (Channel Incision: G, H; Recaptivation: F, I)
- Complex 3: Overflow of Locally Sourced (Initial Incision: K, L; Recaptivation: J)

**Fault**

- Onlap of Upper Pleistocene deposits onto bedrock surface (dashed line)
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent (red outline)

**Notes:**

- Contour interval is 2 m. Heavy contours are 10 m.
- Souza Rock bedrock surface mapped from Seafloor Mapping Lab of California State University Monterey Bay bathymetry.

**Scale:** 0 to 1 km, 0 to 1 mi

**Map projection and scale:** WGS 84 / UTM Zone 10N, 1:40,000

**Figure extent:** DCPD, Point San Luis

**Top of Bedrock Surface Structural Contour Map, Interpreted and Uninterpreted, San Luis Obispo Bay**

**OFFSHORE LESS STUDIES**

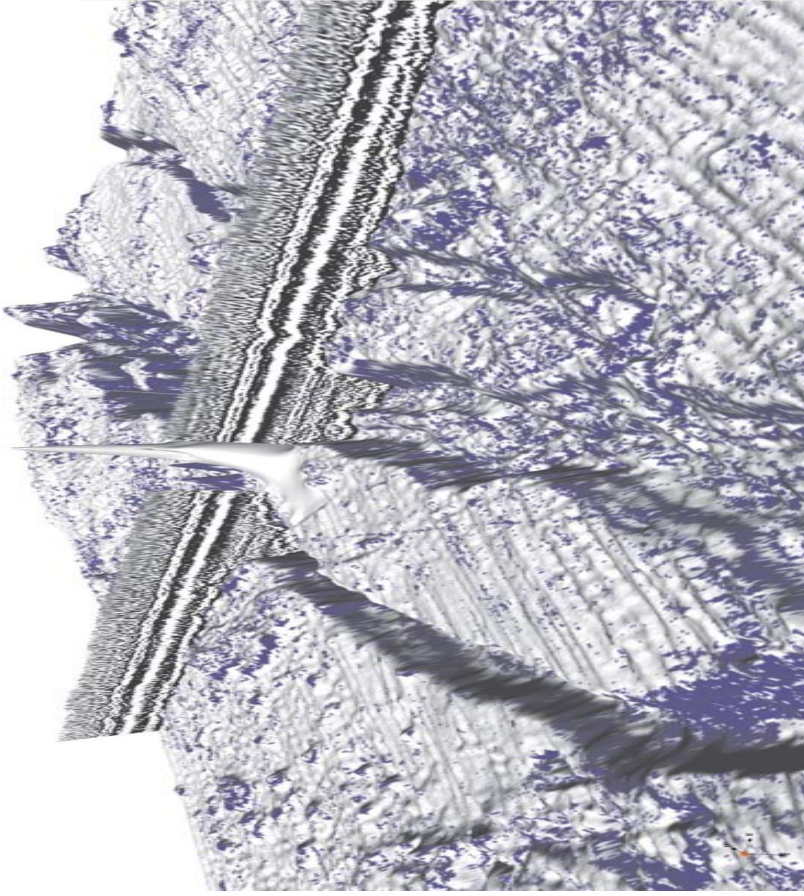
Pacific Gas and Electric Company Figure **7-7**



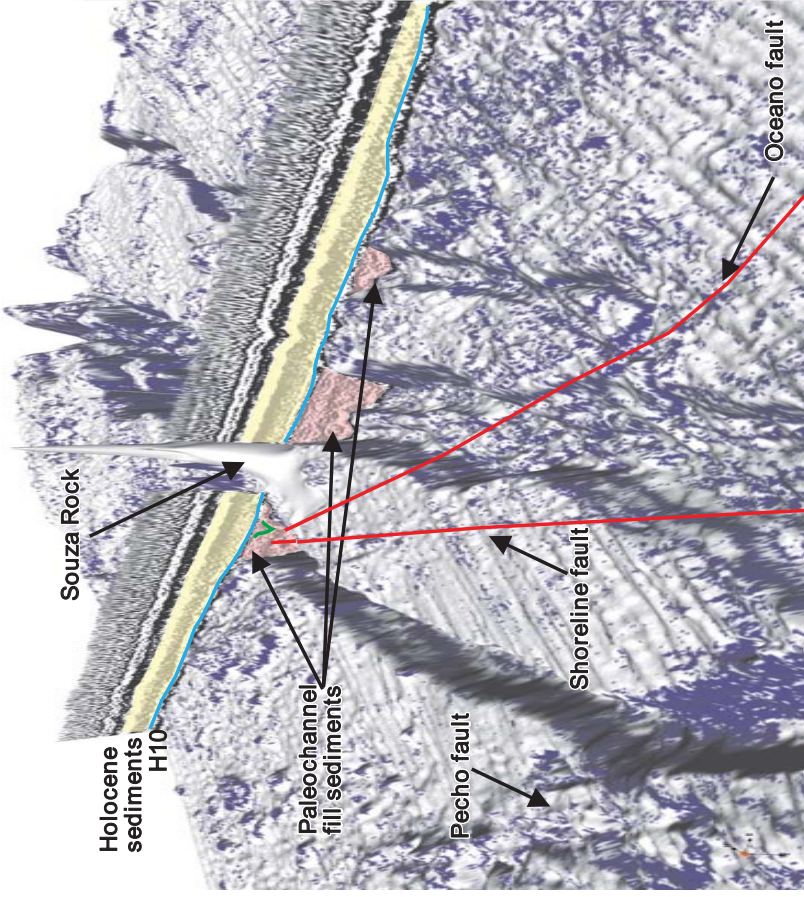




(a) Uninterpreted



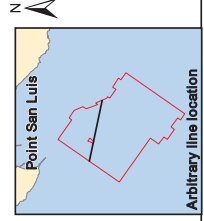
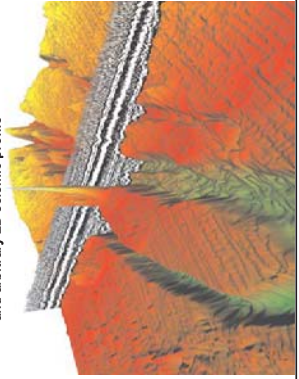
(b) Interpreted



**EXPLANATION**

- Mapped fault splay
- Horizon H10
- Nested Paleochannel A
- Holocene sediments
- Paleochannel fill sediments
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

(c) 3D perspective view of shaded-relief bedrock surface and arbitrary 2D seismic profile



3D Perspective of Dip of Maximum Similarity Bedrock Surface Showing Shoreline and Oceano Fault Geometry near Piercing Point A

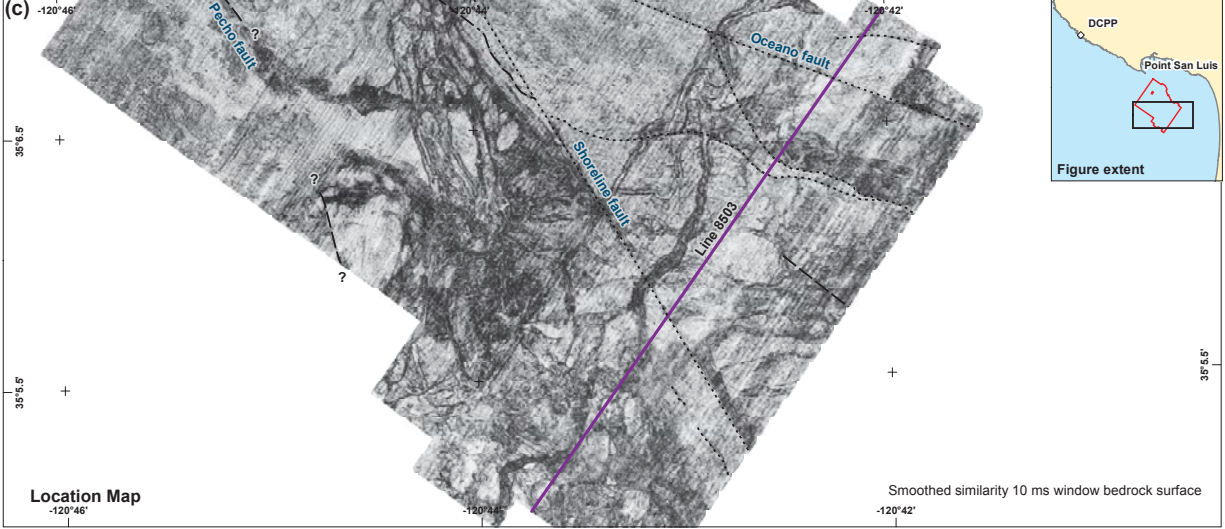
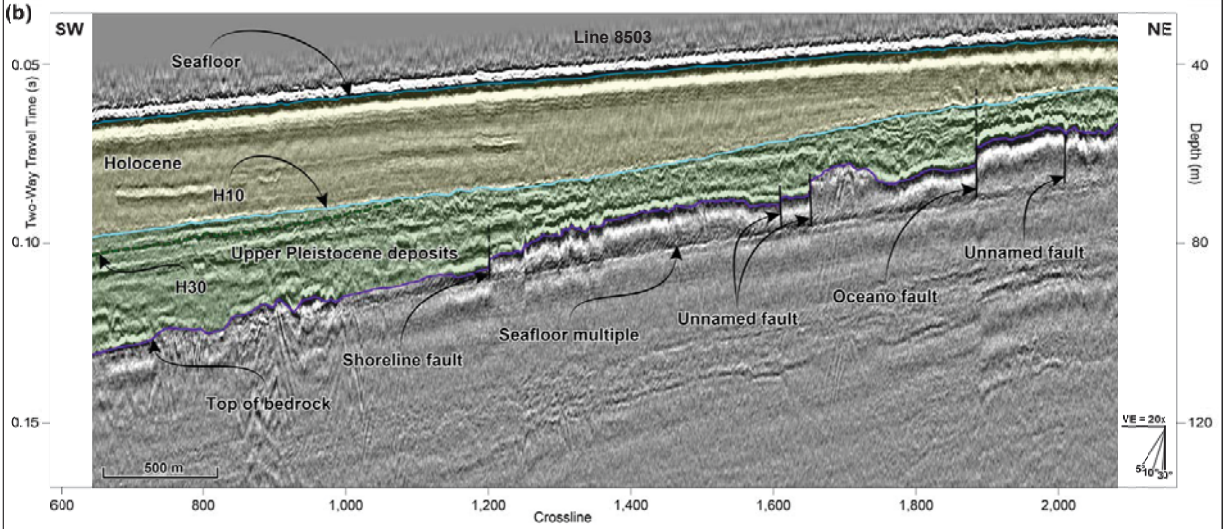
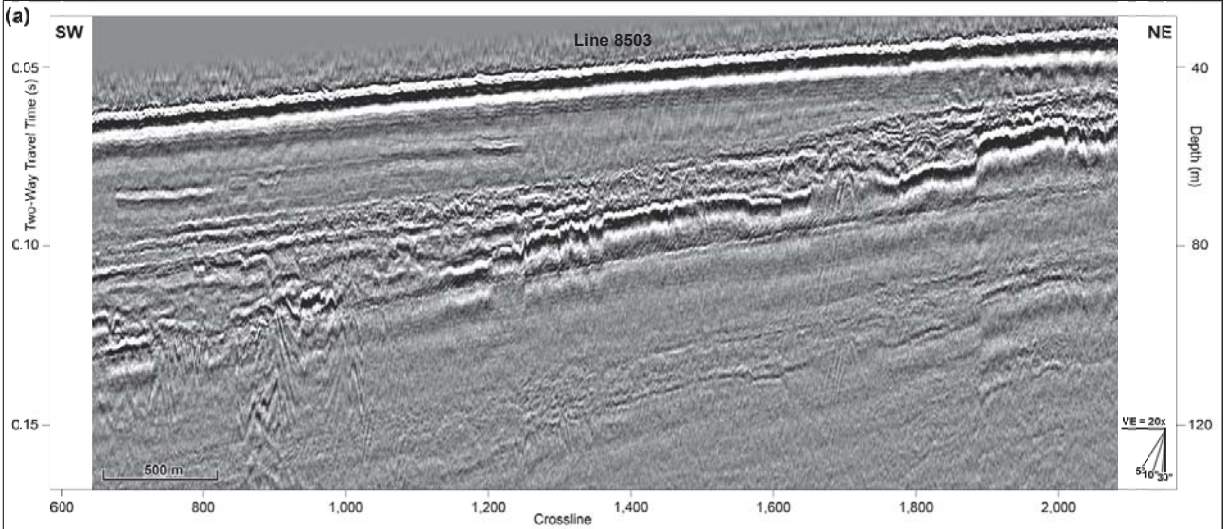
OFFSHORE LESS STUDIES

Pacific Gas and Electric Company

Figure 7-9



File Path: N:\Projects\04\_201304\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd; Figure: 7-10\_Line8503.mxd; Date: 7/17/2014; User: Robert Darné, Fugro; Rev: 3

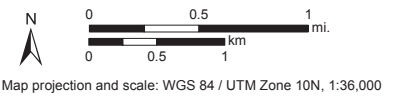


**EXPLANATION**

- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent
- Seafloor
- Unconformity H10
- Unconformity H30
- Top of bedrock
- Line 8503
- Holocene sediment
- Upper Pleistocene deposits

- Quaternary fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- Reverse fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain

Note: Depth values on seismic profile assume a velocity of 1,600 m/s.



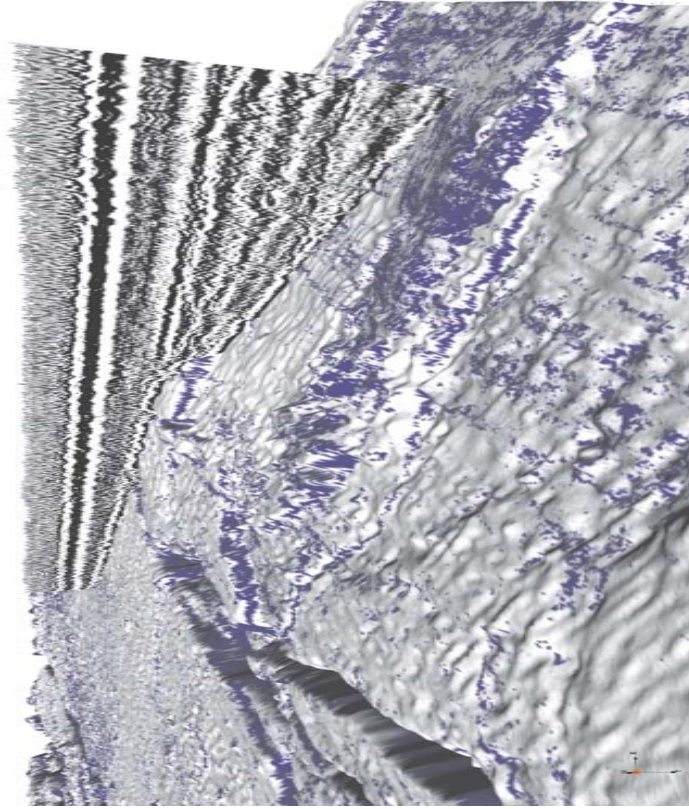
**Line 8503 with Smoothed Similarity Bedrock Surface Showing Shallow Stratigraphy**

**OFFSHORE LESS STUDIES**

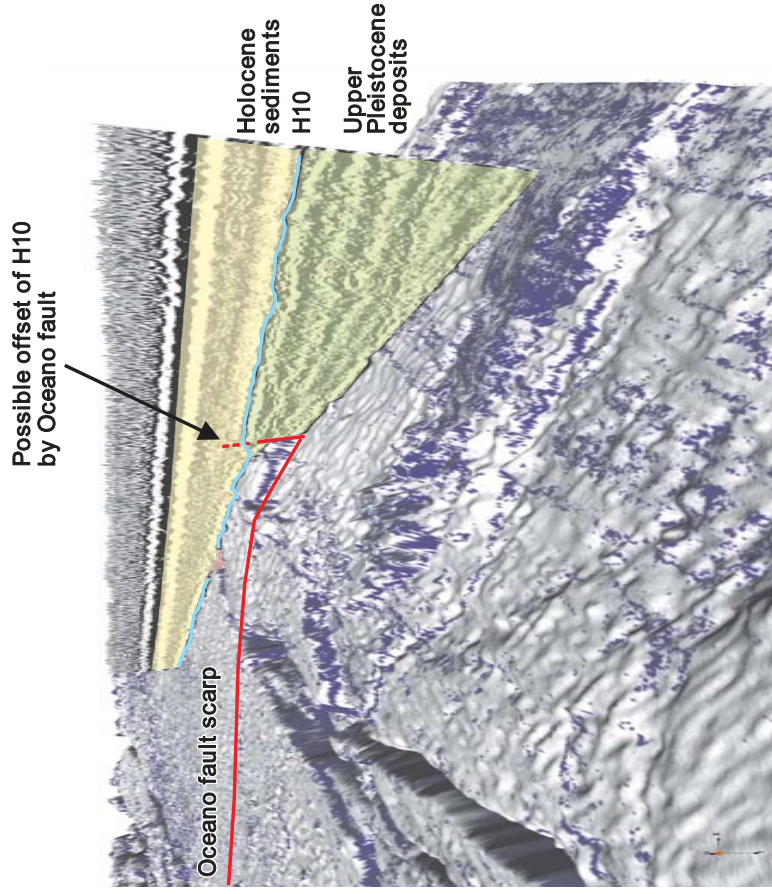
Pacific Gas and Electric Company Figure **7-10**



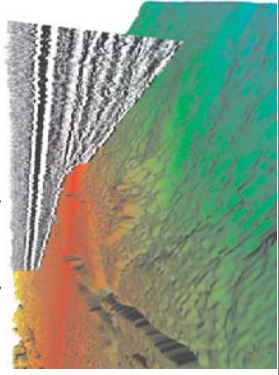
(a) Uninterpreted









(b) Interpreted

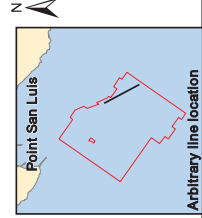



(c) 3D perspective view of shaded-relief bedrock surface and arbitrary 2D seismic profile



**EXPLANATION**

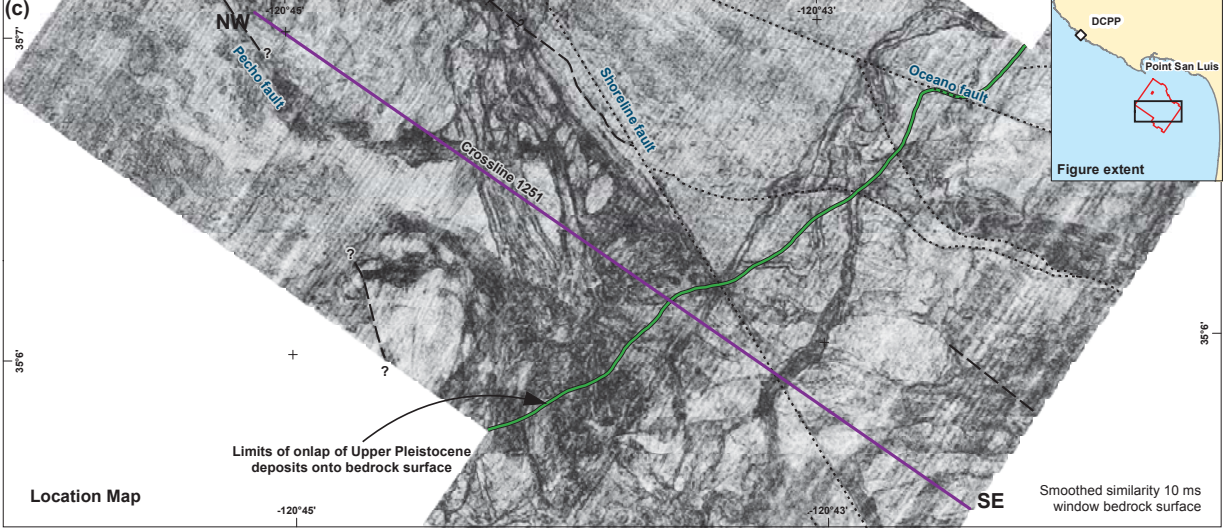
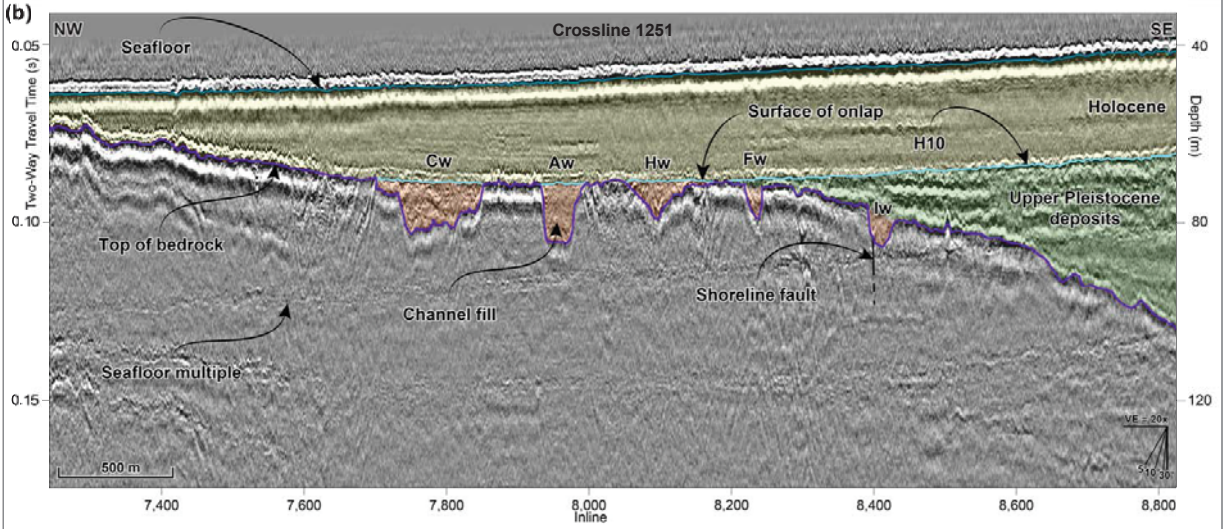
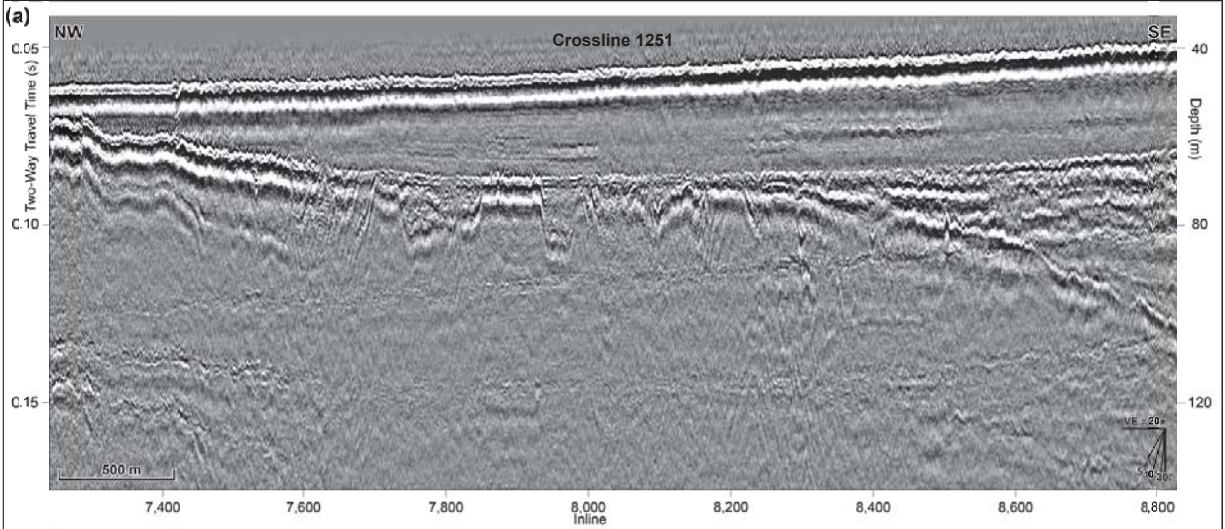
-  Mapped fault splay
-  Horizon H10
-  Holocene sediments
-  Paleochannel fill sediments
-  Upper Pleistocene deposits
-  2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



<p>3D Perspective of Dip of Maximum Similarity Bedrock Surface Showing Oceano Fault and Quaternary Sediment Geometry in the Eastern San Luis Bay 3D Survey Area</p>	
<p>OFFSHORE LESS STUDIES</p>	
	<p>Pacific Gas and Electric Company</p>
<p>Figure 7-11</p>	



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-12\_Crossline1251.mxd; Date: 7/17/2014; User: R.Dame, Fugro, Rev.3

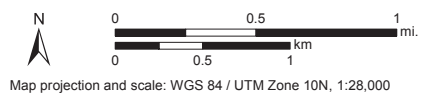


**EXPLANATION**

- Seafloor
  - - - Unconformity H10
  - Top of bedrock
  - Holocene sediment
  - Channel fill
  - Upper Pleistocene deposits
  - Onlap of Upper Pleistocene deposits onto bedrock surface
  - Crossline 1251
- Quaternary fault: solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- Reverse fault: solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain

Notes:  
 1. Depth values on seismic profile assume a velocity of 1,600 m/s.  
 2. Locations of paleochannels referenced can be found on Plate 5.

2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



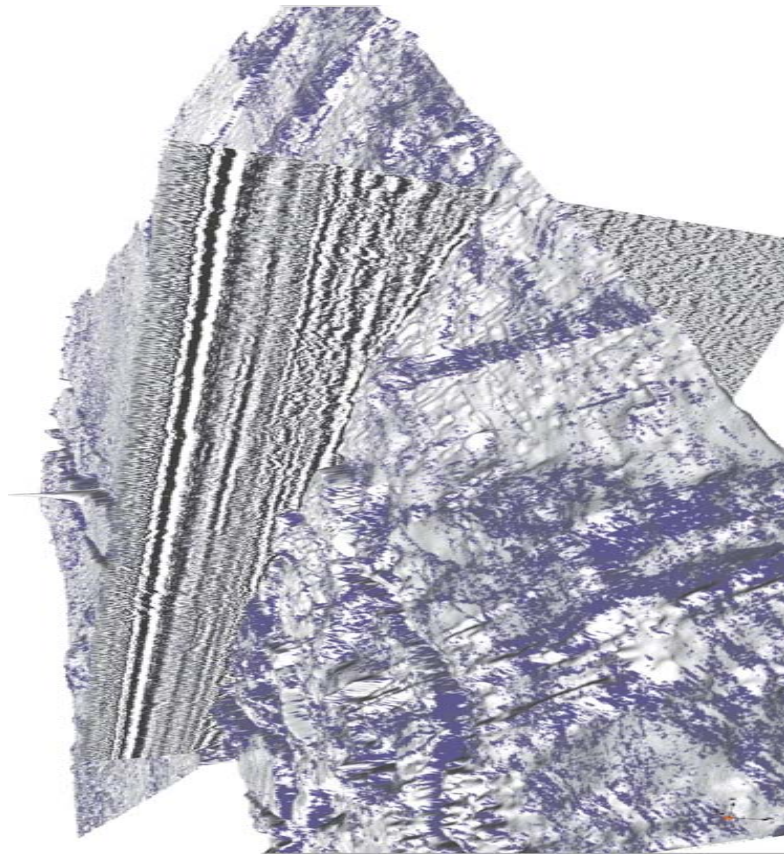
**Representative Crossline 1251 with Smoothed Similarity Bedrock Surface**

**OFFSHORE LESS STUDIES**

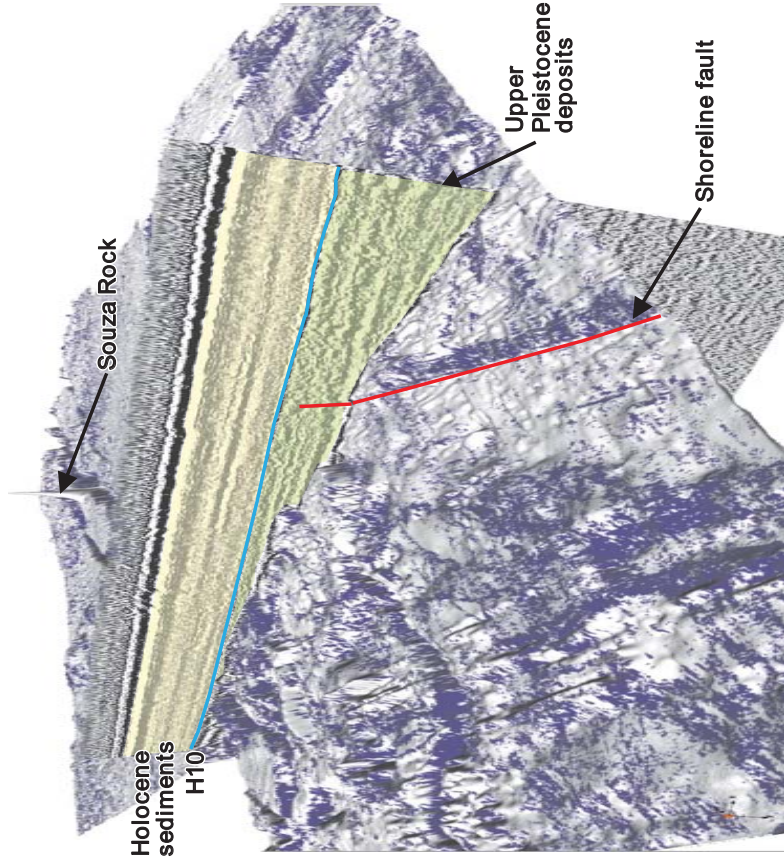
Pacific Gas and Electric Company Figure 7-12



(a) Uninterpreted



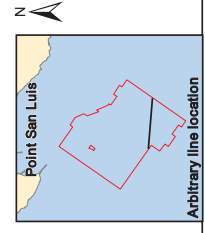
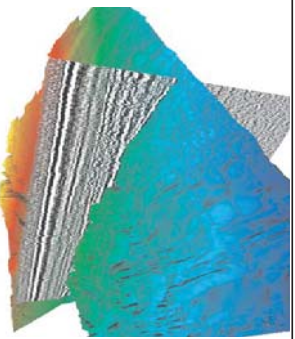
(b) Interpreted



**EXPLANATION**

- Mapped fault splay
- Horizon H10
- Holocene sediments
- Paleochannel fill sediments
- Upper Pleistocene deposits
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

(c) 3D perspective view of shaded-relief bedrock surface and arbitrary 2D seismic profile



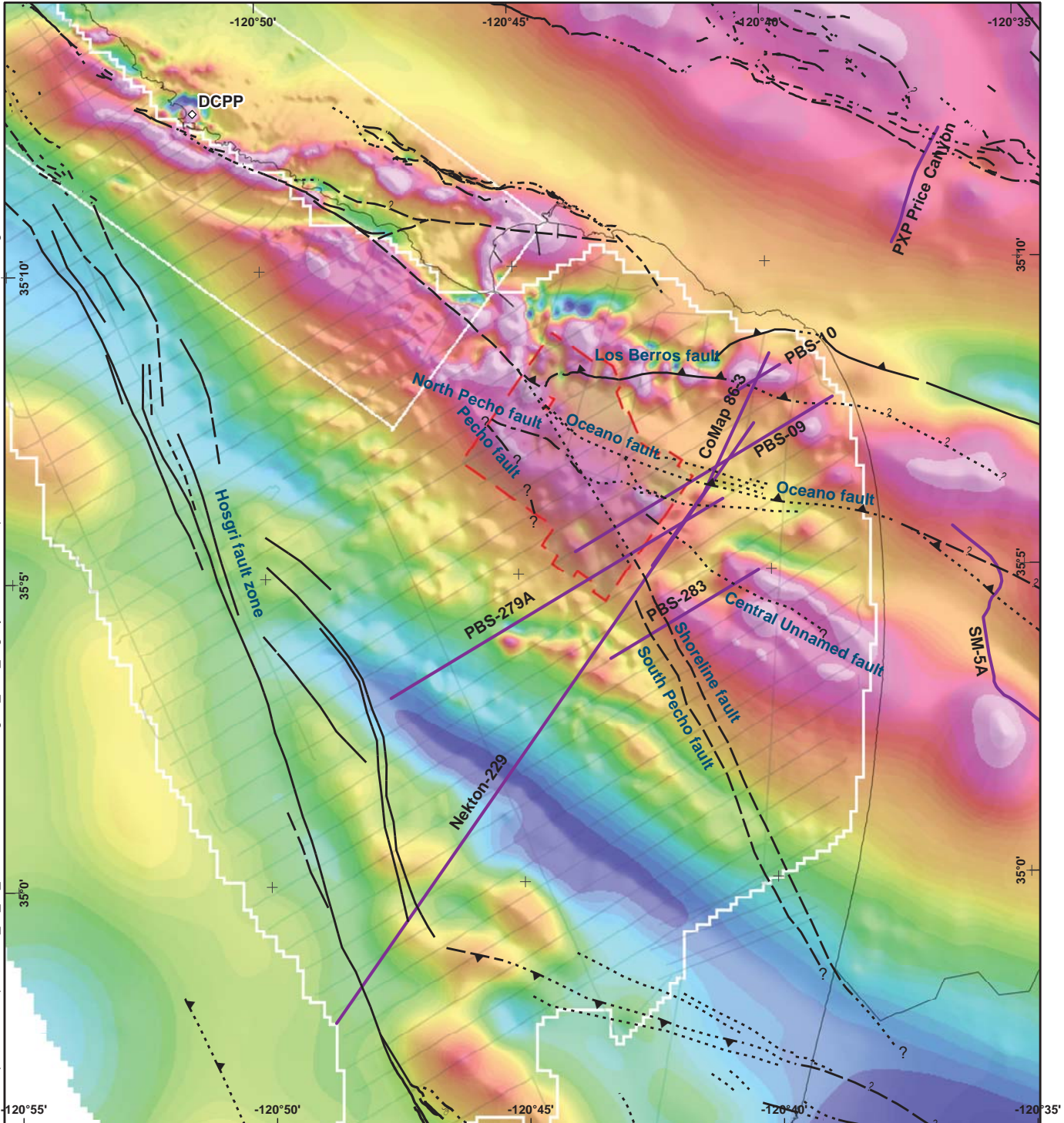
3D Perspective of Dip of Maximum Similarity Bedrock Surface Showing Shoreline Fault Geometry near Quaternary Paleoshorelines in Southern San Luis Obispo Bay

OFFSHORE LESS STUDIES	
	Pacific Gas and Electric Company
Figure 7-13	

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\pdf\figure-7-13-3D-Paleoshoreline.pdf; Date: 07/17/2014; User: Robert Dame; Fugro; Rev. 3



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-14\_LegacyArchiveFaultMap.mxd; Date: 7/17/2014; User: Robert Dame, Fugro, Rev.3



**EXPLANATION**

- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent
- Legacy archive figure line
- Legacy archive line
- Quaternary fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain
- Reverse fault; solid where well located, long dashed where approximately located, short dashed where inferred, dotted where concealed, queried where existence uncertain

Map projection: WGS 84 / UTM Zone 10N  
 Map scale: 1:175,000  
 Source: PG&E DEM compilation v2013.07.



**San Luis Obispo Bay Fault Map with Magnetic Data**

**OFFSHORE LESS STUDIES**

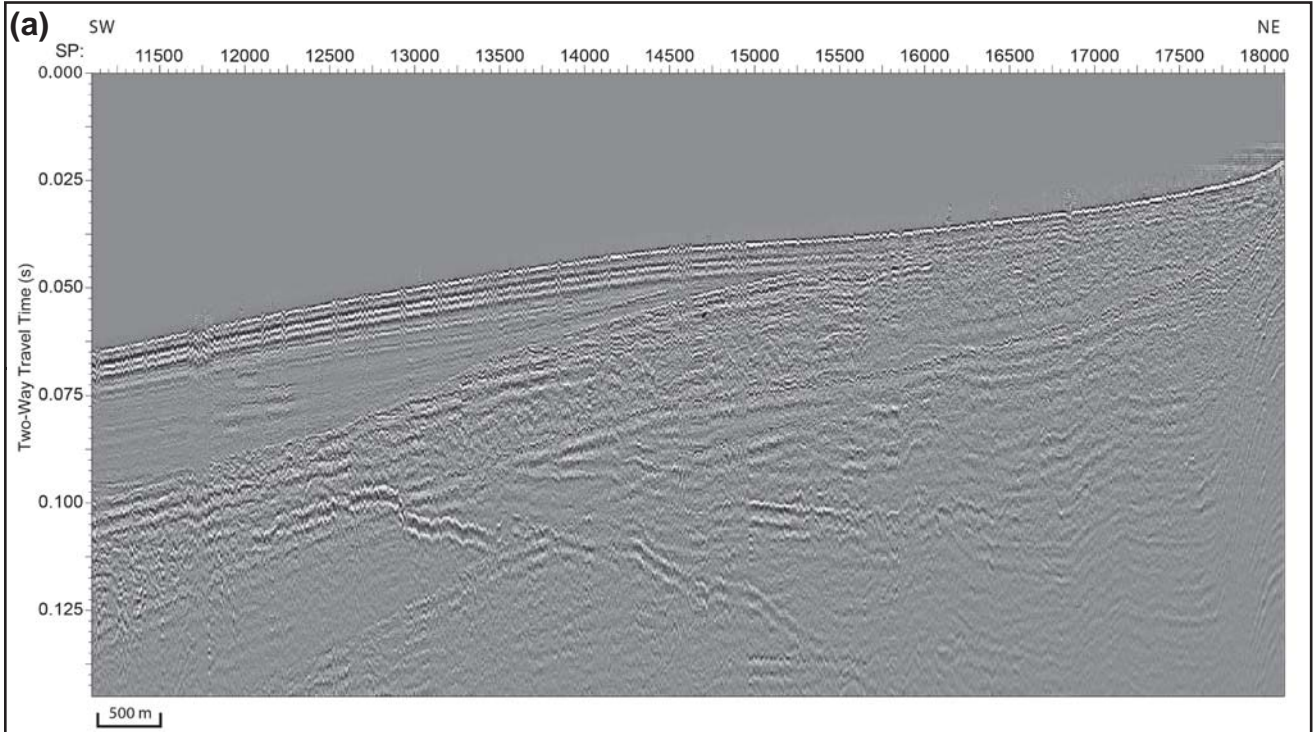
Pacific Gas and Electric Company
 Figure **7-14**



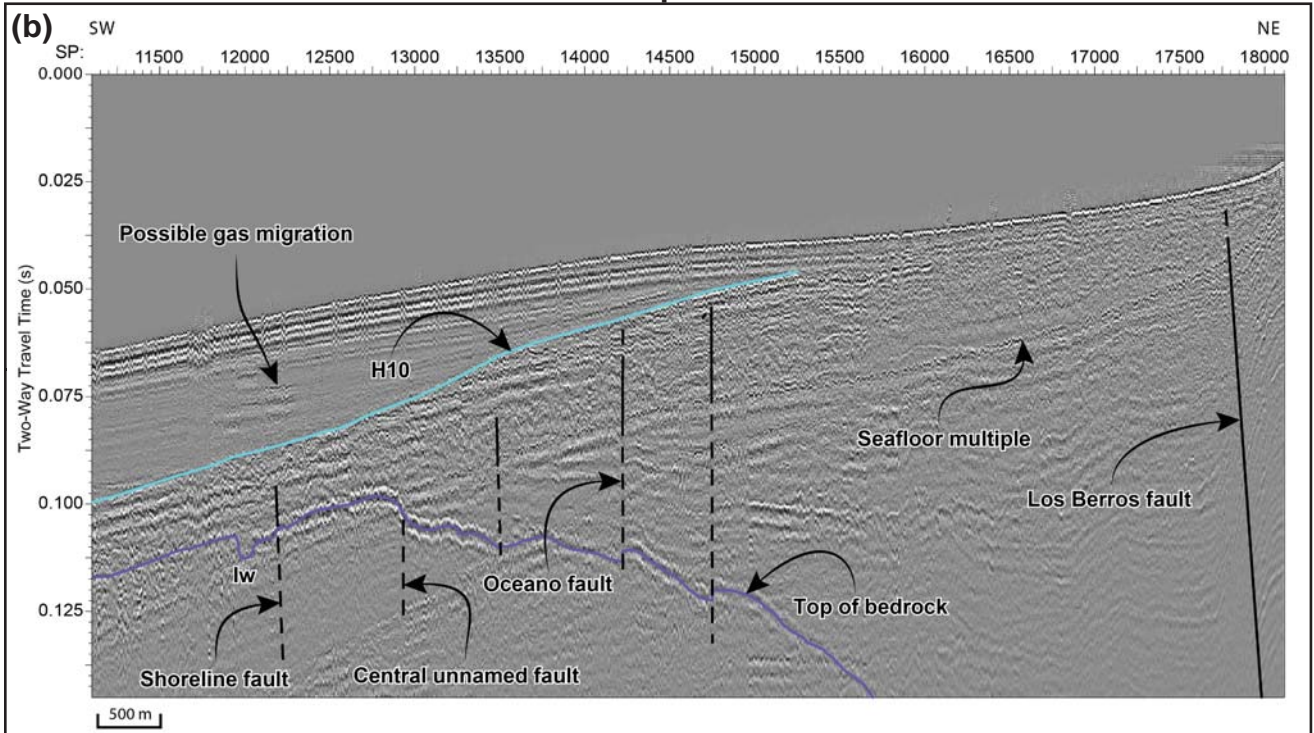


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-16\_PBS-09.mxd; Date: 6/12/2014; User: Raron Dulberg, Fugro; Rev. 3

### Uninterpreted



### Interpreted

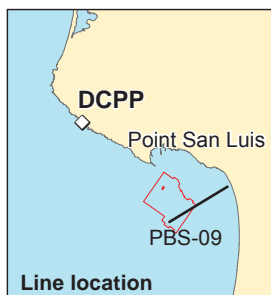


#### EXPLANATION

- H10
- Fault, dashed where inferred
- Top of bedrock
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

Note: See Figure 7-14 for seismic section location.

Source: PG&E legacy data archive.



**Line PBS-09**

**OFFSHORE LESS STUDIES**



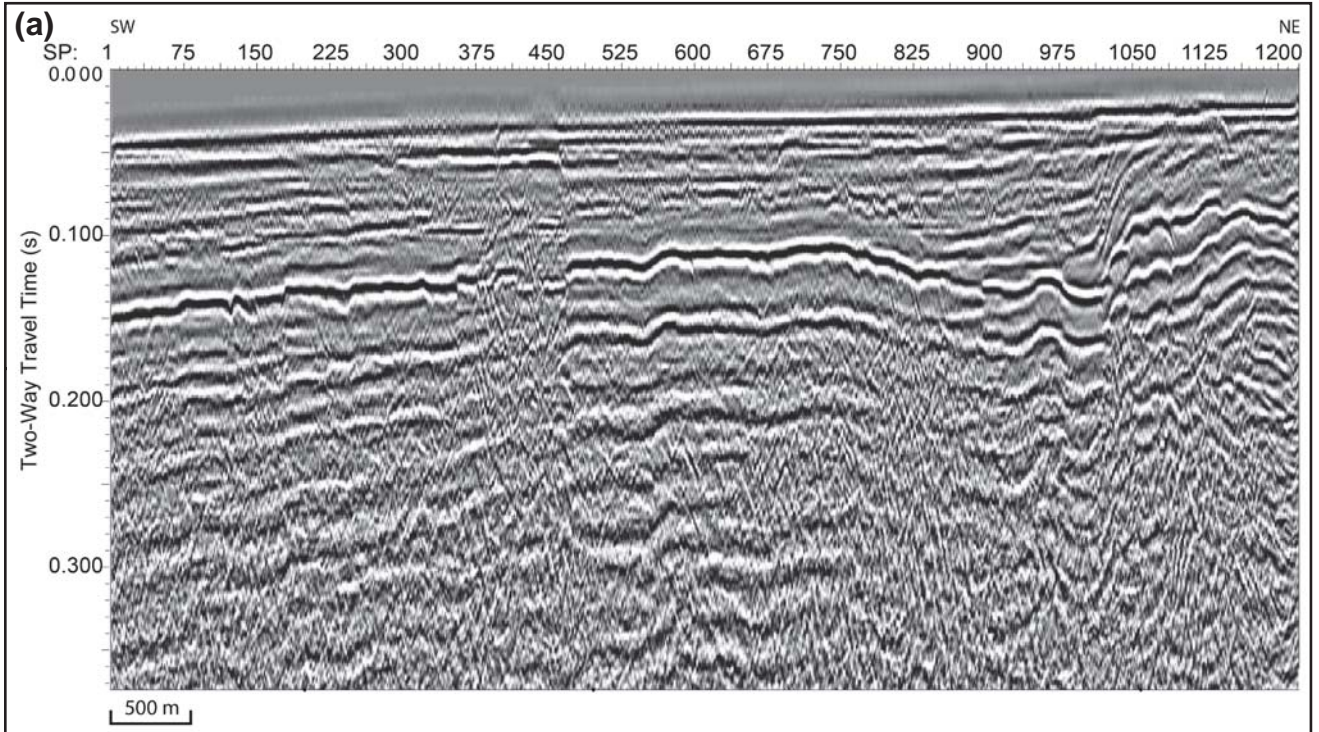
Pacific Gas and Electric Company

Figure **7-16**

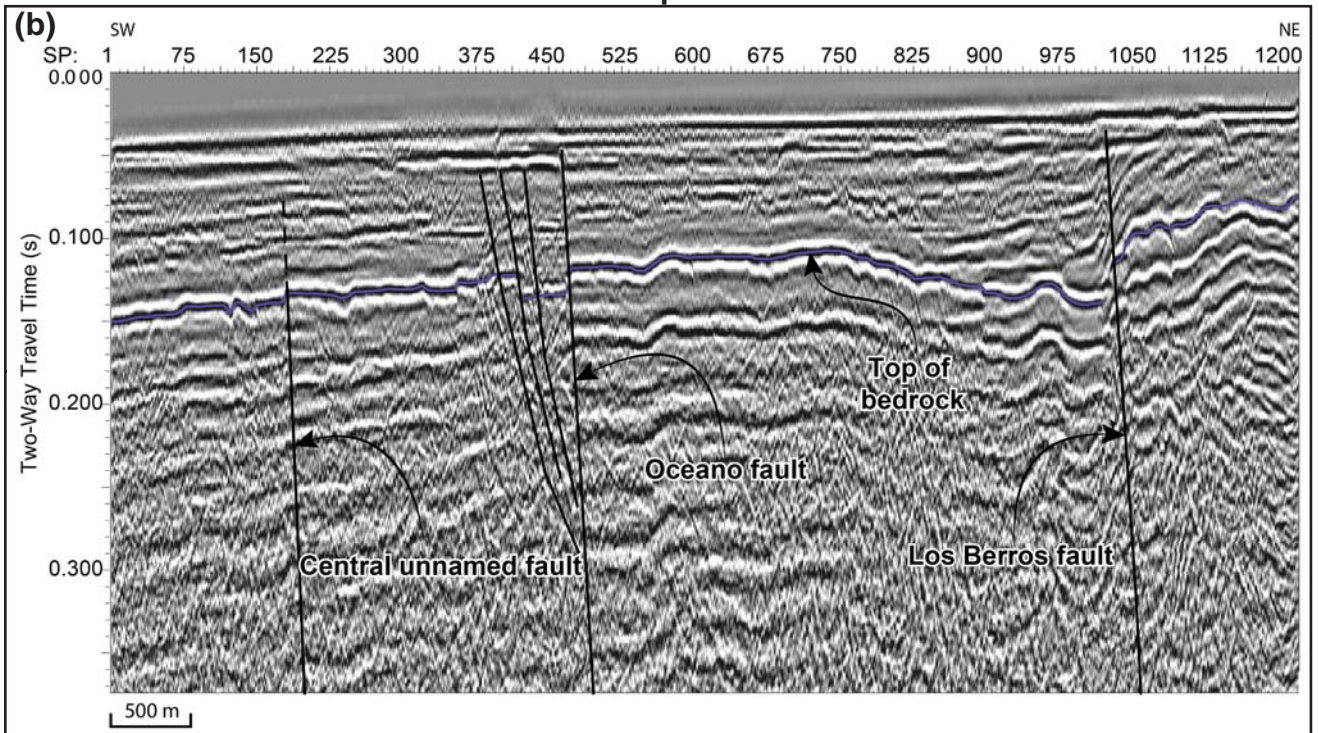


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd\Figure\_7-17\_CoMap\_83-3.mxd; Date: 6/12/2014; User: Ranon Dulberg, Fugro; Rev:3


**Uninterpreted**



**Interpreted**

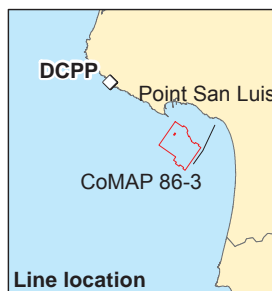


**EXPLANATION**

-  Fault
-  Top of bedrock
-  2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

Note: See Figure 7-14 for seismic section location.

Source: PG&E legacy data archive.



**Line CoMAP 86-3**

**OFFSHORE LESS STUDIES**

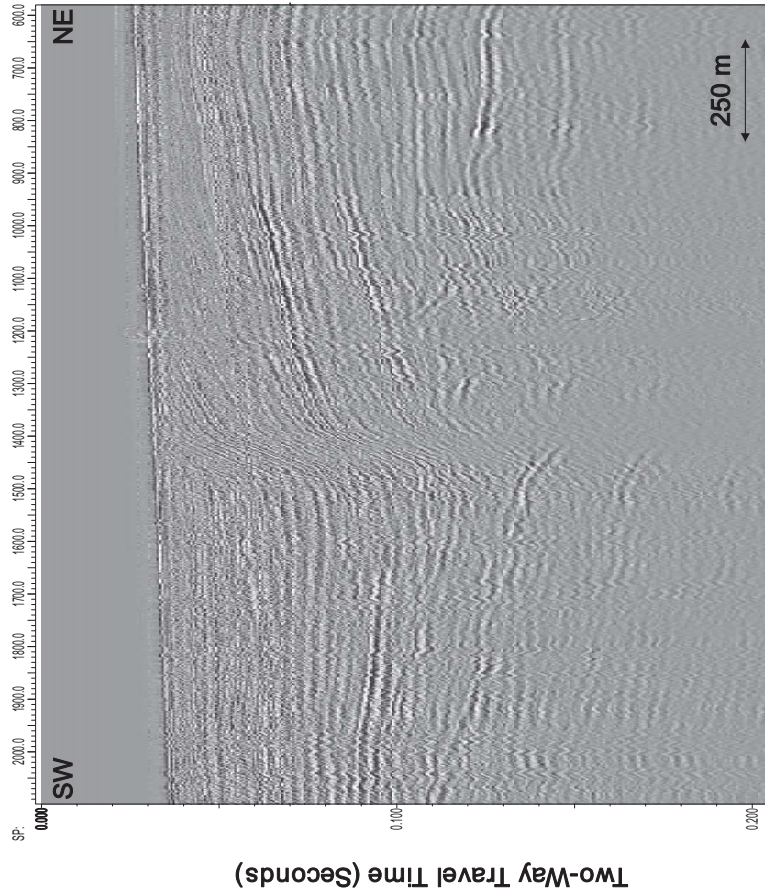


Pacific Gas and Electric Company

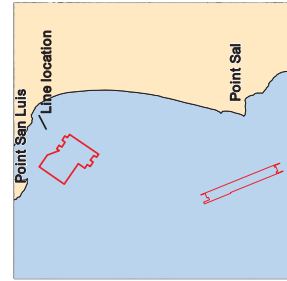
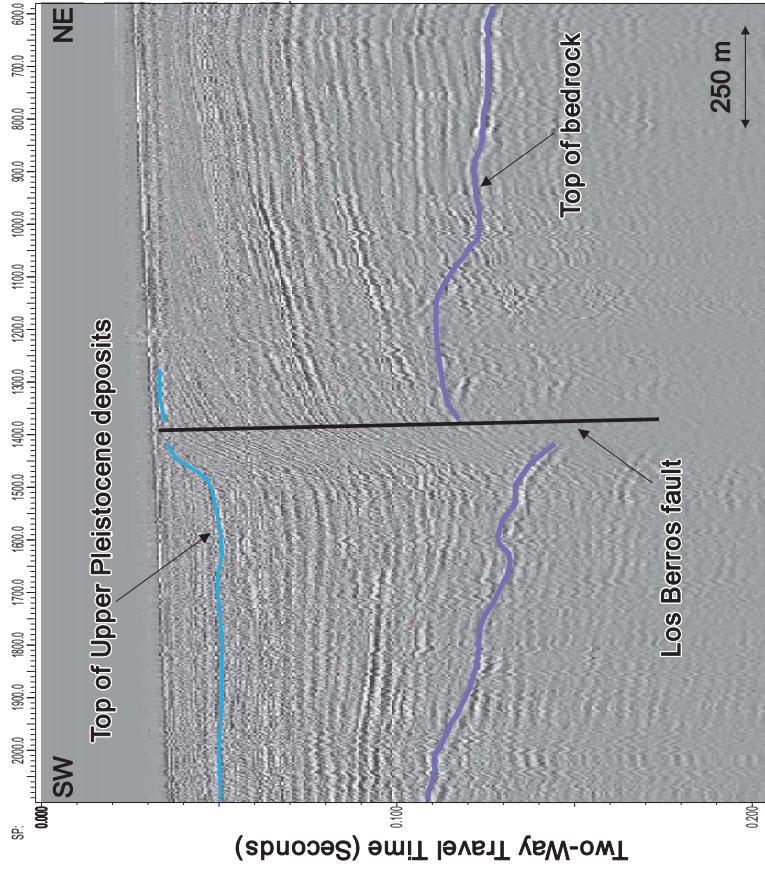
Figure **7-17**



(a) Uninterpreted



(b) Interpreted



**EXPLANATION**

- Mapped fault splay
- Top of Upper Pleistocene deposits
- Top of bedrock
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

USGS Line PBS-10 Showing Offset of Upper Pleistocene Deposits by Los Berros Fault in San Luis Obispo Bay

OFFSHORE LESS STUDIES

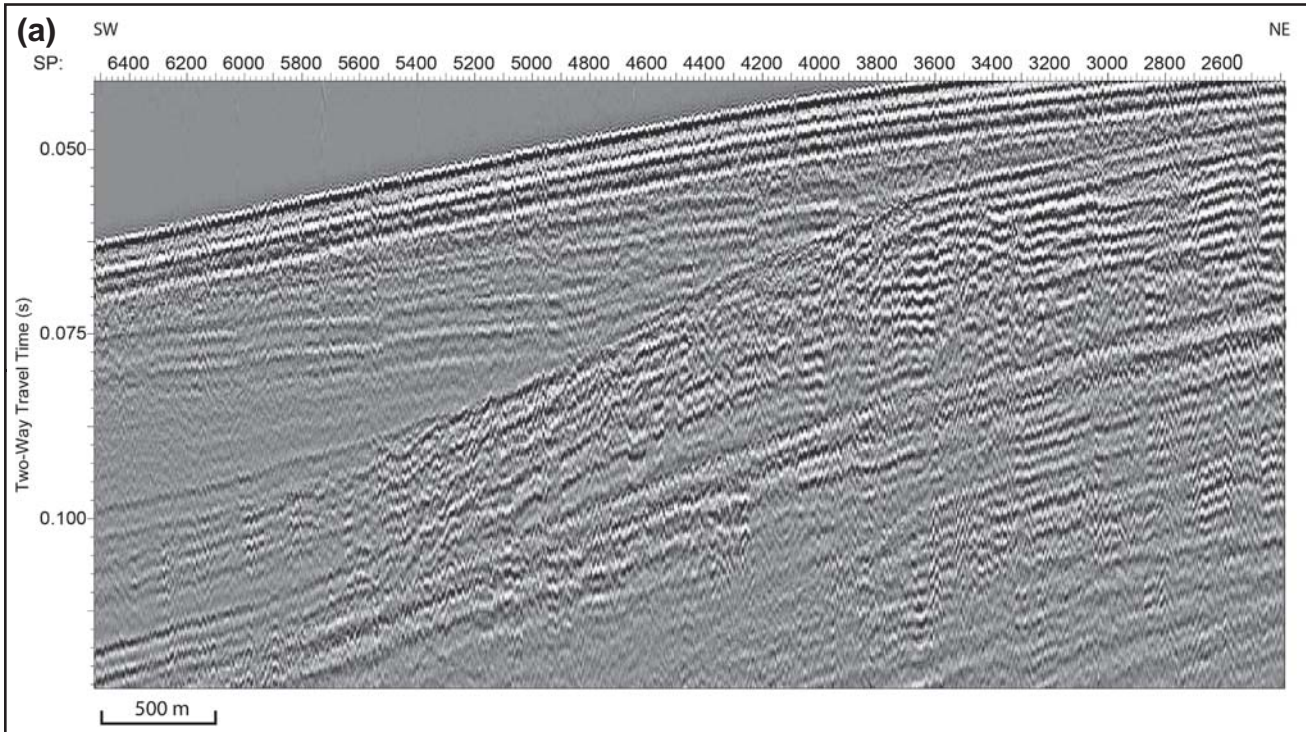


Figure 7-18

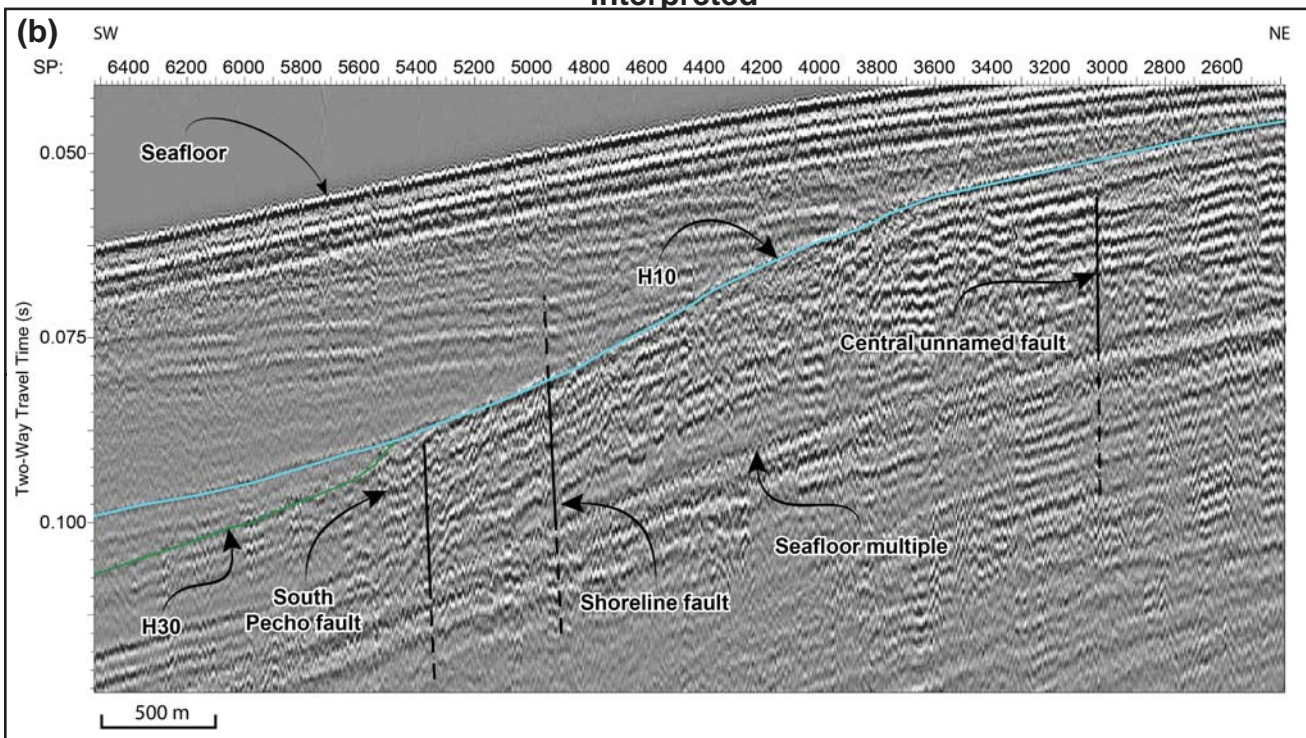


File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-19\_PBS-283.mxd; Date: 6/12/2014; User: Ranon Dulberg, Fugro; Rev.3

### Uninterpreted



### Interpreted



#### EXPLANATION

- Fault, dashed where inferred
- Unconformity H10
- Unconformity H30
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

Note: See Figure 7-14 for seismic section location.

Source: PG&E legacy data archive.



**Line PBS-283**

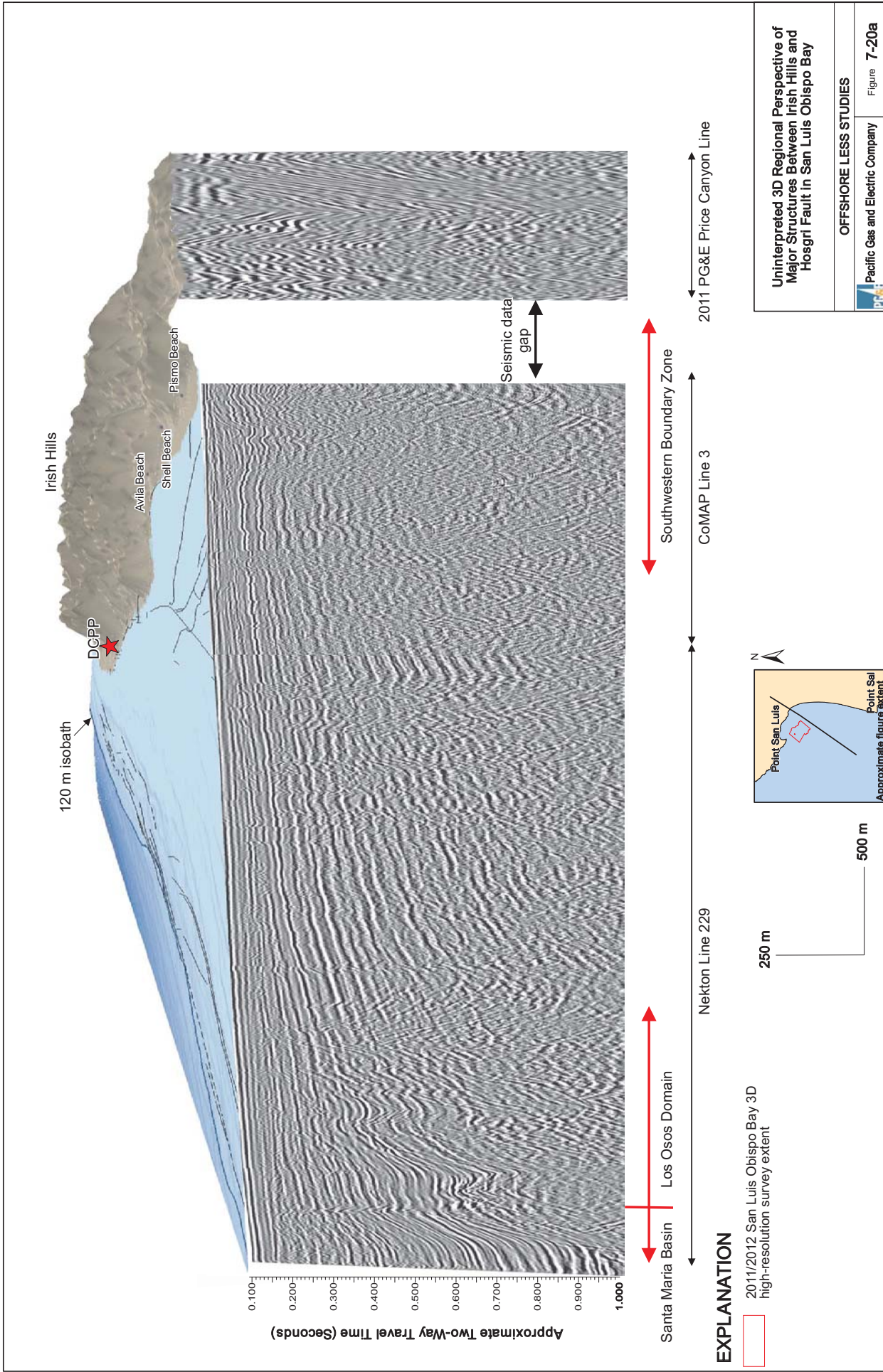
**OFFSHORE LESS STUDIES**



Pacific Gas and Electric Company

Figure **7-19**





**EXPLANATION**

2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

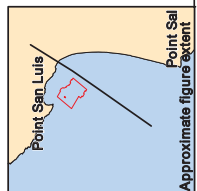


Santa Maria Basin    Los Osos Domain

Nekton Line 229

250 m

500 m



Southwestern Boundary Zone

CoMAP Line 3

2011 PG&E Price Canyon Line

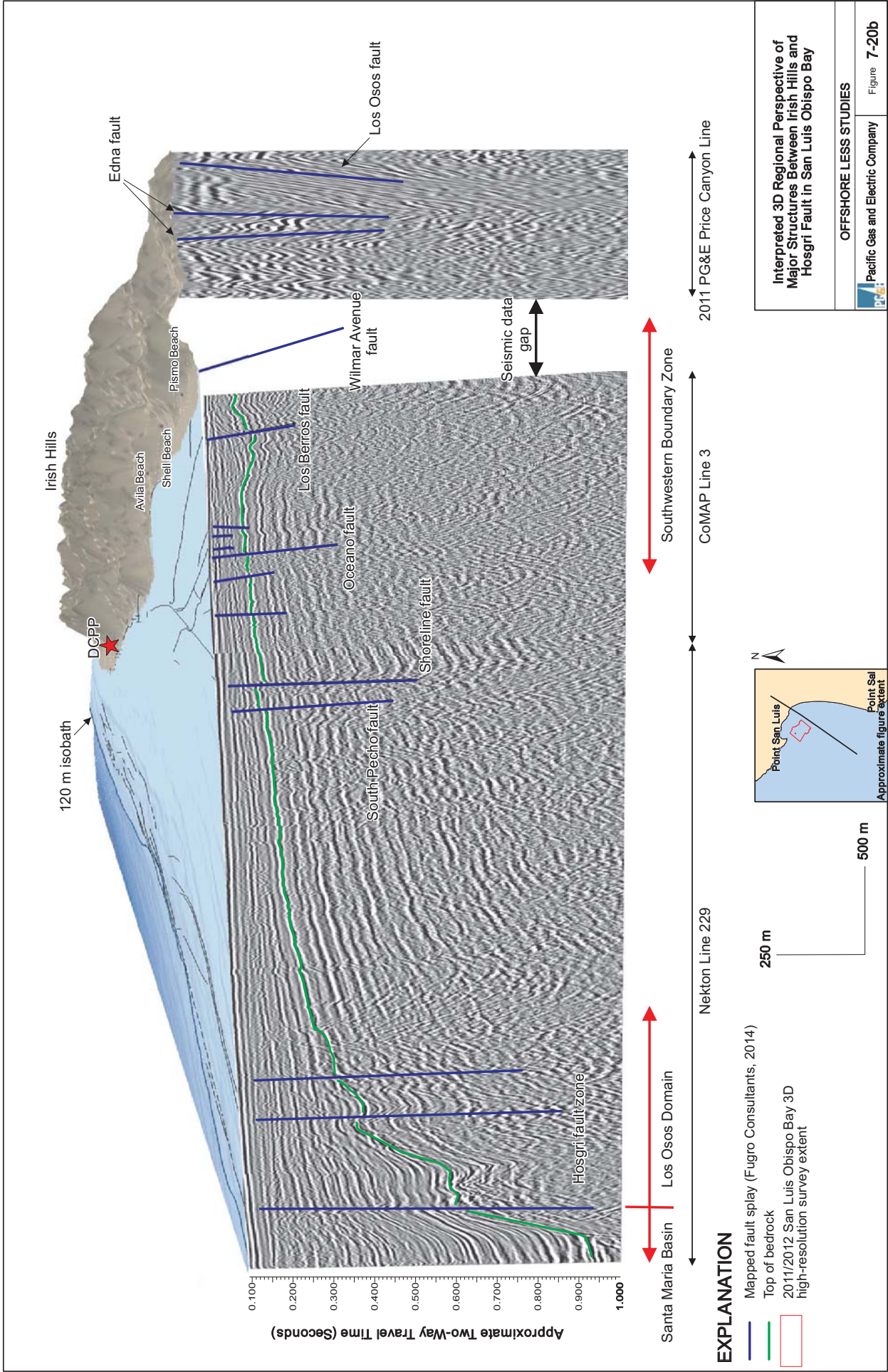
Seismic data gap

Uninterpreted 3D Regional Perspective of Major Structures Between Irish Hills and Hosgri Fault in San Luis Obispo Bay

OFFSHORE LESS STUDIES

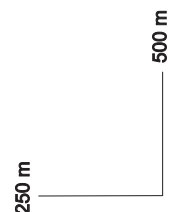
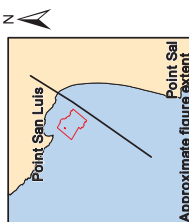
Pacific Gas and Electric Company

Figure 7-20a



**EXPLANATION**

- Mapped fault splay (Fugro Consultants, 2014)
- Top of bedrock
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



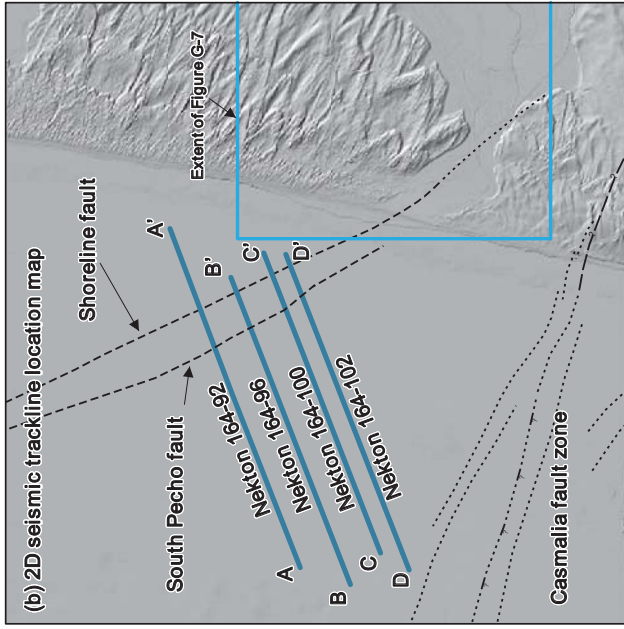
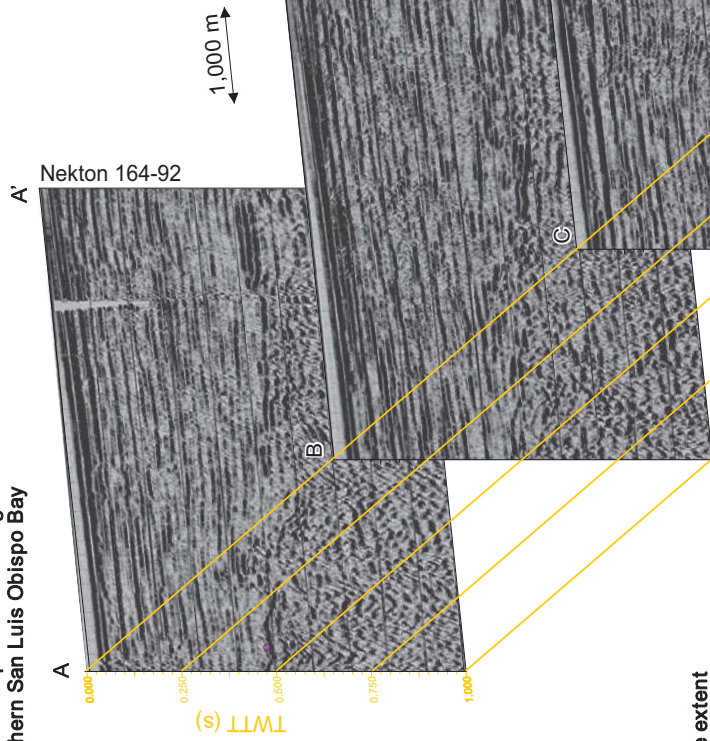
OFFSHORE LESS STUDIES  
 Pacific Gas and Electric Company  
 Figure 7-20b

Interpreted 3D Regional Perspective of Major Structures Between Irish Hills and Hosgri Fault in San Luis Obispo Bay

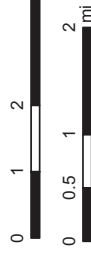
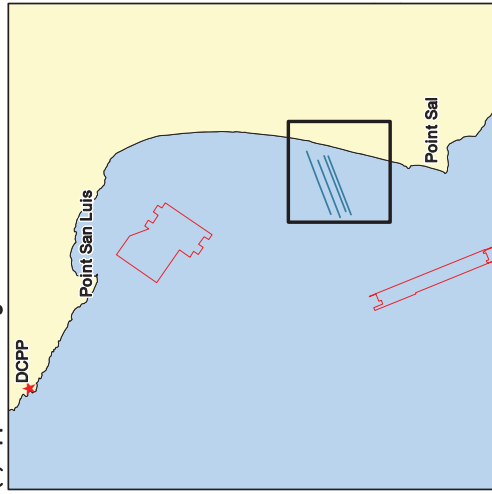
File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\pfr\figure-7-20-RegionalSB.pdf; Date: 05/16/2014; User: Robert Dame, Fugro; Rev: 3



(a) Uninterpreted 2D seismic profiles showing Shoreline and South Pecho fault geometry in southern San Luis Obispo Bay

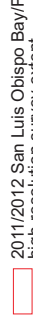


(c) Approximate figure extent



**EXPLANATION**

2011/2012 San Luis Obispo Bay/PT. Sal 3D high-resolution survey extent



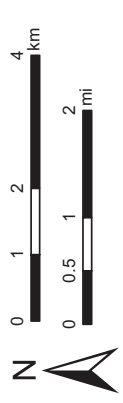
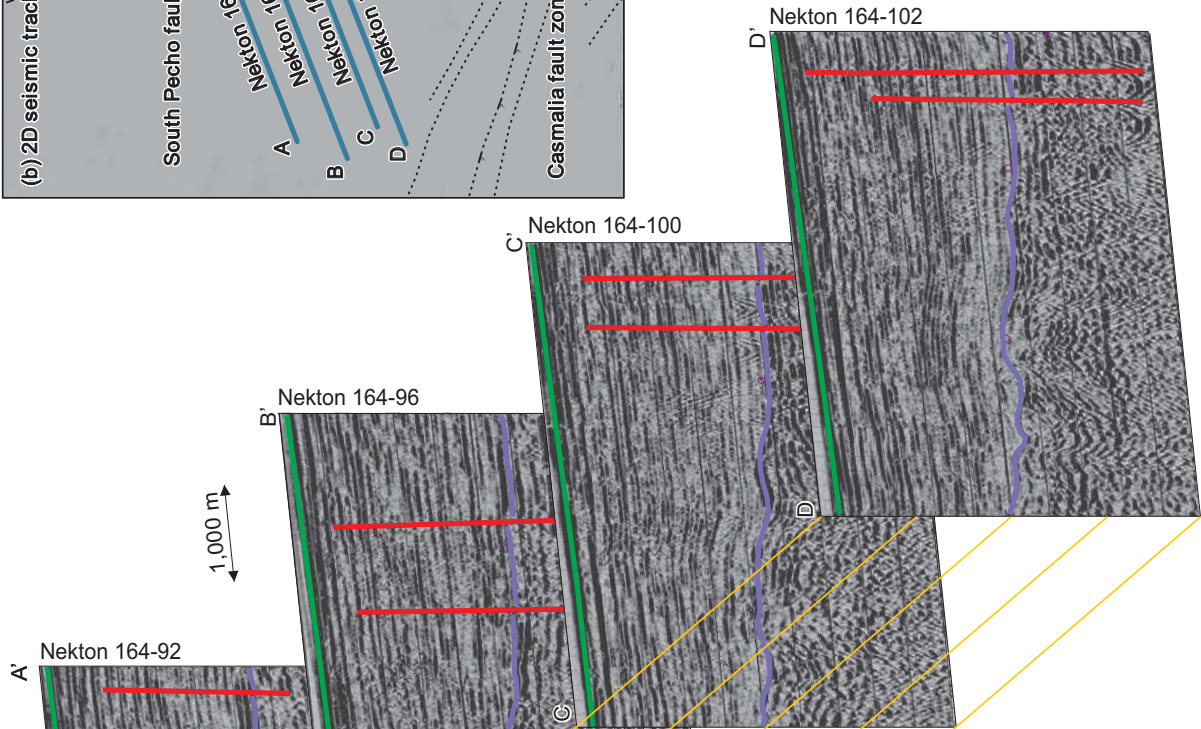
**Uninterpreted South Pecho and Shoreline Fault Seismic Fence Diagram**

OFFSHORE LESS STUDIES

Pacific Gas and Electric Company

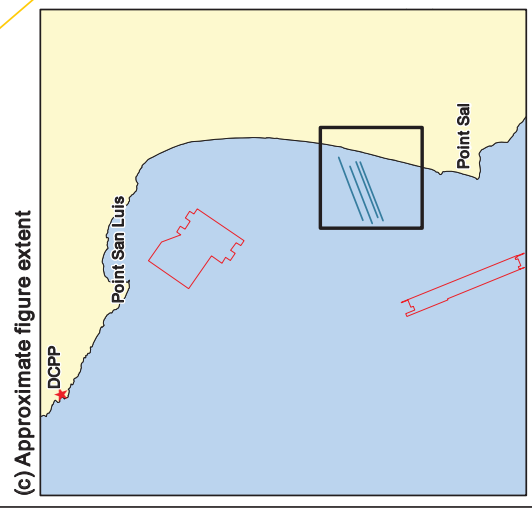
Figure 7-21a

(a) Interpreted 2D seismic profiles showing Shoreline and South Pecho fault geometry in southern San Luis Obispo Bay



**EXPLANATION**

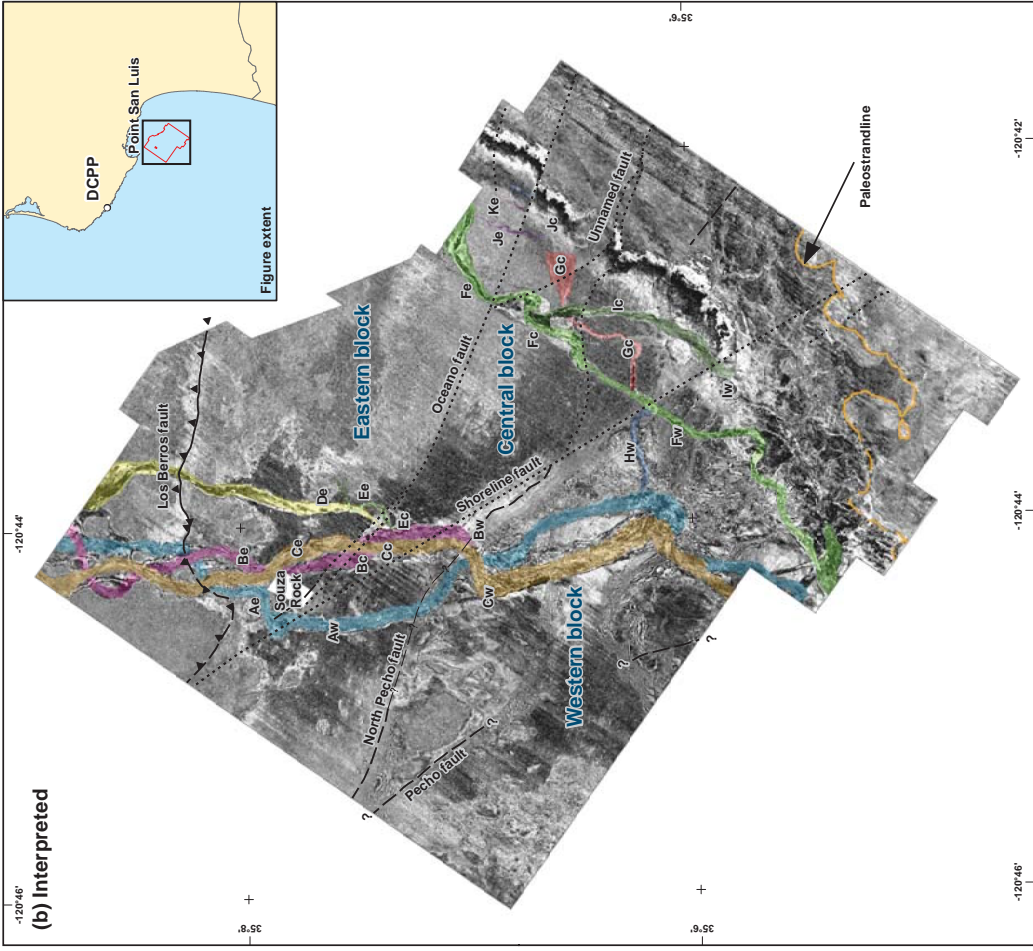
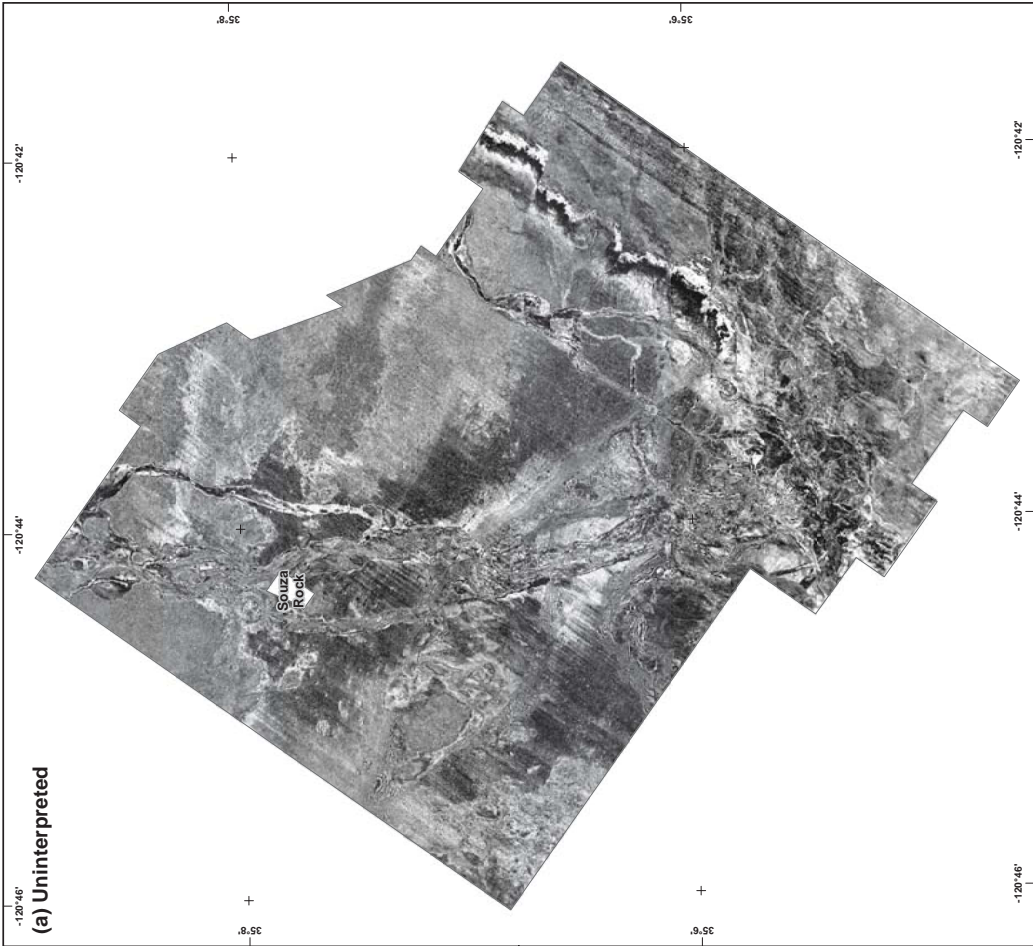
- Seafloor
- Top of bedrock
- Fault
- 2011/2012 San Luis Obispo Bay/ Pt. Sal 3D high-resolution survey extent



(c) Approximate figure extent

<b>Interpreted South Pecho and Shoreline Fault Seismic Fence Diagram</b>	
OFFSHORE LESS STUDIES	
Pacific Gas and Electric Company	Figure 7-21b





**EXPLANATION**

**Bedrock Source Channel Complexes**

<b>Complex 1</b> San Luis Obispo Creek	<b>Complex 2</b> Pismo Creek	<b>Complex 3</b> Overflow of Locally Sourced
Initial Incision: A, B, C, D, E, L	Channel Incision: G, H, F, I	Initial Incision: K, L, J
Reoccupation: A, B, C, D, E, L	Reoccupation: G, H, F, I	Reoccupation: K, L, J
Younger	Younger	Younger

Relative age within each source channel complex

Legend:

- Fault, dashed where inferred
- Paleostrandline
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

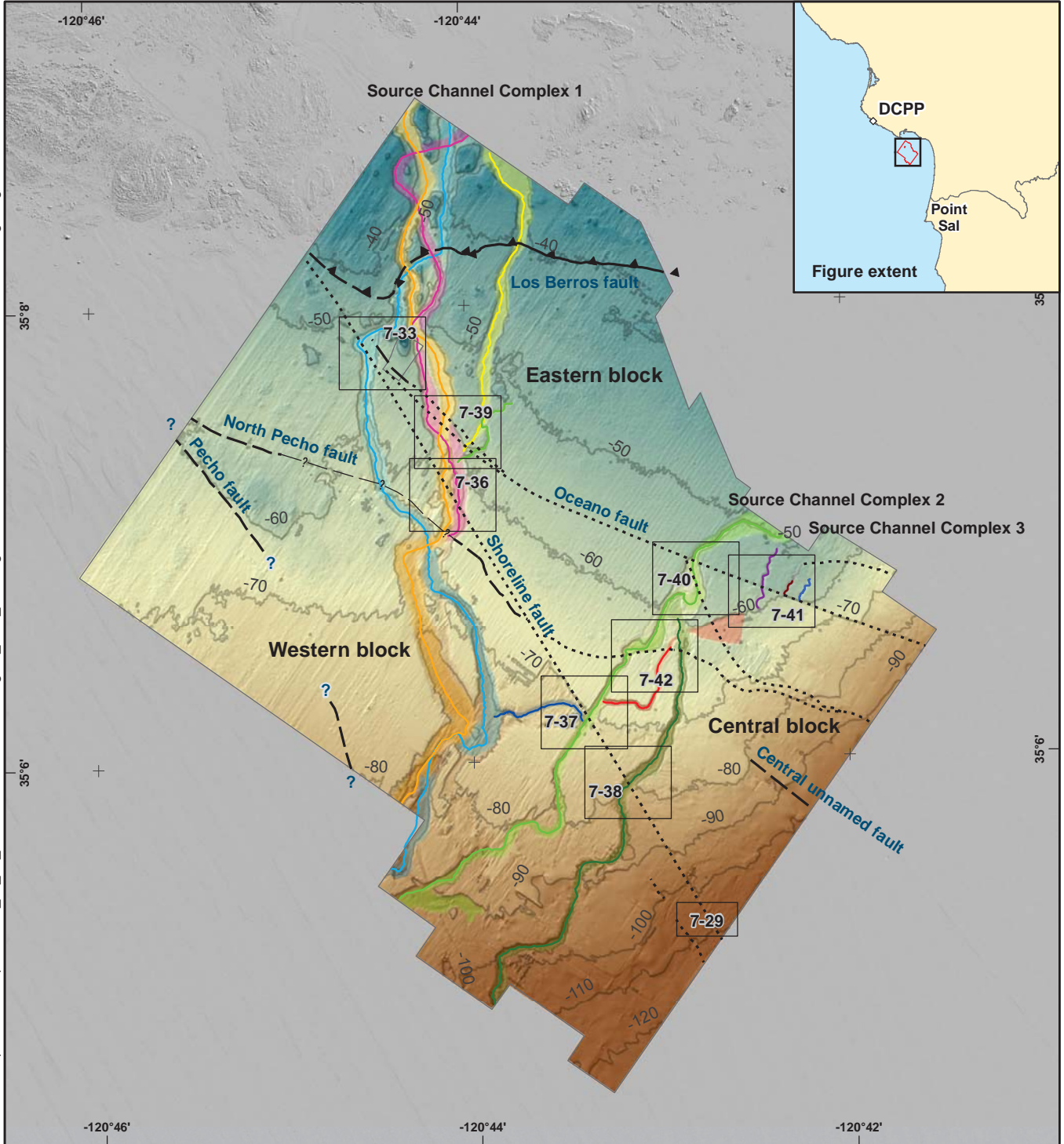
**Scale:** 0 to 1 mile / 0 to 2 km

**Map projection and scale:** WGS 84 / UTM Zone 10N, 1:40,000

**Amplitude Inclined Slice, Uninterpreted and Interpreted, with Faults, Paleochannels, and Paleostrandline, San Luis Obispo Bay**

**OFFSHORE LESS STUDIES** Pacific Gas and Electric Company Figure **7-22**

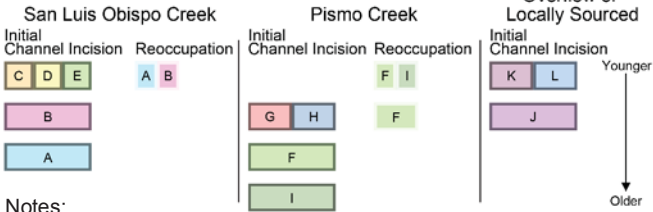
File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\imxd\Figure\_7-23\_PiercingPoints.mxd; Date: 6/12/2014; User: Ranon Dulberg, Fugro; Rev.3



**EXPLANATION**

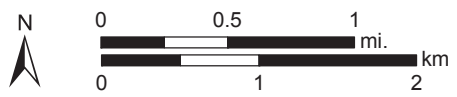
- Fault
- Channel thalweg
- Piercing point

**Bedrock Source Channel Complexes**



- Notes:
- Depth values on grid assume a velocity of 1,600 m/sec.
  - Relative age within each source channel complex.

Source: PG&E DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:48,000

**San Luis Obispo Bay Piercing Points**

**OFFSHORE LESS STUDIES**

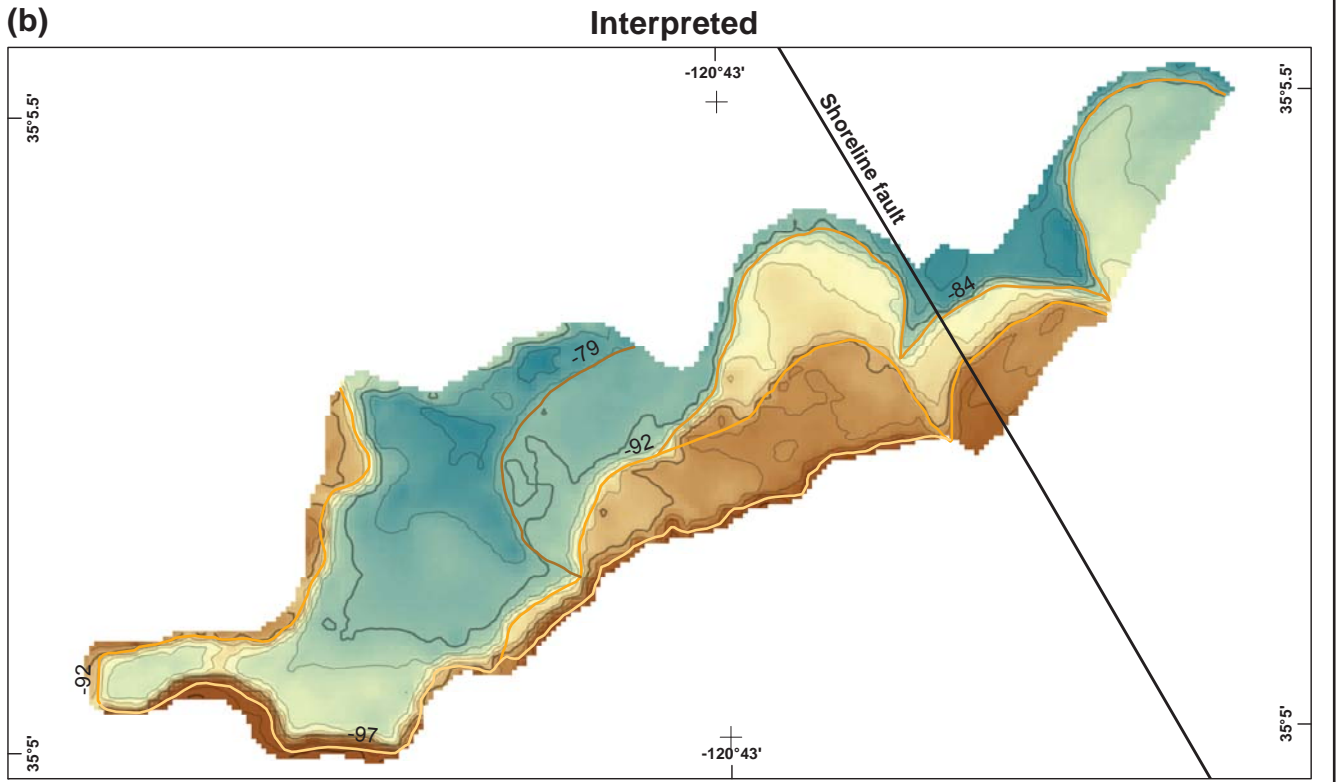
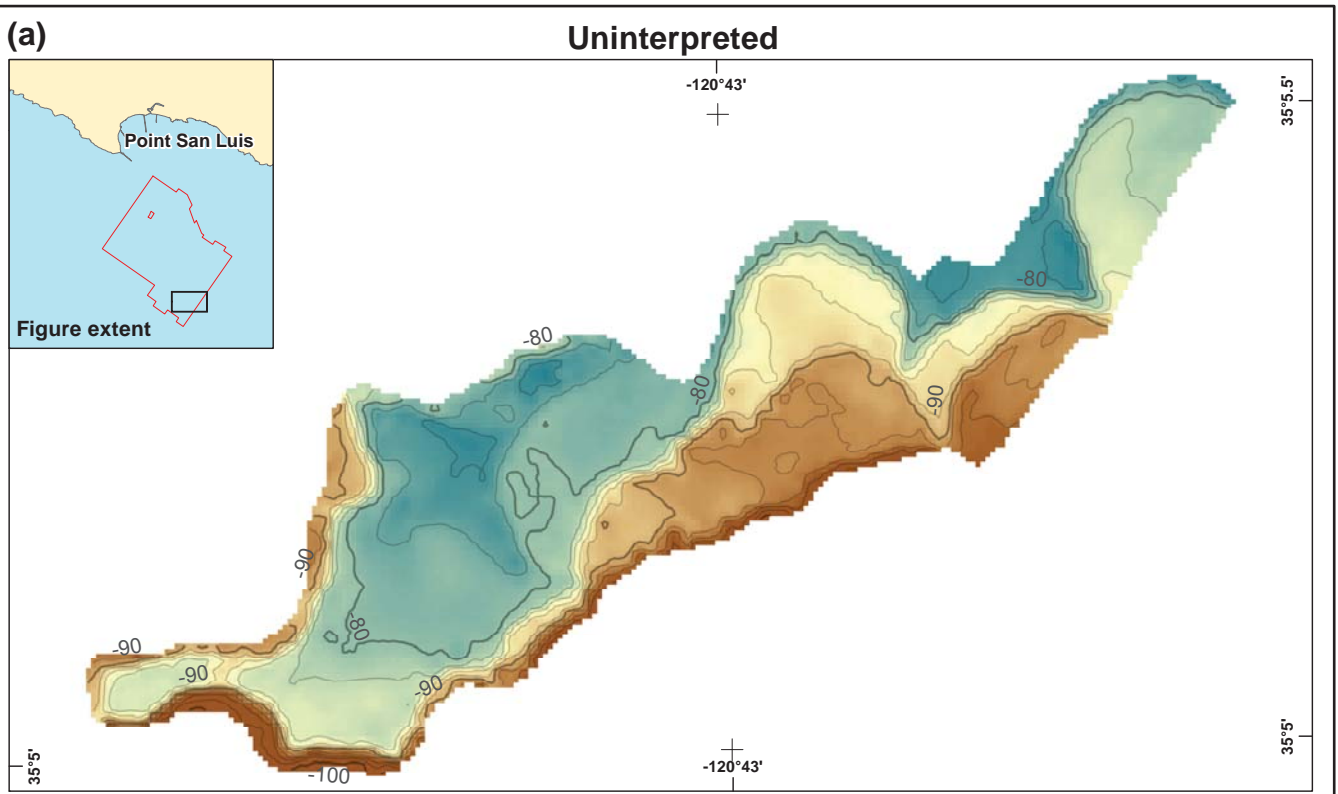


Pacific Gas and Electric Company

Figure **7-23**



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd\Figure\_7-24\_Paleostrandline.mxd; Date: 5/12/2014; User: Ranon Dulberg, Fugro; Rev.3

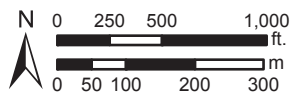


**EXPLANATION**

Paleostrandline

- 79 m
- 84 m
- 92 m
- 97 m
- Fault

2011/2012 San Luis Obispo Bay  
3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:11,000

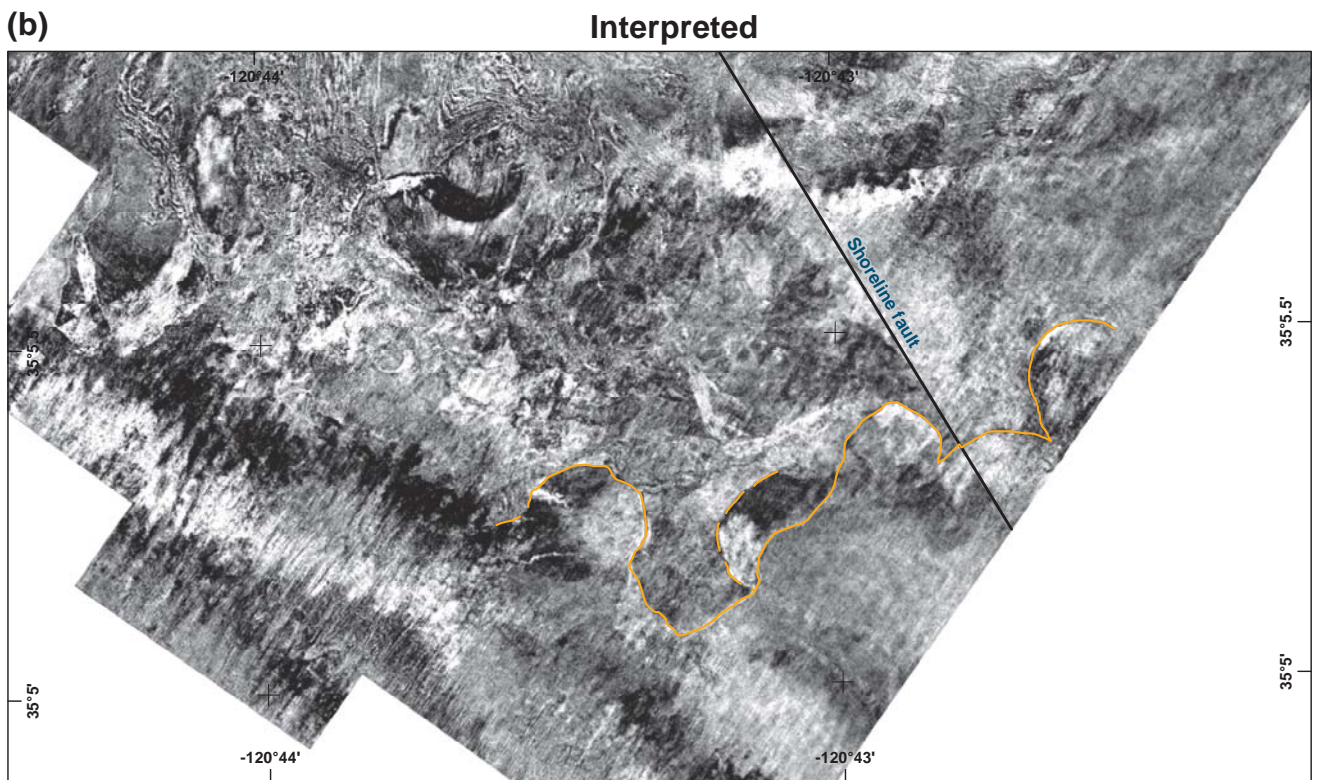
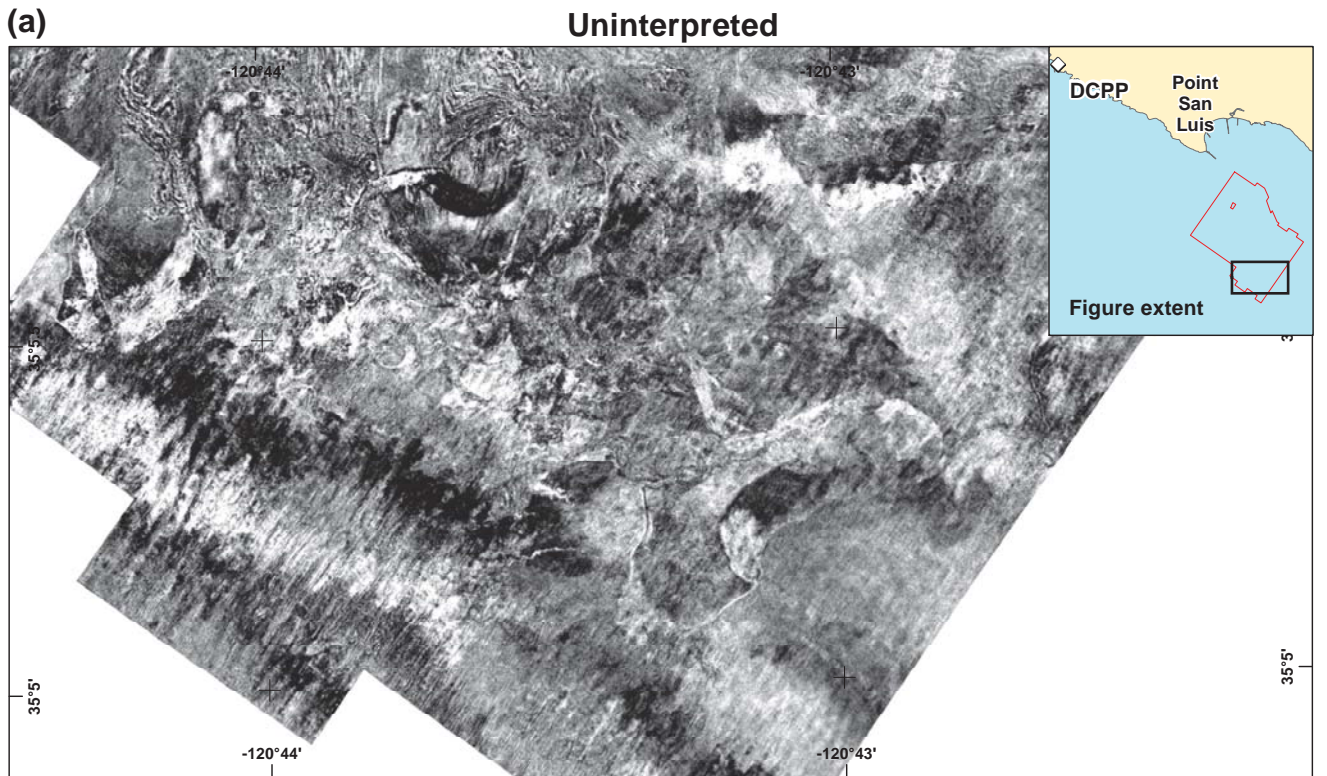
**Gridded Contoured  
Plan View Shorelines**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company

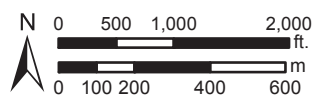
Figure **7-24**

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-25\_Paleoshoreline\_1053.mxd; Date: 6/12/2014; User: Ranon Dulberg, Fugro; Rev: 3



**EXPLANATION**

- Paleoshoreline
- Fault
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:20,000

**Amplitude Time Slice at 105.3 ms with  
84 m Paleoshoreline and Shoreline Fault**

**OFFSHORE LESS STUDIES**

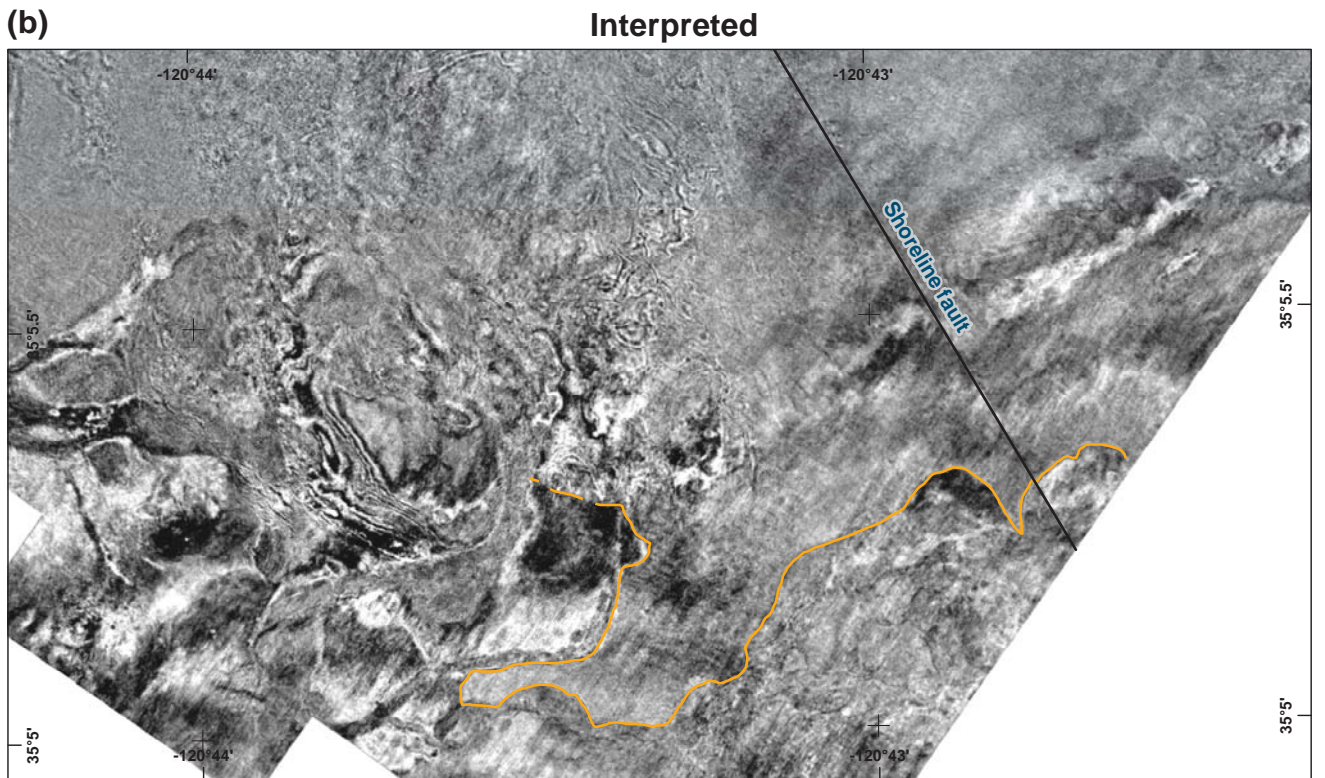
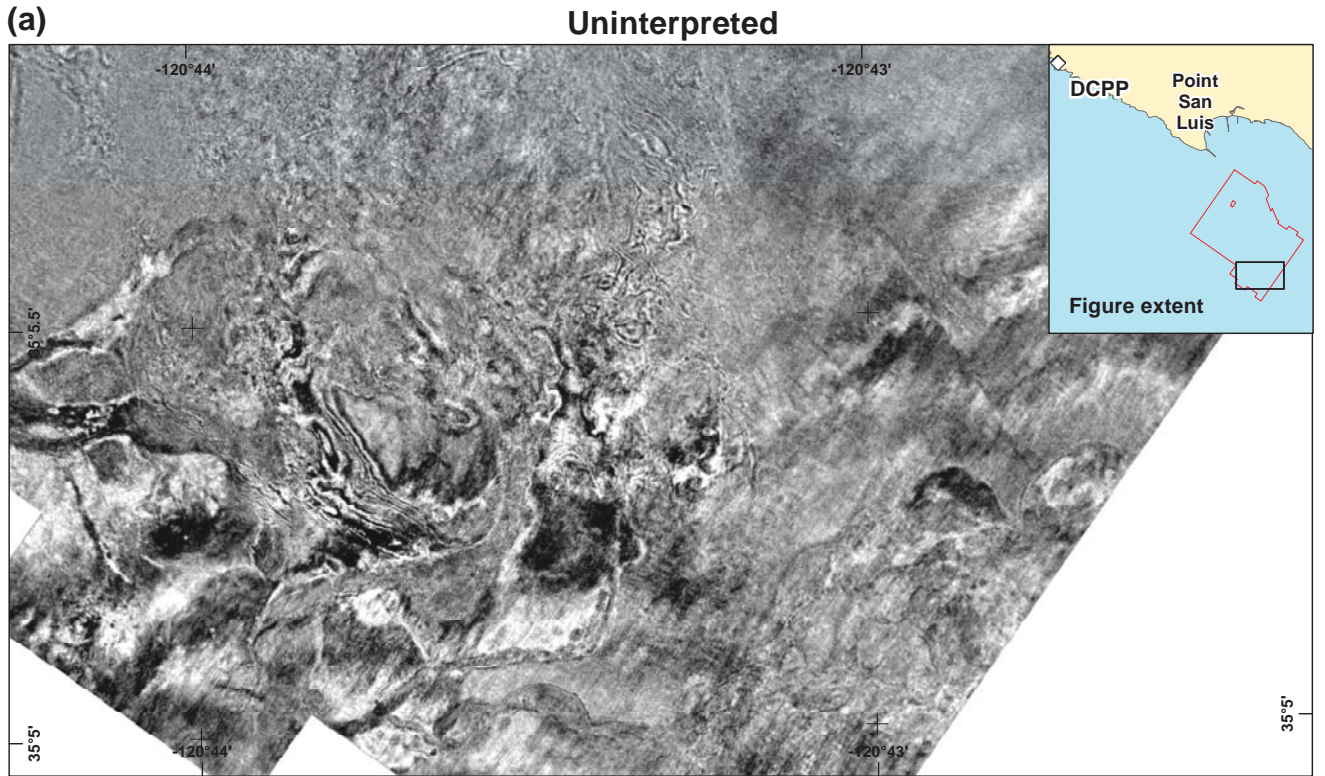


Pacific Gas and Electric Company

Figure **7-25**



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-26\_Paleoshoreline\_1193.mxd; Date: 5/12/2014; User: Raron Dulberg, Fugro; Rev:3



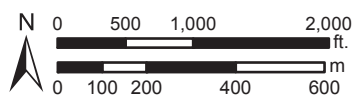
**EXPLANATION**

- Paleoshoreline
- Fault
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

Map projection and scale: WGS 84 / UTM Zone 10N, 1:17,000

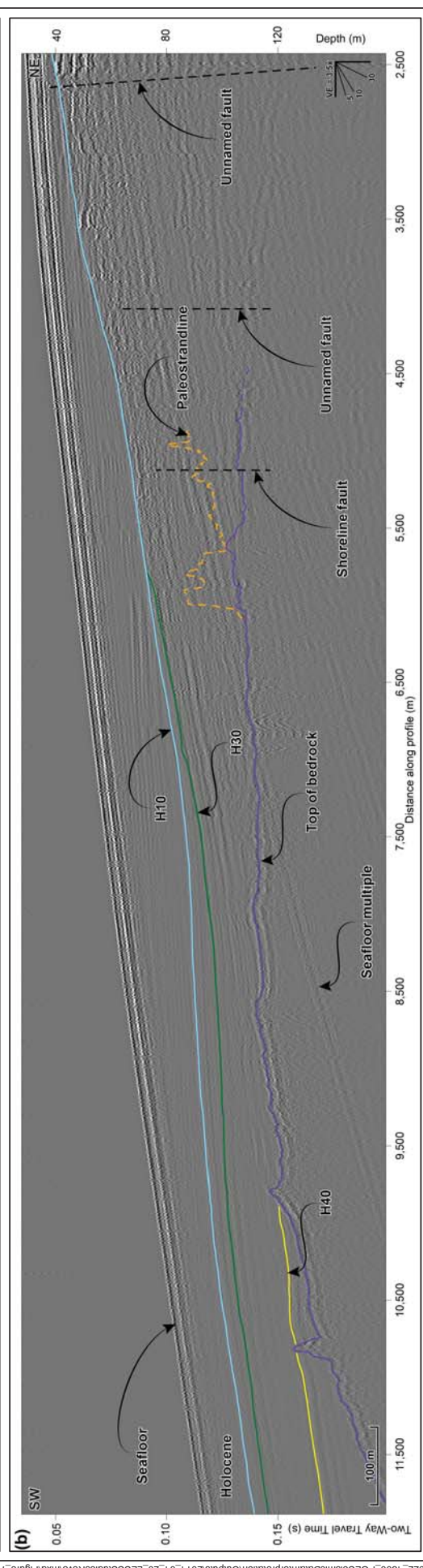
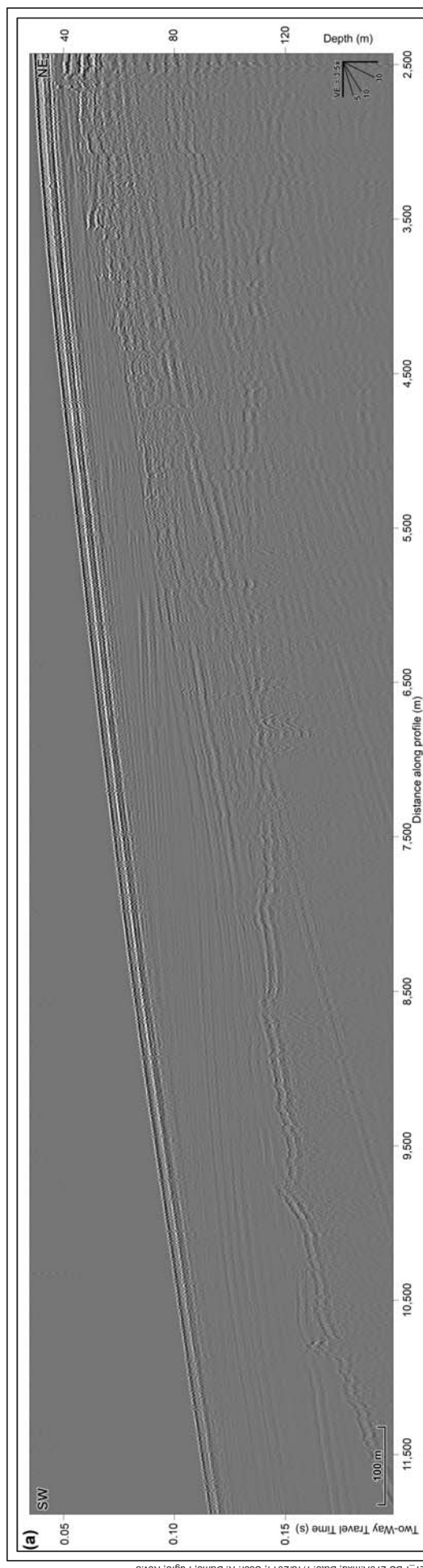
**Amplitude Time Slice at 119.3 ms with  
92 m Paleoshoreline and Shoreline Fault**

**OFFSHORE LESS STUDIES**



Pacific Gas and Electric Company

Figure **7-26**



**EXPLANATION**

- Unconformity H10
- Unconformity H30
- Unconformity H40
- Top of bedrock
- Paleoshoreline (H35)
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

Note: Depth values on seismic profile assume a velocity of 1,600 m/s.

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company

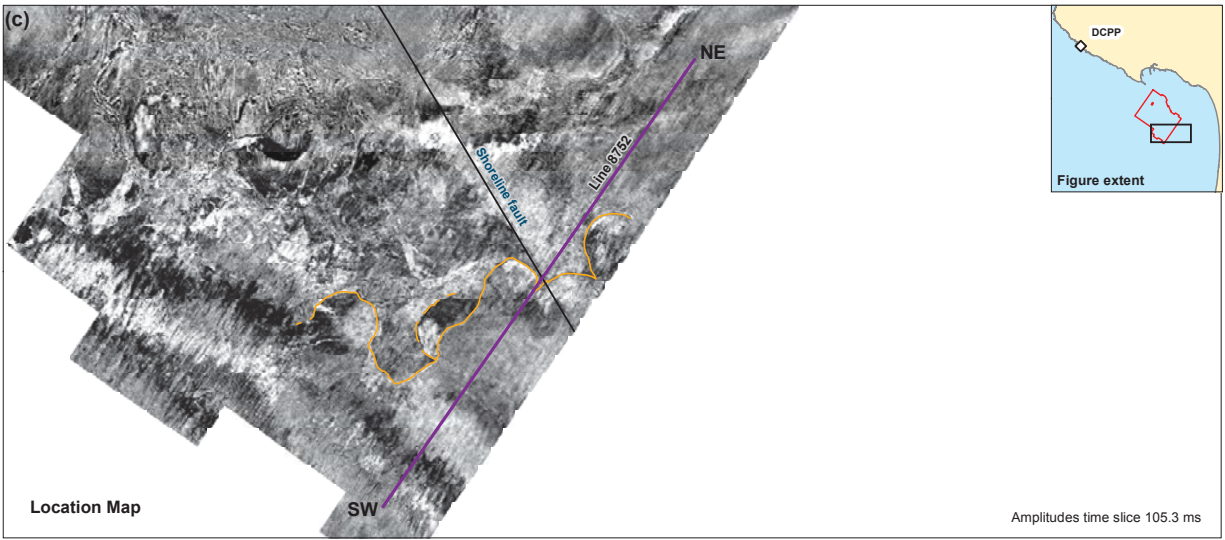
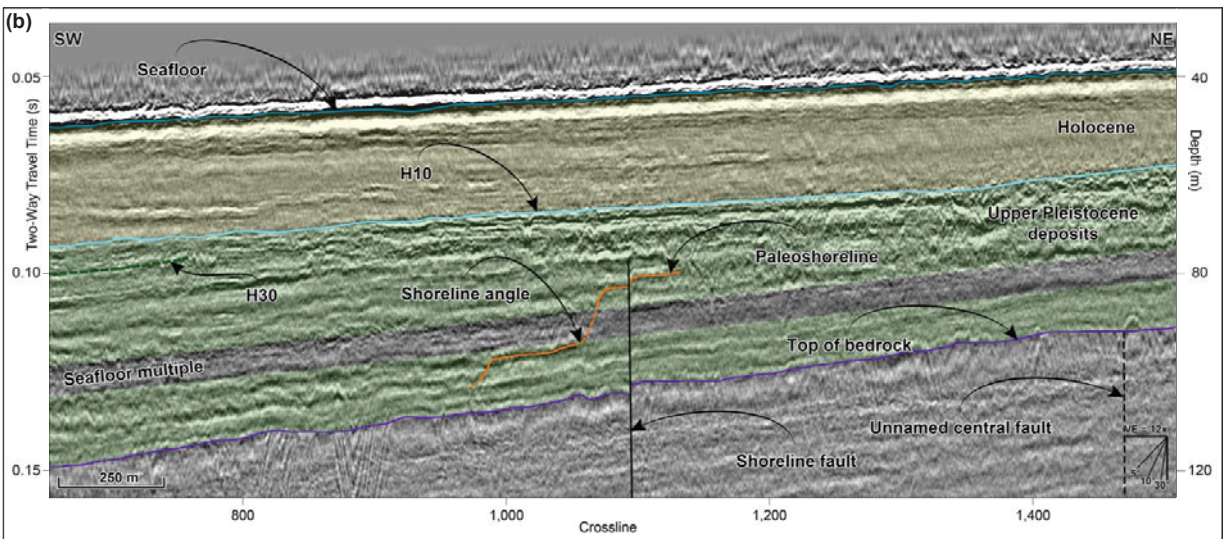
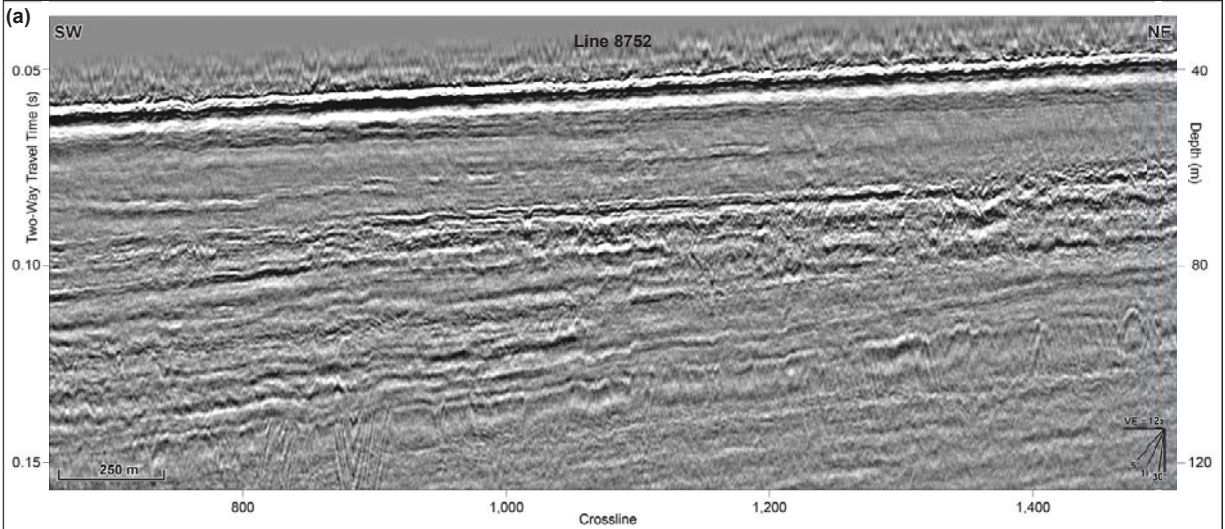
Figure **7-27**

**Excerpt of Line PBS-279A Showing Paleostrandline and Regional Unconformities San Luis Obispo Bay**

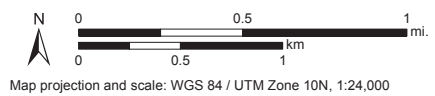
Line location



File Path: N:\Projects\04\_201304\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3.mxd; Figure\_7-28\_Paleoshoreline\_Line8752.mxd; Date: 7/15/2014; User: R. Dame, Fugro, Rev.3



- EXPLANATION**
- Fault
  - Seafloor
  - Unconformity H10
  - Unconformity H30
  - Paleoshoreline
  - Top of bedrock
  - Line 8752
  - Holocene sediment
  - Upper Pleistocene deposits
  - 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



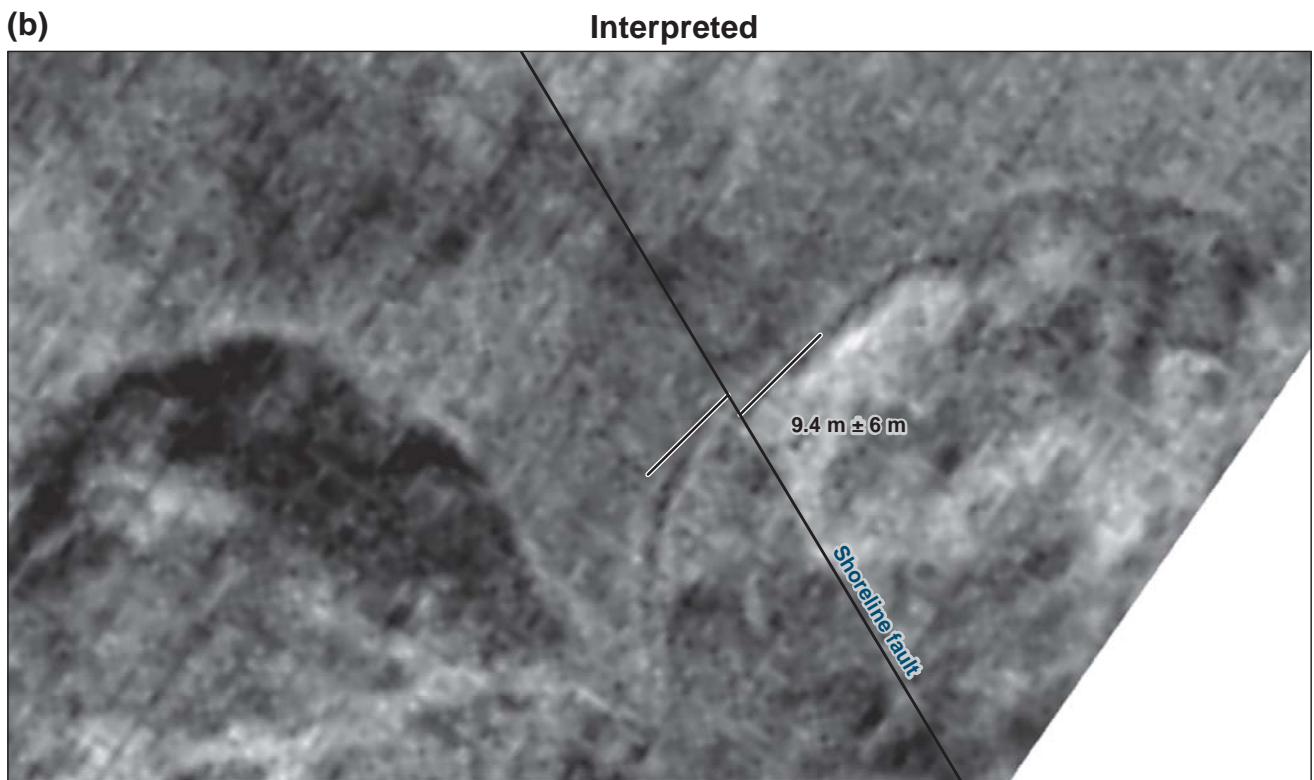
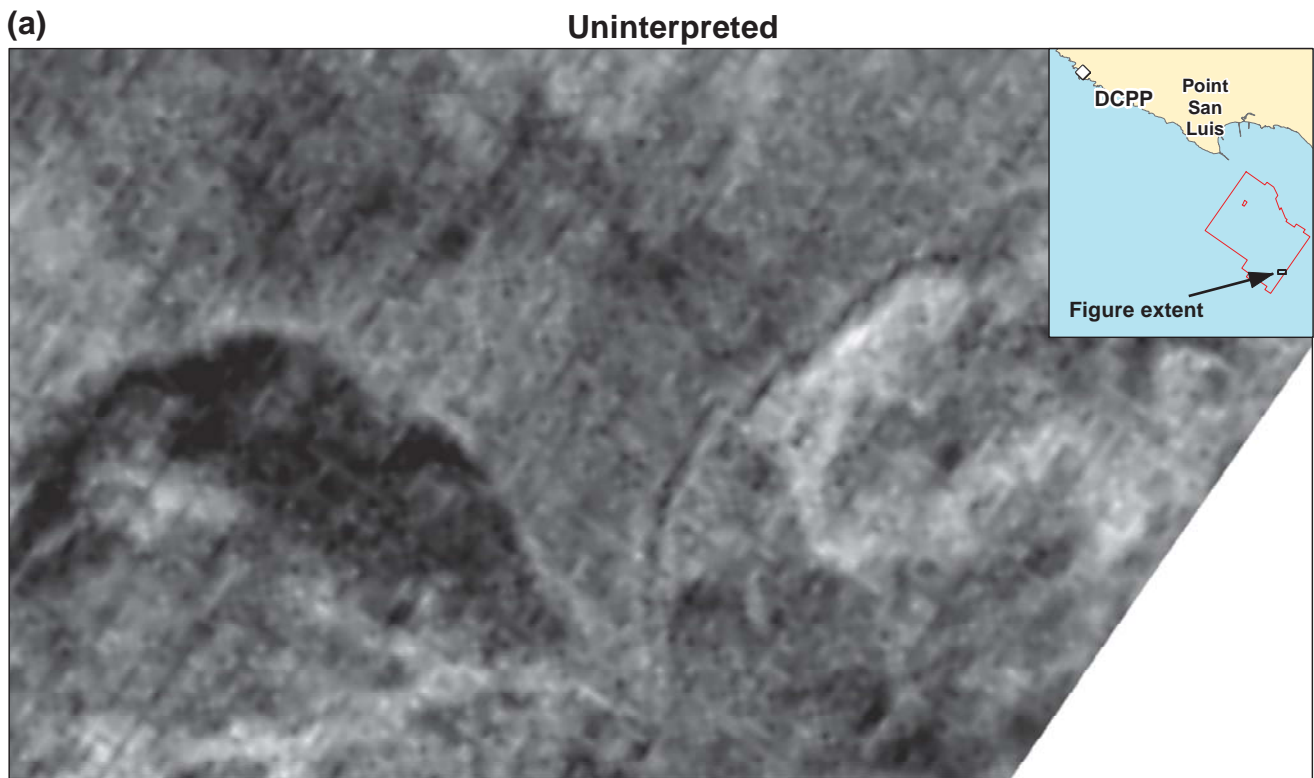
**Excerpt of Line 8752 and Amplitudes Time Slice at 105.3 ms Showing Paleoshoreline Offset**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company Figure **7-28**

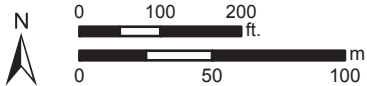
Note: Depth values on seismic profile assume a velocity of 1,600 m/s.

File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudies\Rev3\mxd\Figure\_7-29\_Shoreline.mxd; Date: 6/12/2014; User: Raron Dulberg, Fugro; Rev: 3




**EXPLANATION**

- Shoreline fault
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

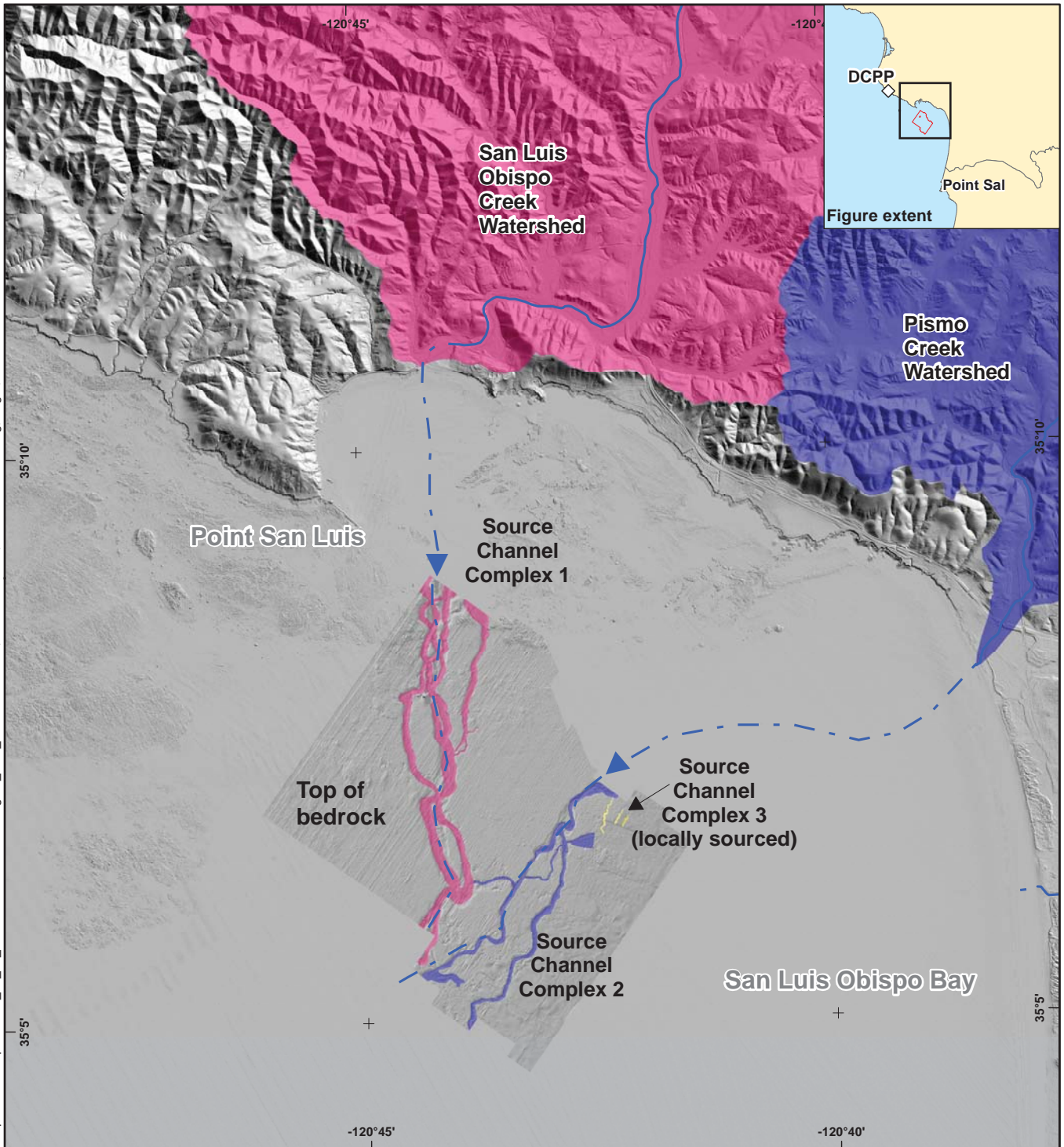


Map projection and scale: WGS 84 / UTM Zone 10N, 1:2,850

<b>Amplitude Time Slice at 119.3 ms with Paleoshoreline and Shoreline Fault Offset Measurement</b>	
<b>OFFSHORE LESS STUDIES</b>	
 Pacific Gas and Electric Company	Figure <b>7-29</b>



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-30\_WaterSheds.mxd; Date: 5/23/2014; User: Ranton Dulberg, Fugro; Rev.3

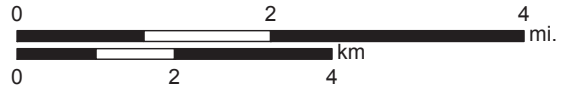


**EXPLANATION**

- - - Paleochannel flow pathway
- Creek
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

**Notes:**

1. See Plate 6 for paleochannel profiles.
2. See Plate 5 for contoured bedrock surface.
3. PG&E DEM compilation v2013.07.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:96,000

**San Luis Obispo Bay Source Channel Complex One, Two, and Three Watersheds**

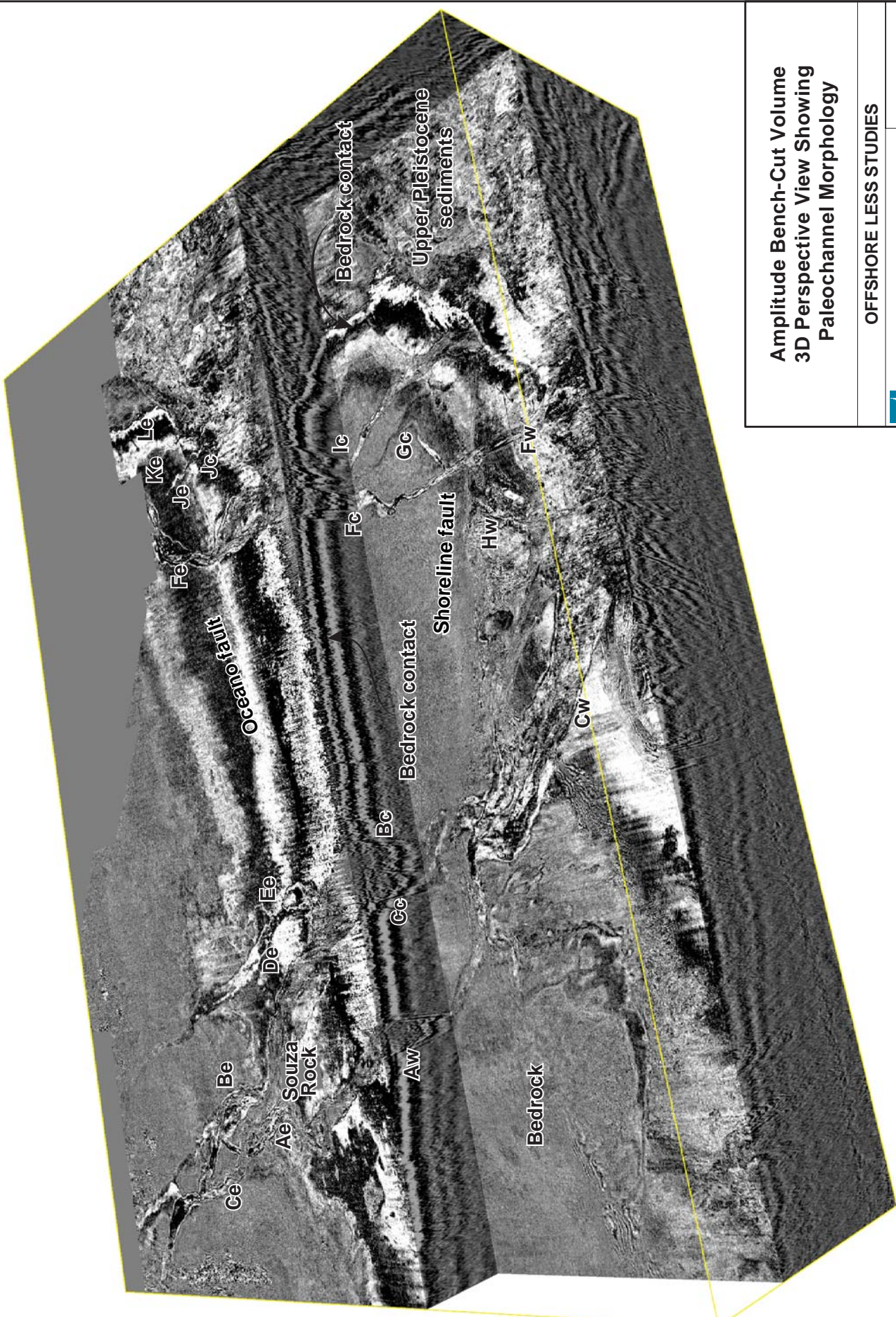
**OFFSHORE LESS STUDIES**



Pacific Gas and Electric Company

Figure **7-30**



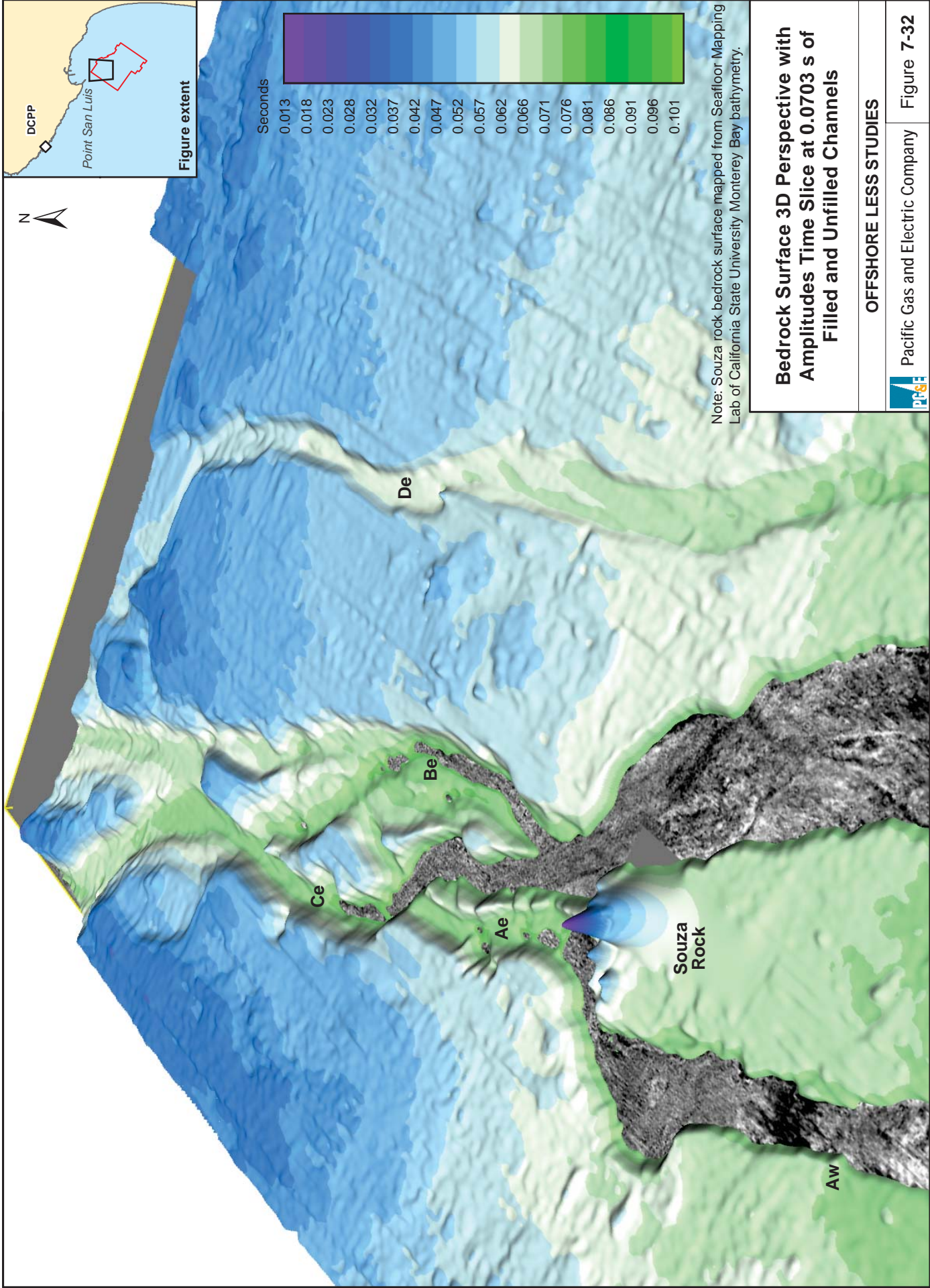


File path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Output\2014\_04\_20\_LESSStudiesRev3\Fig\7-31\_3D\_ChannelMorphology.at; Date: 05/11/2014; User: Bryan Bergkamp; Fugro; Rev.3

**Amplitude Bench-Cut Volume  
3D Perspective View Showing  
Paleochannel Morphology**







Note: Souza rock bedrock surface mapped from Seafloor Mapping Lab of California State University Monterey Bay bathymetry.

### Bedrock Surface 3D Perspective with Amplitudes Time Slice at 0.0703 s of Filled and Unfilled Channels

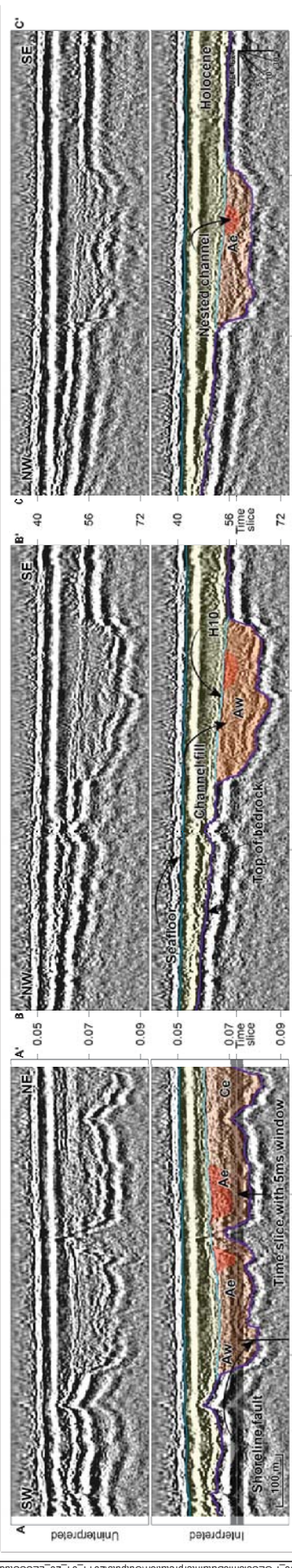
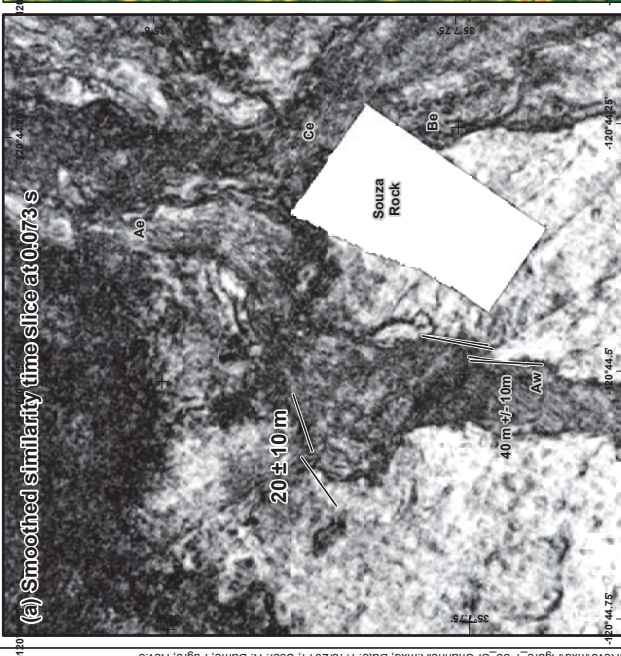
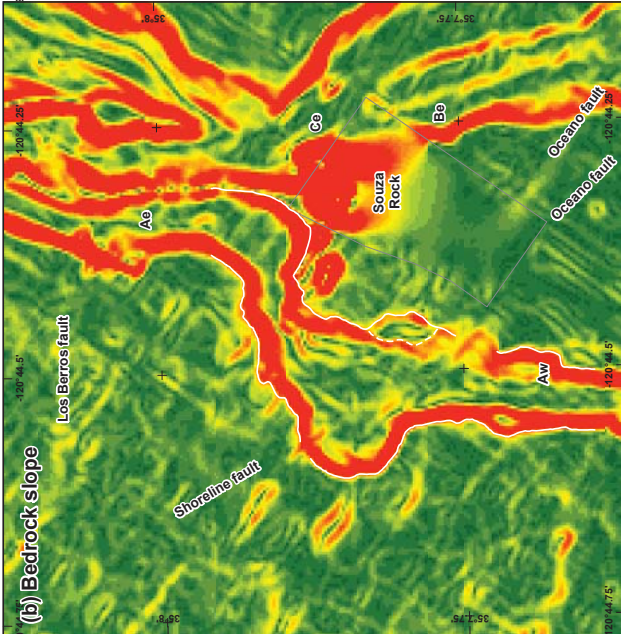
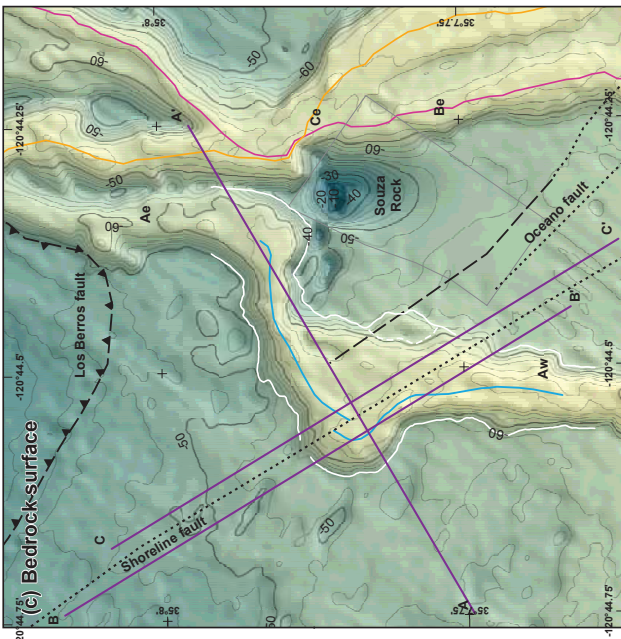
OFFSHORE LESS STUDIES



Pacific Gas and Electric Company

Figure 7-32





**EXPLANATION**

- Seafloor
- Unconformity H10
- Top of bedrock
- Holocene sediment
- Channel fill
- Fault
- Channel thalweg
- Channel margins
- Arbitrary line
- Nested channel
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

**Sources**

- Channel Complex 1
- San Luis Obispo Creek
- Initial Channel Incision
- Reincubation
- Relictine age younger

**(g) 3D bedrock surface**

**Notes:**

- See Figure 7-23 for piercing point location.
- See Section 3.3 for description of channel nomenclature.
- Contour interval is 2 m. Major contours are 10 m.
- Depth values on grid assume a velocity of 1,600 m/s.
- Souza Rock bedrock surface and slope mapped from Seafloor Mapping Lab of California State University Monterey Bay bathymetry.

**Channel A - Shoreline and Oceano Faults Piercing Points**

**OFFSHORE LESS STUDIES**

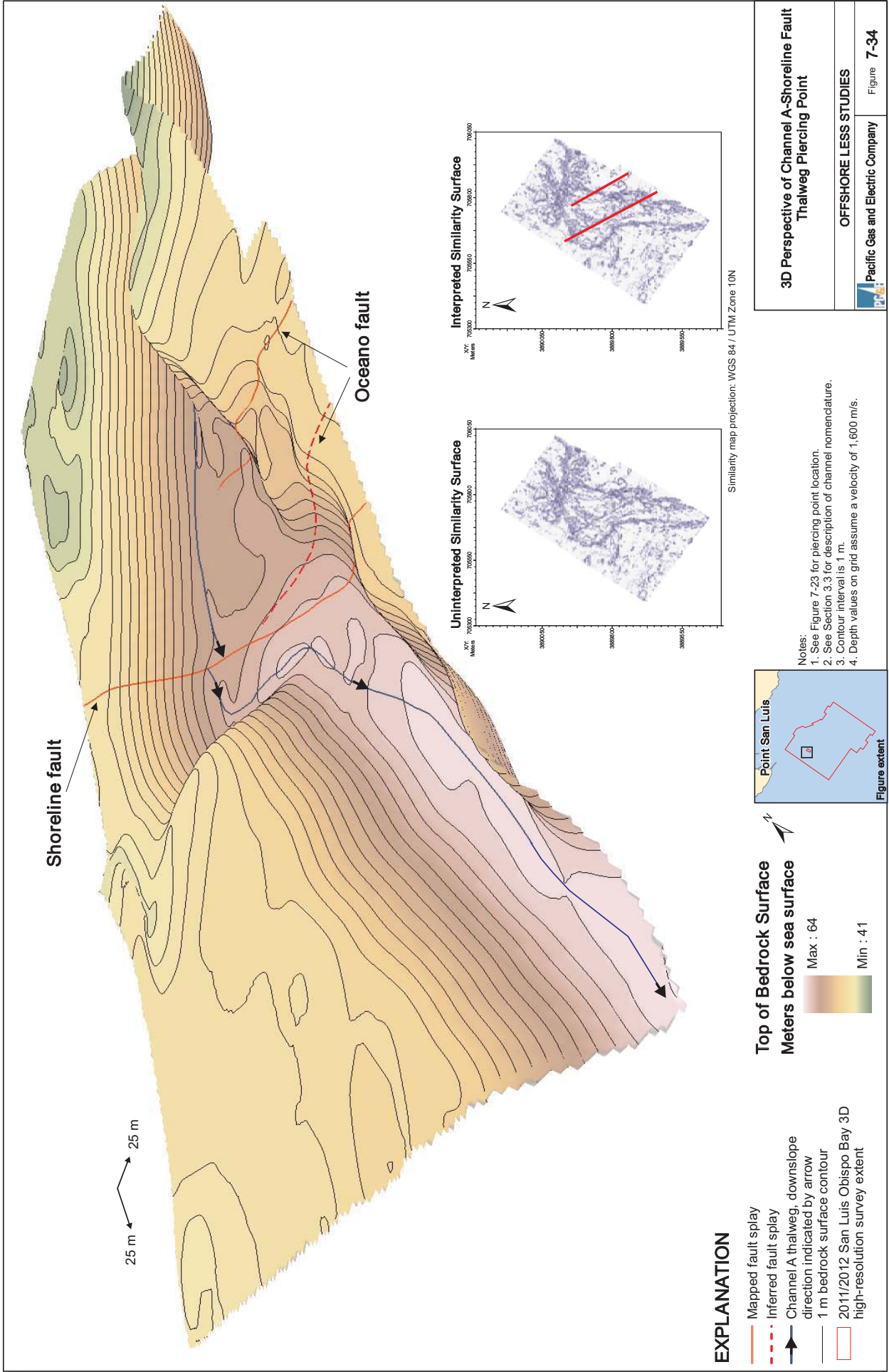
**Pacific Gas and Electric Company**      **Figure 7-33**

Map projection and scale: WGS 84 / UTM Zone 10N, 1:7,500

Scale: 0 to 0.2 mi, 0 to 0.4 km

Figure extent map showing Point San Luis and the study area.

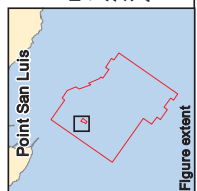
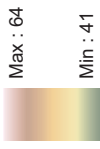




**EXPLANATION**

- Mapped fault splay
- - - Inferred fault splay
- Channel A thaweg, downslope direction indicated by arrow
- 1 m bedrock surface contour
- 2011/2012 San Luis Obispo Bay 3D high-resolution survey extent

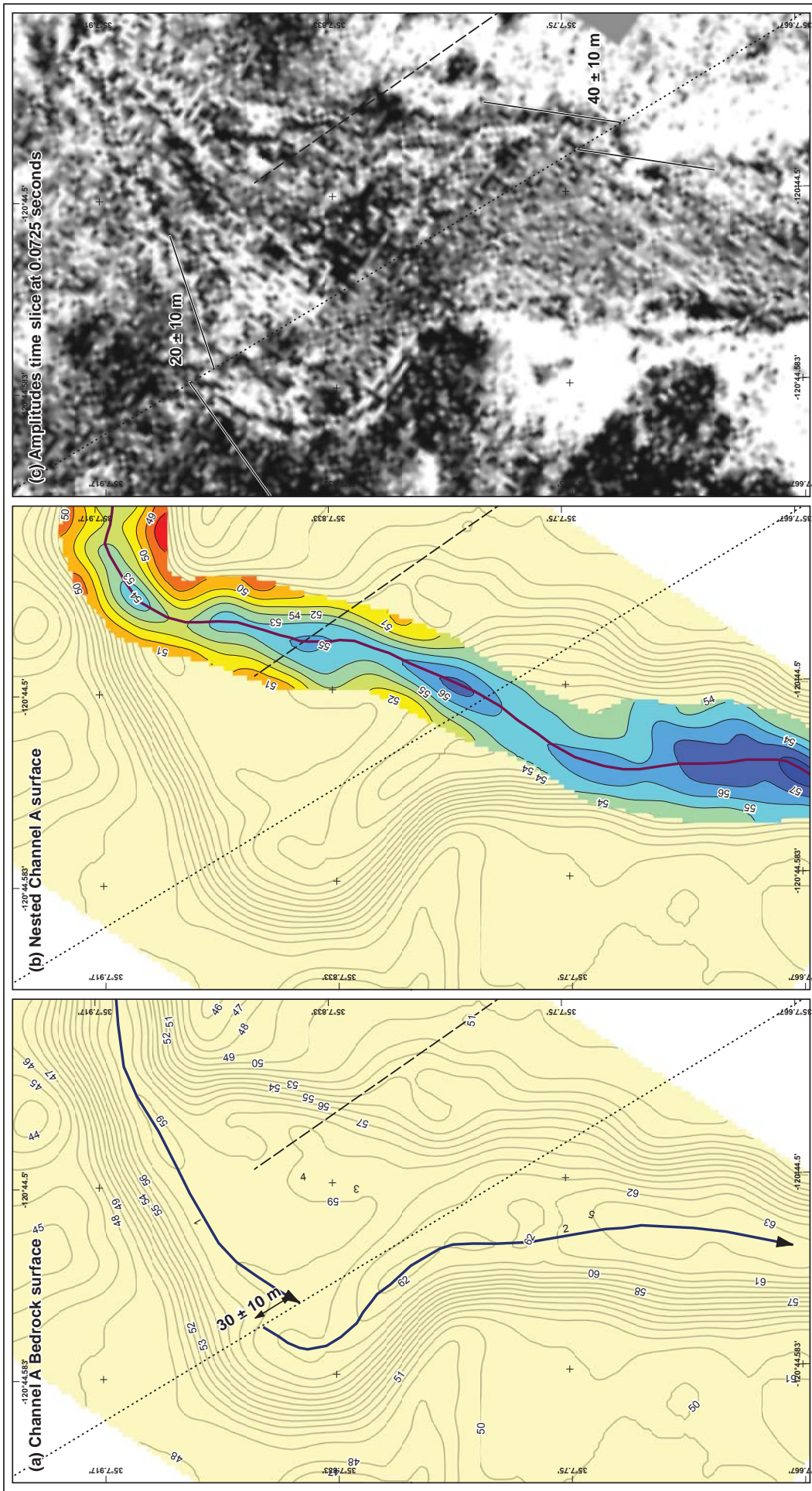
**Top of Bedrock Surface**  
**Meters below sea surface**



- Notes:
1. See Figure 7-23 for piercing point location.
  2. See Section 3.3 for description of channel nomenclature.
  3. Contour interval is 1 m.
  4. Depth values on grid assume a velocity of 1,600 m/s.

**3D Perspective of Channel A-Shoreline Fault Thaweg Piercing Point**

OFFSHORE LESS STUDIES  
 Pacific Gas and Electric Company  
 Figure 7-34



**Channel Complex A - Shoreline Fault Zone Piercing Points**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company

Figure 7-35

Point San Luis

Figure extent

0 250 500 ft.

0 50 100 m

Map projection and scale: WGS 84 / UTM Zone 10N, 1:2,500

Notes:

1. Contour interval is 1 m.
2. Depth values on grid assume a velocity of 1,600 m/s.

**EXPLANATION**

- Nested Channel A thalweg
- Channel A thalweg, flow direction indicated by arrow
- Concealed Fault
- Approximate 2011/2012 San Luis Bay 3D high-resolution survey extent

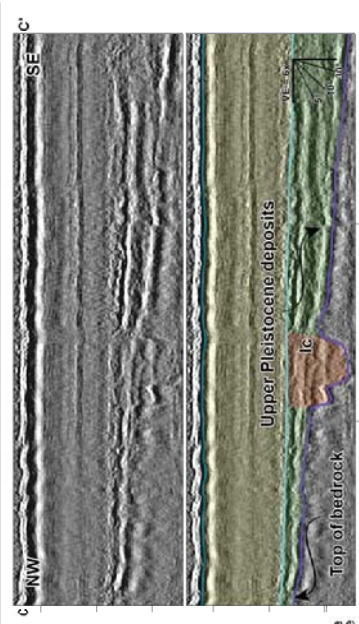
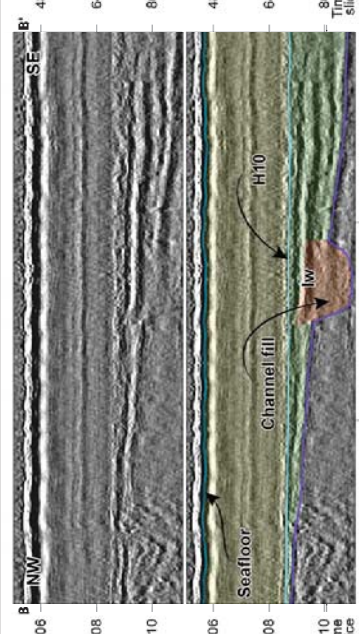
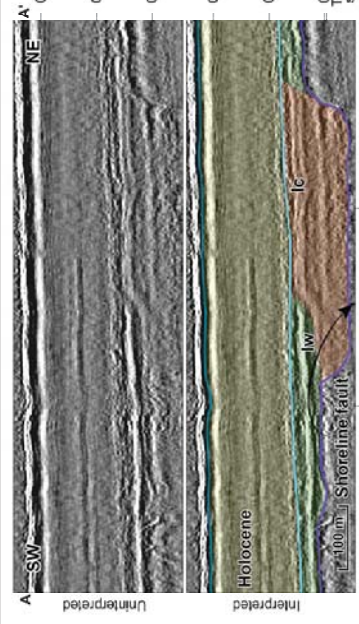
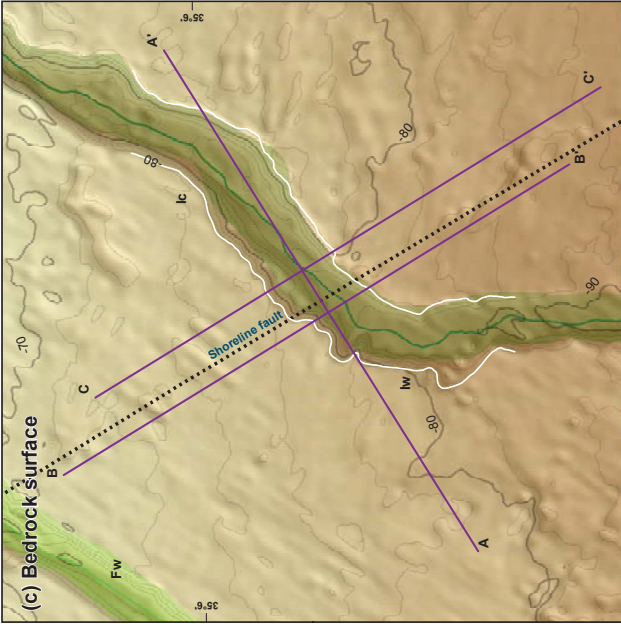
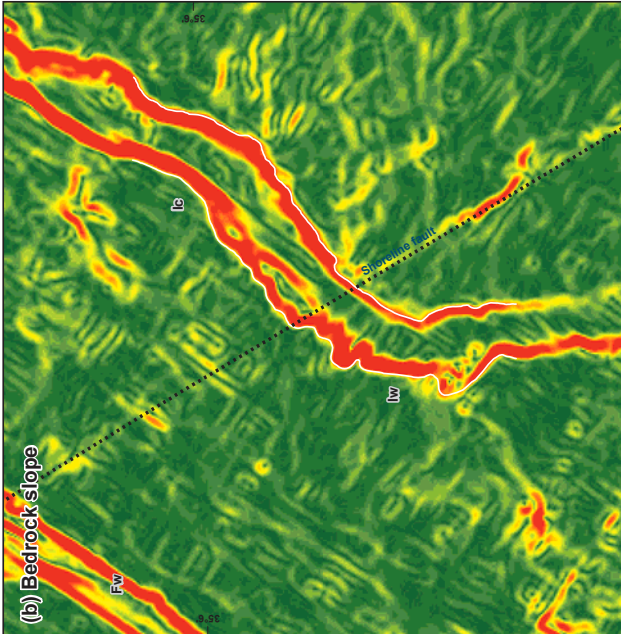












**EXPLANATION**

- Seafloor
- Unconformity H10
- Top of bedrock
- Holoocene sediment
- Channel fill
- Upper Pleistocene deposits
- Fault

**Source Channel Complex 2**

- Inline Channel location
- Channel thalweg
- Channel margins
- Arbitrary line
- 2011/2012 San Luis
- Obispo Bay 3D high-resolution survey extent

**Relative age**

- Younger
- Older

**(g) 3D bedrock surface**

**Figure extent**

**Figure 7-33 for piercing point location**

**Figure 7-34 for position of channel nomenclature**

Notes:

- See Figure 7-23 for piercing point location.
- See Section 3.3 for position of channel nomenclature.
- Contour interval is 2 m. Major contours are 10 m.
- Depth values on grid assume a velocity of 1,600 m/s.

Map projection and scale: WGS 84 / UTM Zone 10N, 1:7,500

Scale: 0 to 0.4 km, 0 to 0.2 mi.

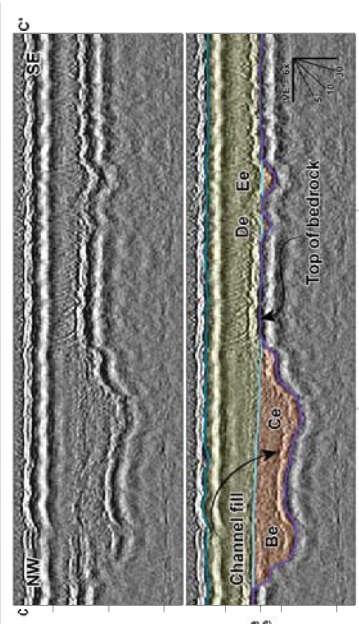
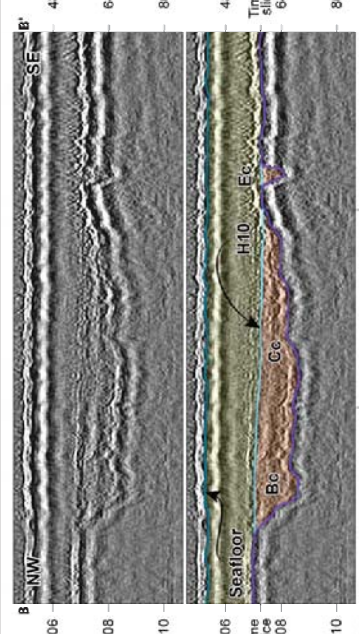
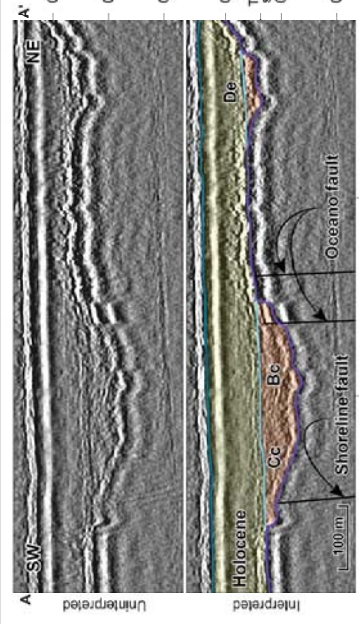
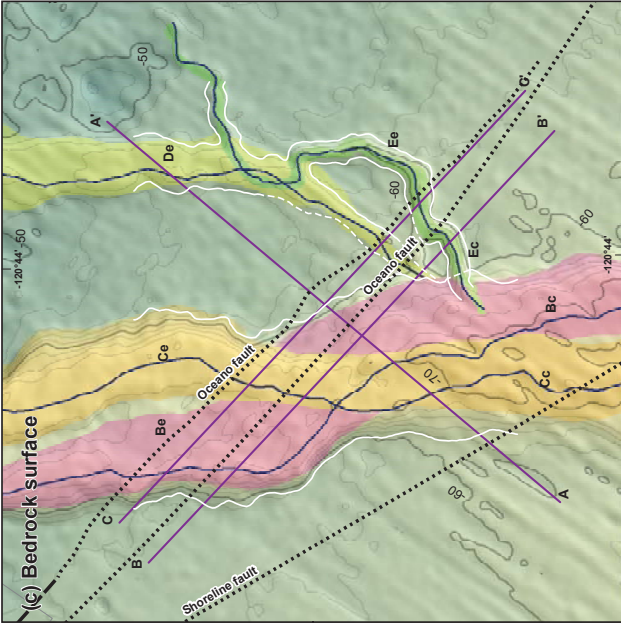
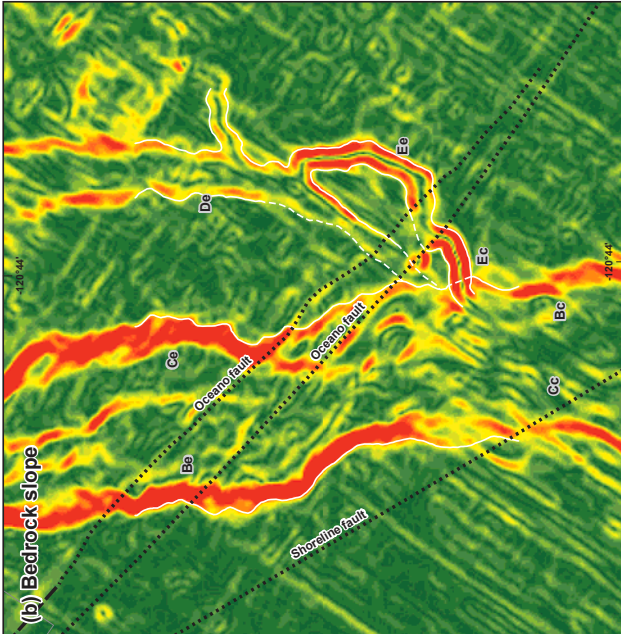
**Channel I - Shoreline Fault Piercing Point**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company

Figure 7-38





**EXPLANATION**

- Sea floor
- Unconformity H10
- Top of bedrock
- Holocene sediment
- Channel fill
- Fault

Source Channel Complex 1  
San Luis Chispa Creek

Initial Channel Incision: C, D, E, A, B

Reincision: A, B

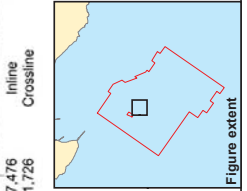
Relative age: Older (top), Younger (bottom)

Channel thalweg

Channel margins

Arbitrary line

2011/2012 San Luis Obispo Bay 3D high-resolution survey extent



Map projection and scale: WGS 84 / UTM Zone 10N, 1:7,500

Scale bars: 0 to 0.2 mi, 0 to 0.4 km

Notes:

- See Figure 7-23 for piercing point location.
- See Section 3.3 for resolution of channel nomenclature.
- Contour interval is 4 m. Major contours are 10 m.
- Depth values on grid assume a velocity of 1,600 m/s.

**Channels B, C, D, and E—  
Oceanic Fault Piercing Points**

OFFSHORE LESS STUDIES

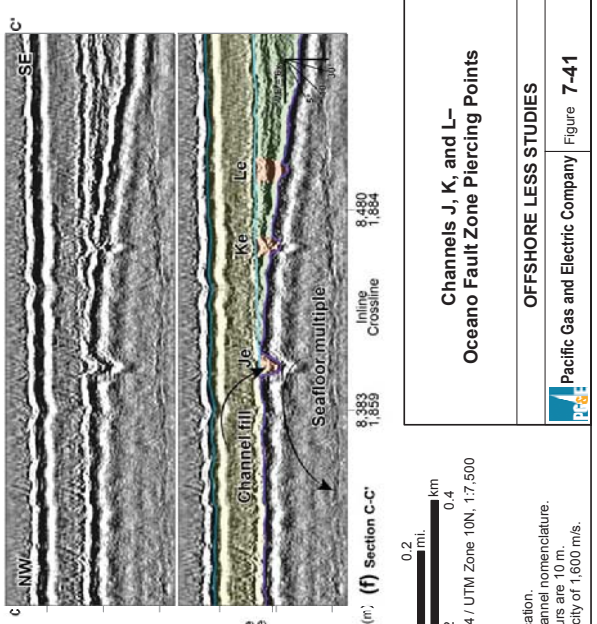
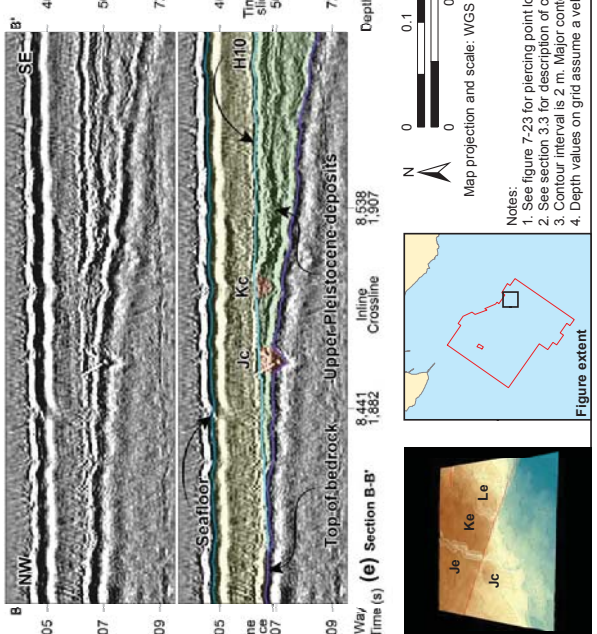
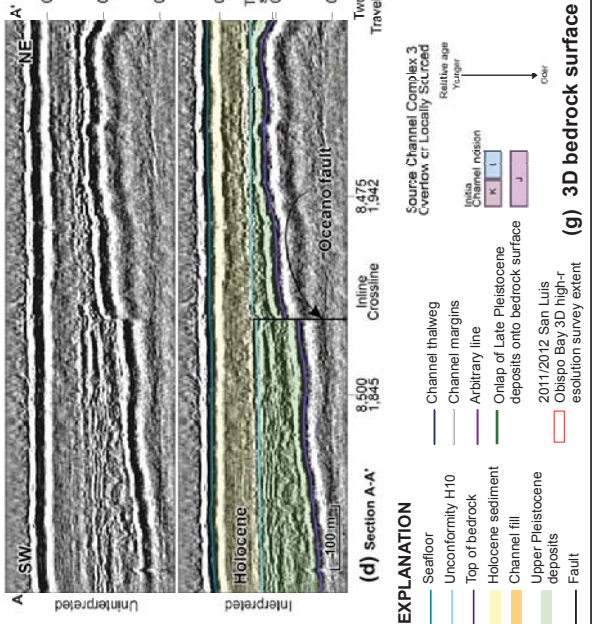
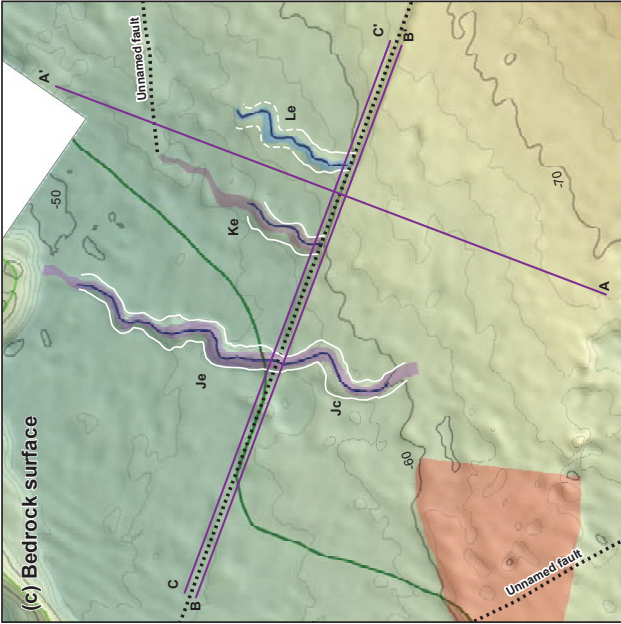
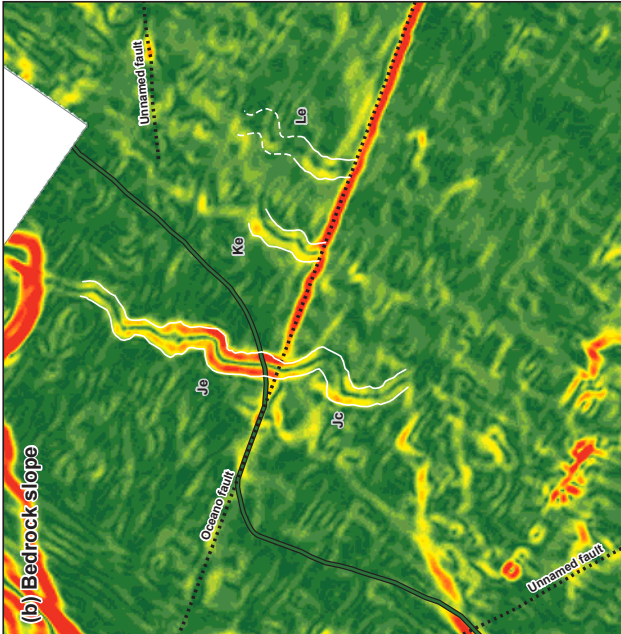
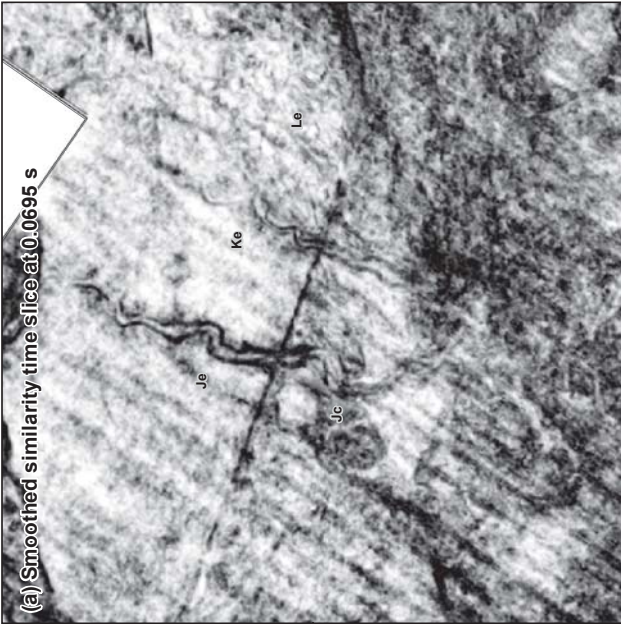
Pacific Gas and Electric Company

Figure 7-39









**EXPLANATION**

- Sea floor
- Unconformity H10
- Top of bedrock
- Holocene sediment
- Channel fill
- Upper Pleistocene deposits
- Fault

**Source Channel Complex 3 C'overflow or Locally Situated Channel notion**

- Je
- Ke
- Le
- Jc

**Realtime age color**

- 2011/2012 San Luis Obispo Bay 3D high resolution survey extent

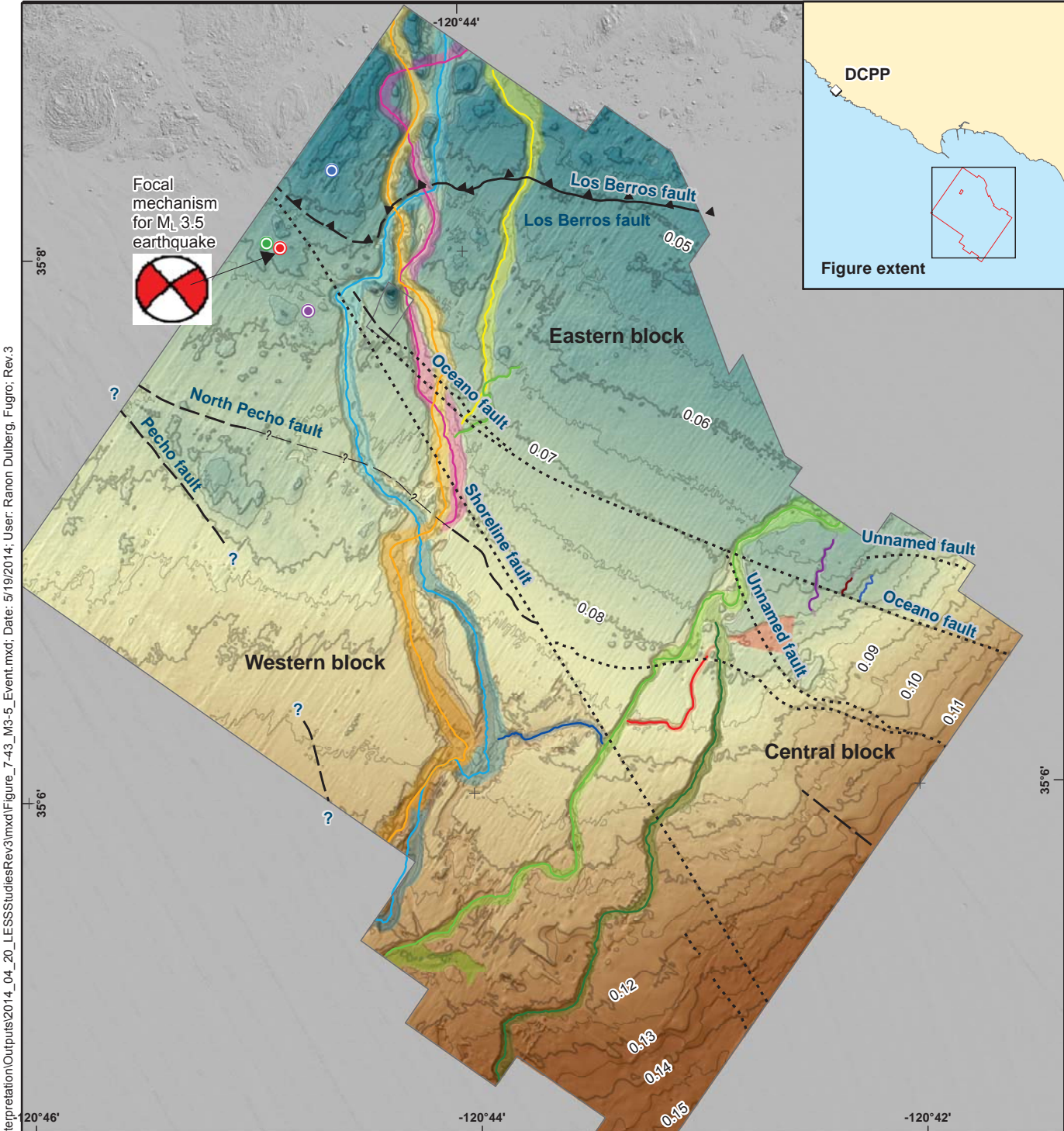
**Notes:**

- See figures 7, 23 for piercing point location.
- See section 3.3 for a description of channel nomenclature.
- Contour interval is 4 m. Major contours are 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1400, 1410, 1420, 1430, 1440, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 1560, 1570, 1580, 1590, 1600, 1610, 1620, 1630, 1640, 1650, 1660, 1670, 1680, 1690, 1700, 1710, 1720, 1730, 1740, 1750, 1760, 1770, 1780, 1790, 1800, 1810, 1820, 1830, 1840, 1850, 1860, 1870, 1880, 1890, 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970, 1980, 1990, 2000, 2010, 2020, 2030, 2040, 2050, 2060, 2070, 2080, 2090, 2100, 2110, 2120, 2130, 2140, 2150, 2160, 2170, 2180, 2190, 2200, 2210, 2220, 2230, 2240, 2250, 2260, 2270, 2280, 2290, 2300, 2310, 2320, 2330, 2340, 2350, 2360, 2370, 2380, 2390, 2400, 2410, 2420, 2430, 2440, 2450, 2460, 2470, 2480, 2490, 2500, 2510, 2520, 2530, 2540, 2550, 2560, 2570, 2580, 2590, 2600, 2610, 2620, 2630, 2640, 2650, 2660, 2670, 2680, 2690, 2700, 2710, 2720, 2730, 2740, 2750, 2760, 2770, 2780, 2790, 2800, 2810, 2820, 2830, 2840, 2850, 2860, 2870, 2880, 2890, 2900, 2910, 2920, 2930, 2940, 2950, 2960, 2970, 2980, 2990, 3000, 3010, 3020, 3030, 3040, 3050, 3060, 3070, 3080, 3090, 3100, 3110, 3120, 3130, 3140, 3150, 3160, 3170, 3180, 3190, 3200, 3210, 3220, 3230, 3240, 3250, 3260, 3270, 3280, 3290, 3300, 3310, 3320, 3330, 3340, 3350, 3360, 3370, 3380, 3390, 3400, 3410, 3420, 3430, 3440, 3450, 3460, 3470, 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17260, 17270, 17280, 17290, 17300, 17310, 17320, 17330, 17340, 17350, 17360, 17370, 17380, 17390, 17400, 17410, 17420, 17430, 17440, 17450, 17460, 17470, 17480, 17490, 17500, 17510, 17520, 17530, 17540, 17550, 17560, 17570, 17580, 17590, 17600, 17610, 17620, 17630, 17640, 17650, 17660, 17670, 17680, 17690, 17700, 17710, 17720, 17730, 17740, 17750, 17760, 17770, 17780, 17790, 17800, 17810, 17820, 17830, 17840, 17850, 17860, 17870, 17880, 17890, 17900, 17910, 17920, 17930, 17940, 17950, 17960, 17970,









File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESeismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_7-43\_M3-5\_Event.mxd; Date: 5/19/2014; User: Raron Dulberg, Fugro; Rev.3

**EXPLANATION**

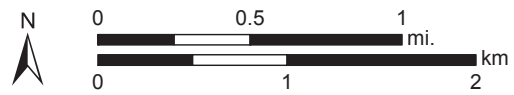
— Fault, dashed where inferred

**Earthquake locations from Hardebeck (pers. comm., 2014)**

- 3.5 (8/10/2000)
- 1.7 (8/13/2000)
- 1.4 (12/2/2001)
- 1.2 (12/5/2001)

**Notes:**

1. Refer to Figure 7-23 for paleochannel explanation.
2. Bedrock contour interval is 5 ms.



Map projection and scale: WGS 84 / UTM Zone 10N, 1:40,000

**10 August 2000 M<sub>L</sub> 3.5 Event, Bedrock Surface, San Luis Obispo Bay**

**OFFSHORE LESS STUDIES**

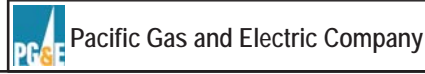
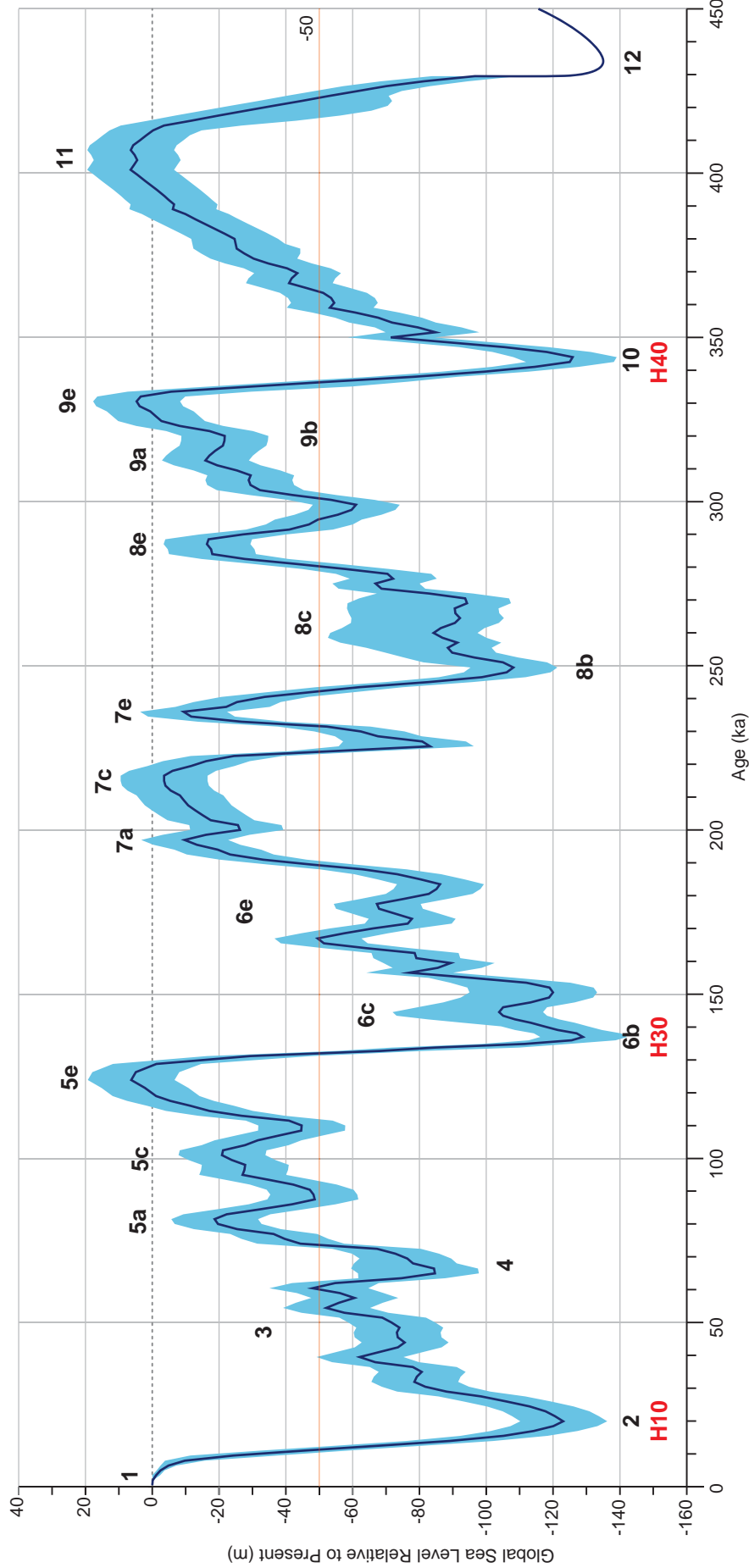


Figure **7-43**







**EXPLANATION**

- Sea-level curve
- Uncertainty
- Marine isotope stage, substage
- 5a** Unconformity (see Figure 1-6)
- H10**

- All channels (reoccupation)
- Select paleochannels

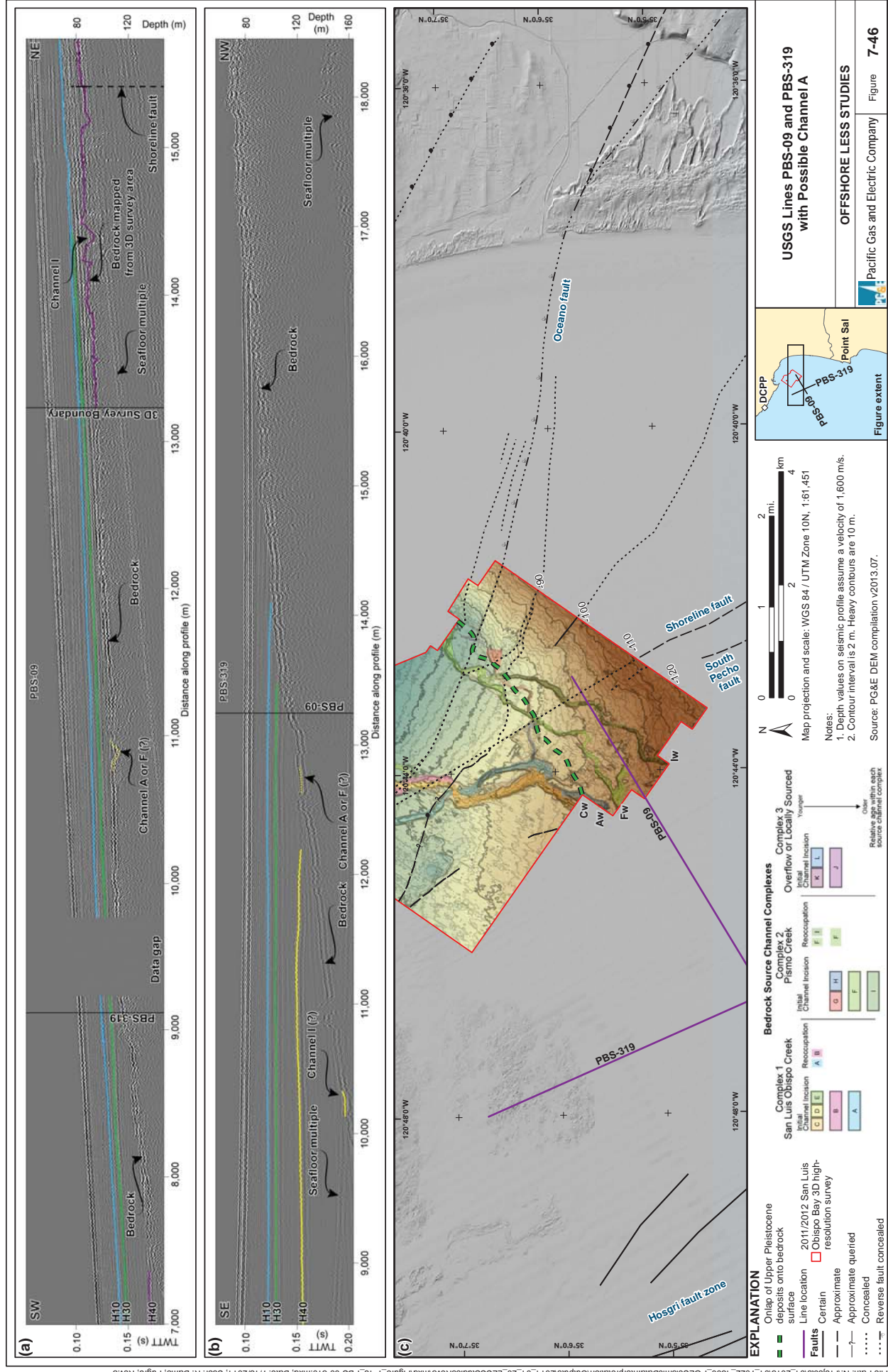
Notes:  
 1. See Figures 7-32 through 7-43 for illustrations of paleochannels.  
 2. Channels G and H are not included in age model.

**Age Model for  
Paleochannels, San Luis Obispo Bay**

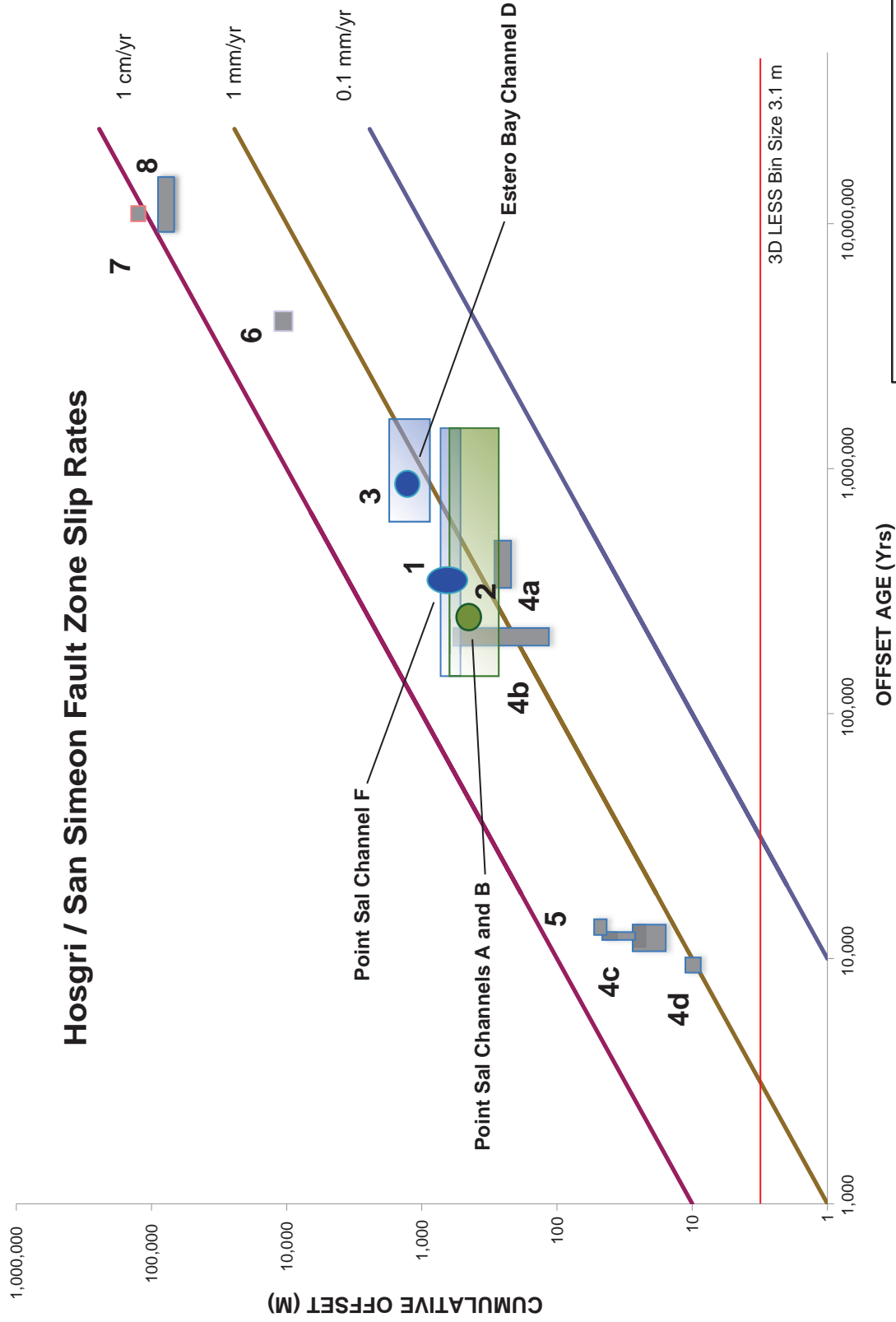
**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company **Figure 7-45**





# Hosgri / San Simeon Fault Zone Slip Rates



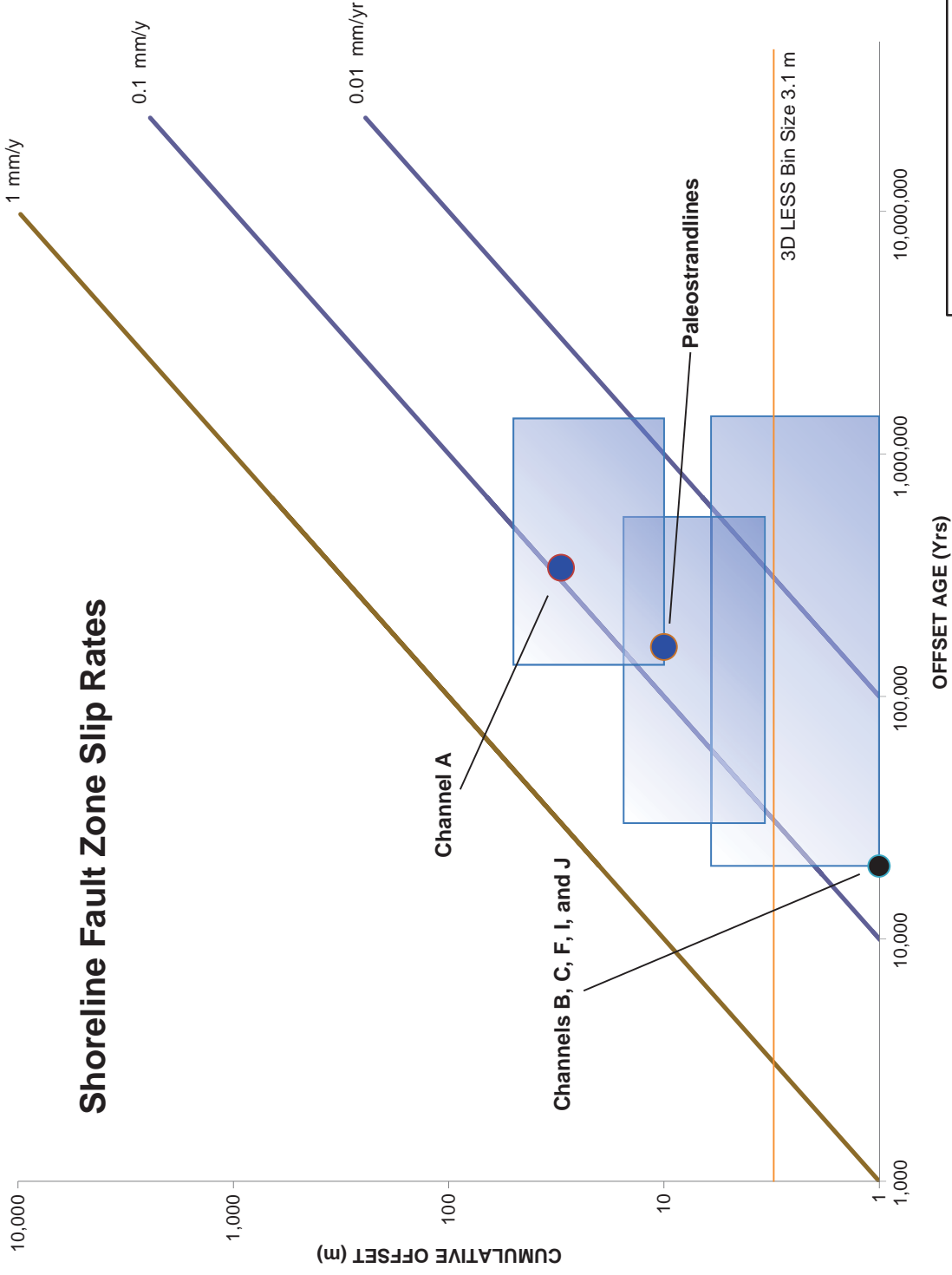
Note:  
 Cumulative fault offsets are plotted with respect to the reported age of the offset. For each piercing point, the reported range of offsets and age date are shown as rectangles. Preferred values are shown as filled circles. Reference rates of 1 cm/y, 1, and 0.1 mm/y are shown as diagonal lines. Points 1, 2, and 3 refer to the slip rates reported in this study (Pt. Sal (1) channel F (1.8 to 1.9 mm/yr (range: 0.4 to 5.1 mm/yr) and (2) channels A and B (1.8 mm/yr (range: 0.2 to 4.5 mm/yr) and Estero Bay (3) Channel De-Ee1-DBw (1.4 mm/yr (range: 0.2 to 3.6 mm/yr))). Other slip rates or piercing points include points 4a-d (San Simeon, Hall et al., 1994; Hansen et al., 1994); 5 (offshore Pt. Estero, Johnson et al (2013); 6 (southern Hosgri, Sorlien et al., 1999); 7, 8 (Pt. Buchon/Pt. Sur and Pt. Sal/ San Simeon ophiolites (Langenheilm et al., 2013)).

## Hosgri-San Simeon Fault Zone Slip Rates

### OFFSHORE LESS STUDIES



# Shoreline Fault Zone Slip Rates



**Note:** Cumulative fault offsets are plotted with respect to the reported age of the offset. For each piercing point, the reported range of offsets and age date are shown as rectangles. Preferred values are shown as filled circles. Reference rates of 1, 0.1 and 0.01 mm/y are shown as diagonal lines. Horizontal line depicts the 3D LESS bin size of 3.1 m, which represents the minimum spatial resolution dimension (or pixel size) for the 3D seismic reflection volume used in this study. The paleostrandlines have a preferred slip rate of 0.06 mm/yr (range: 0.01 to 0.5 mm/yr), Channel A has preferred slip rate of 0.1 (range: 0.01 to 0.4 mm/yr) and, Channels B, C, F, I, and J have a preferred slip rate of 0 mm/yr (range: 0 to 0.3 mm/yr). See text for further discussion.

## Shoreline Fault Zone Slip Rates

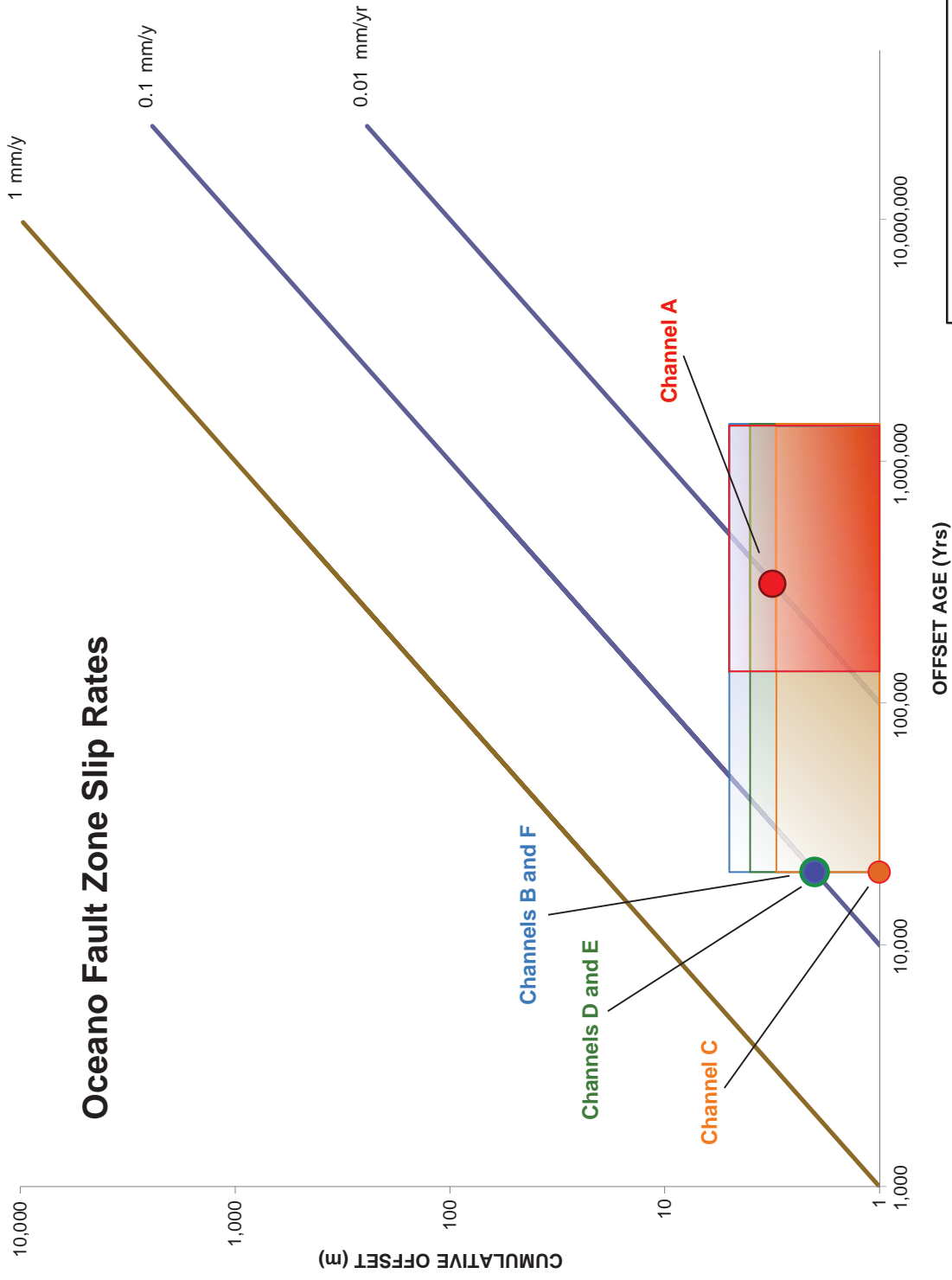
### OFFSHORE LESS STUDIES

Pacific Gas and Electric Company

Figure 8-2



# Oceano Fault Zone Slip Rates



Note:  
 Cumulative fault offsets are plotted with respect to the reported age of the offset. For each piercing point, the reported range of offsets and age date are shown as rectangles. Preferred values are shown as filled circles. Reference rates of 1, 0.1 and 0.01 mm/y are shown as diagonal lines. Channel A has a preferred slip rate of 0.01 mm/yr (range: 0.0007 to 0.04 mm/yr), Channels B and F have a preferred slip rate of 0.1 mm/yr (range: 0.0007 to 0.3 mm/yr), Channel C has a preferred slip rate of 0.05 mm/yr (range: 0.0007 to 0.15 mm/yr), and Channels D and E have a preferred slip rate of 0.1 mm/yr (range: 0.00007 to 0.2 mm/yr).

## Oceano Fault Zone Slip Rates

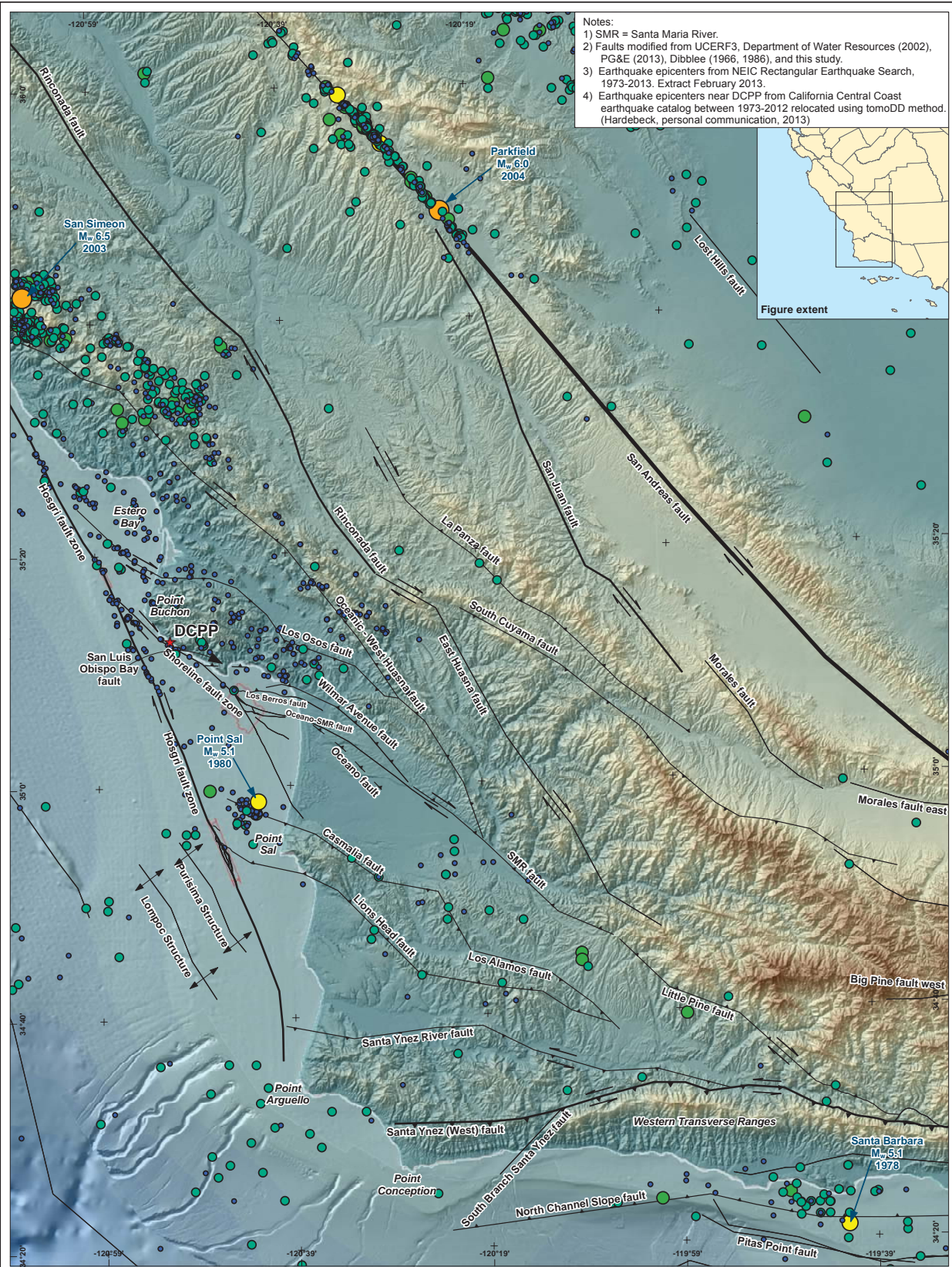
### OFFSHORE LESS STUDIES



Figure 8-3



File Path: N:\Projects\04\_2013\04\_7922\_4500\_PGESismicData\Interpretation\Outputs\2014\_04\_20\_LESSStudiesRev3\mxd\Figure\_9-1\_FaultActivitySeismicity.mxd; Date: 7/17/2014; User: Robert Dame; Fugro; Rev:3



- Notes:
- 1) SMR = Santa Maria River.
  - 2) Faults modified from UCERF3, Department of Water Resources (2002), PG&E (2013), Dibblee (1966, 1986), and this study.
  - 3) Earthquake epicenters from NEIC Rectangular Earthquake Search, 1973-2013. Extract February 2013.
  - 4) Earthquake epicenters near DCPD from California Central Coast earthquake catalog between 1973-2012 relocated using tomoDD method. (Hardebeck, personal communication, 2013)

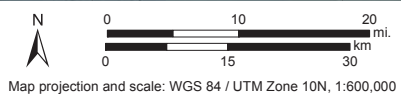


**EXPLANATION**

- Faults**
- Strike-slip fault (dips 70° to 90°)
  - Reverse or thrust fault, teeth on hanging wall (dips 30° to 75°)
  - Reverse or thrust fault, mostly blind
  - Oblique-slip fault, reverse component (dips 45° to 75°)
  - Fault poorly characterized
  - Offshore Anticline

- Slip Rate Categories**
- > 5 mm/yr
  - 1-5 mm/yr
  - < 1 mm/yr
  - 3D LESS extents

- Earthquake Epicenter**
- M<sub>w</sub>
- 1.5 - 2.9
  - 3.0 - 3.9
  - 4.0 - 4.9
  - 5.0 - 5.9
  - 6.0 - 6.9



**Generalized Fault Activity and Seismicity Map**

**OFFSHORE LESS STUDIES**

Pacific Gas and Electric Company Figure **9-1**