

Overcoming the Challenges to Intelligently Pig the Unpiggable – Platform Elly to Shore Oil Pipeline Case Study

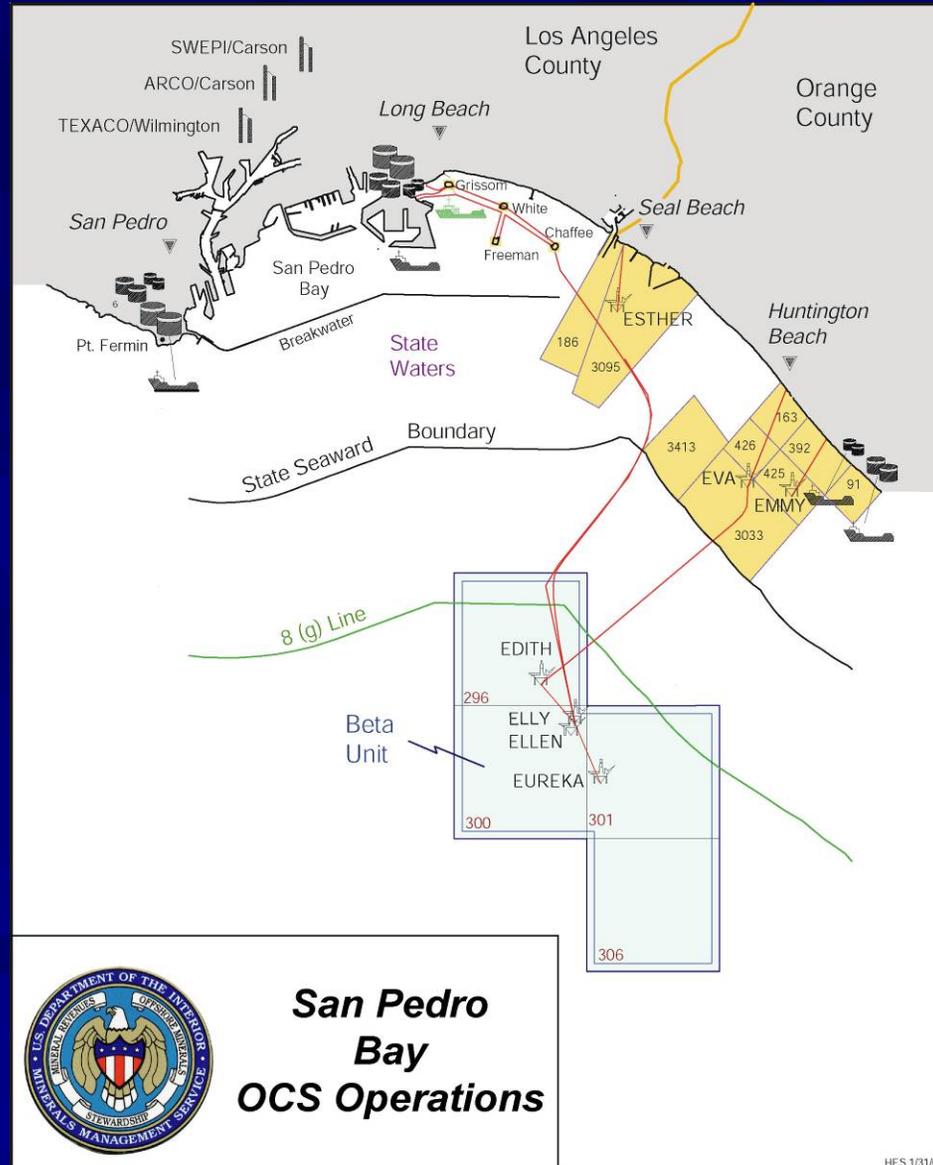
by

Theresa Bell, Robert Chambers
and Robert Pyle

Prevention First 2008

Sept. 2008

Beta Unit



Background

- Beta Unit operators –
 - Shell Oil (1976-1982)
 - Shell California Production (1982-1983)
 - SWEPI (1983-1995)
 - CalResources (1995-1997)
 - Aera Energy (1997-2007)
 - Pacific Energy Resources (2007 - current)
- Right of Way holder – San Pedro Bay Pipeline Company

Background

- 17.3 mile sub sea pipeline installed in 1980 from Platform Elly to Long Beach Harbor
- 16" OD, 0.5" wt API 5LX 52, 0.844" wt riser, zinc sacrificial anodes
- Product – dry oil separated
 - 15.2 API gravity
 - 1.9% BS&W
 - Paraffins & asphaltenes in 3:1 ratio
- Using only sphere pig to remove H₂O

Start of the Adventure

- In 1990, MMS Pacific OCS Region issued policy requiring internal and external pipeline inspections on alternating years
- In 1992, SWEPI was granted a waiver from ILI inspection (6 months – chemical monitoring; annual – CP; 2 years – ROV, close interval CP, caliper pig)

Issues with ILI in 1992

- Low velocity of tool
- Vertical launchers
- Bend radius
- Dents
- No experience with removing paraffin/asphaltene



The Real Adventure Begins

- June 1999 – Leak in 12” gross fluids line
Platforms Eureka & Elly
- March 2000 – MMS rescinded ILI waiver
and Aera Energy appealed; stay with
agreement of Action Plan and monthly
progress reports



Action Plan

- Phase I – Preparing the pipeline
(estimated 1 year)
- Phase II – Cleaning the pipeline
(estimated 1 year)
- Phase III – ILI of the pipeline

Reviewed by MMS, California State Lands
Commission & DOT's Pipeline and
Hazardous Materials Administration

Action Plan – Phase I

- Obtain Deposit Sample
- Assess Volume, Location & Thickness
- Investigate Removal Techniques
- Develop Pipeline Line Integrity Plan
- Onshore Modification Plan
- Implement Line Integrity Test/Onshore Valve Addition



Action Plan – Phase I

- Develop Cleaning Plan
- Preliminary Smart Pig Evaluation
- Launcher/Receiver Replacement Plan
- Launcher/Receiver Installation
- Dent Repair Plan
- Run Geometry Tool



Phase II – January 2001

- Beta Station & Elly Modifications
- Pig Detection
- Procedures for Cleaning
- Caliper Pig
- Cleaning Pipeline (Est. 6 months)



Phase II Challenges

- Dents found and repaired in Long Beach Harbor – special order clamp with long lead time
- Problems with gauging plate passing
- Cleaning took longer than planned



Cleaning Program

- Series of cup/slotted disc then cup/full disc
Start diameter 14.7", increasing 0.03" to
final diameter 15.0"
 - K-disc #1 (slit every 27.5 degrees)
 - K-disc #2
 - Sensor Carrier/Gauging Plate pig
 - K-disc #3 thru #6 (#6 run twice)
 - Cup/brush pig

Phase III – February 2007

- Run Dual Diameter Ultrasonic tool run in water
- Approved with condition that operator must complete the physical smart pig by August 30, 2007

Pacific's First Major Challenge

- Pacific Energy Resources acquired Beta Complex March 6, 2007.
- Inherited the Phase III MMS/CLSC Approved Plan. Completion deadline August 30, 2007.
- Had to complete all preparations within four months, leaving one month for contingencies.
- Completed the cleaning program per the approved plan, then added modest chemical cleaning just prior to running the UT tool.
- Contingency Planning for inspection and emergency repair.

Pacific's First Attempt

- Moving the UT tool: push with water due to velocity / time constraints
- Getting enough clean water from the source well to Launcher
- Disposing of chemicals and 60,000 bbls of water on shore
- First UT tool run was unsuccessful due to contamination of the sensors



Plan B. Back to the Drawing Board

- Contamination from platform piping & tanks appeared to be the cause
- Reorganized project command and control to coordinate better with platform operations
- Revised Source Water Plan from A-16 to remove dead legs & tanks. Pump directly from source well.
- Had UT tool contractor review & develop more comprehensive cleaning program



Failure is Not an Option

- Accelerated chemical cleaning to remove possible remaining hard wax
- Used more aggressive pigs, with “pills” of solvent followed by even more aggressive discs and brushes.
- 30 ft wax candle “surprise” at Beta Station. Entire prior cleaning program produced nothing like this.



The Second Try

- UltraScan Tool turn around changed to hours instead of days, so we went for it again.
- Ran UT Tool behind second chemical cleaning.
- Encapsulated tool in water / surfactant pill.
- Put another solvent pill in after the smart pig in case we had to run again.
- “Clean enough to eat off of”
- Now have Base Line and will run ILI Bi-Annually.

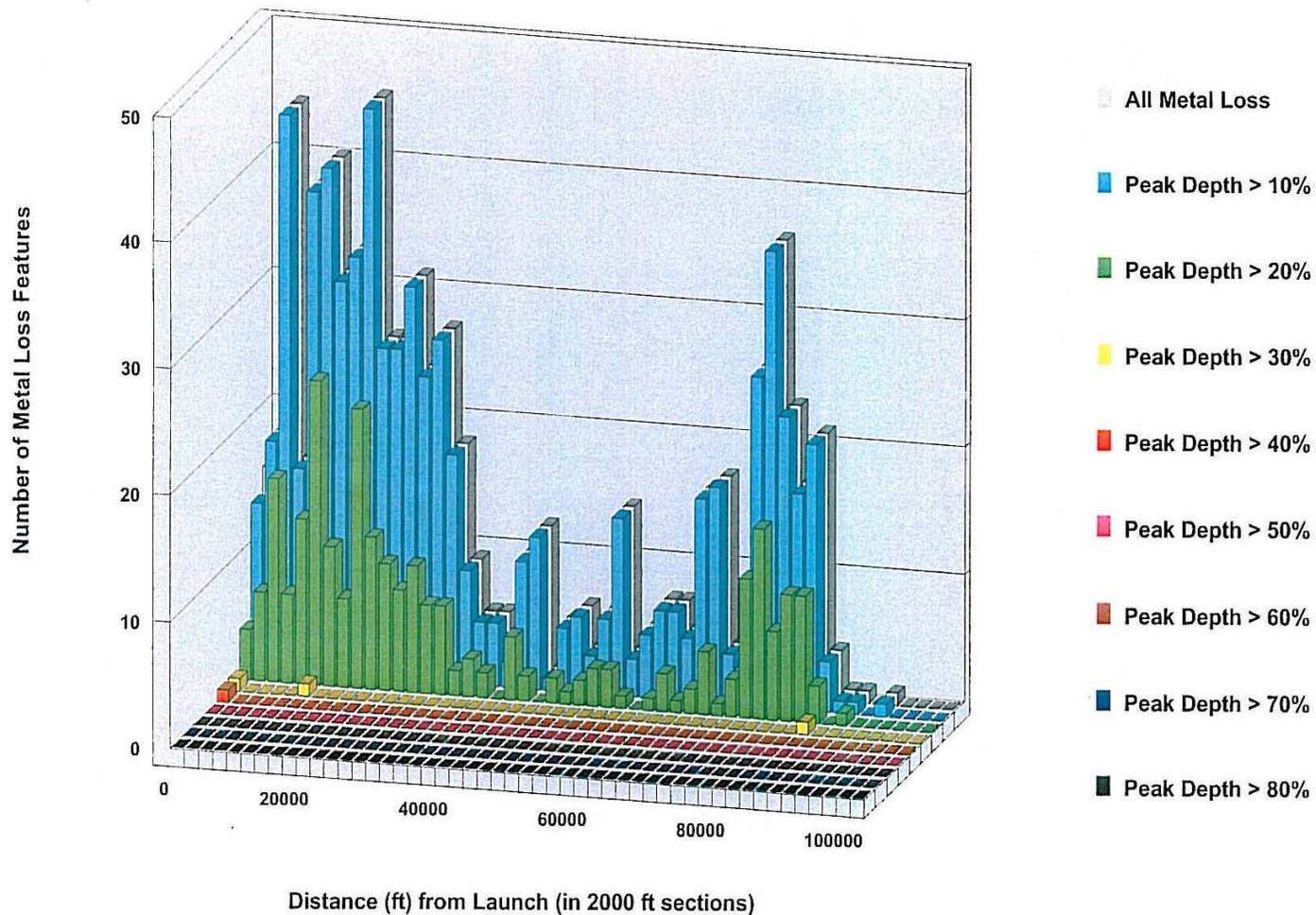


GE PII UT Tool Data

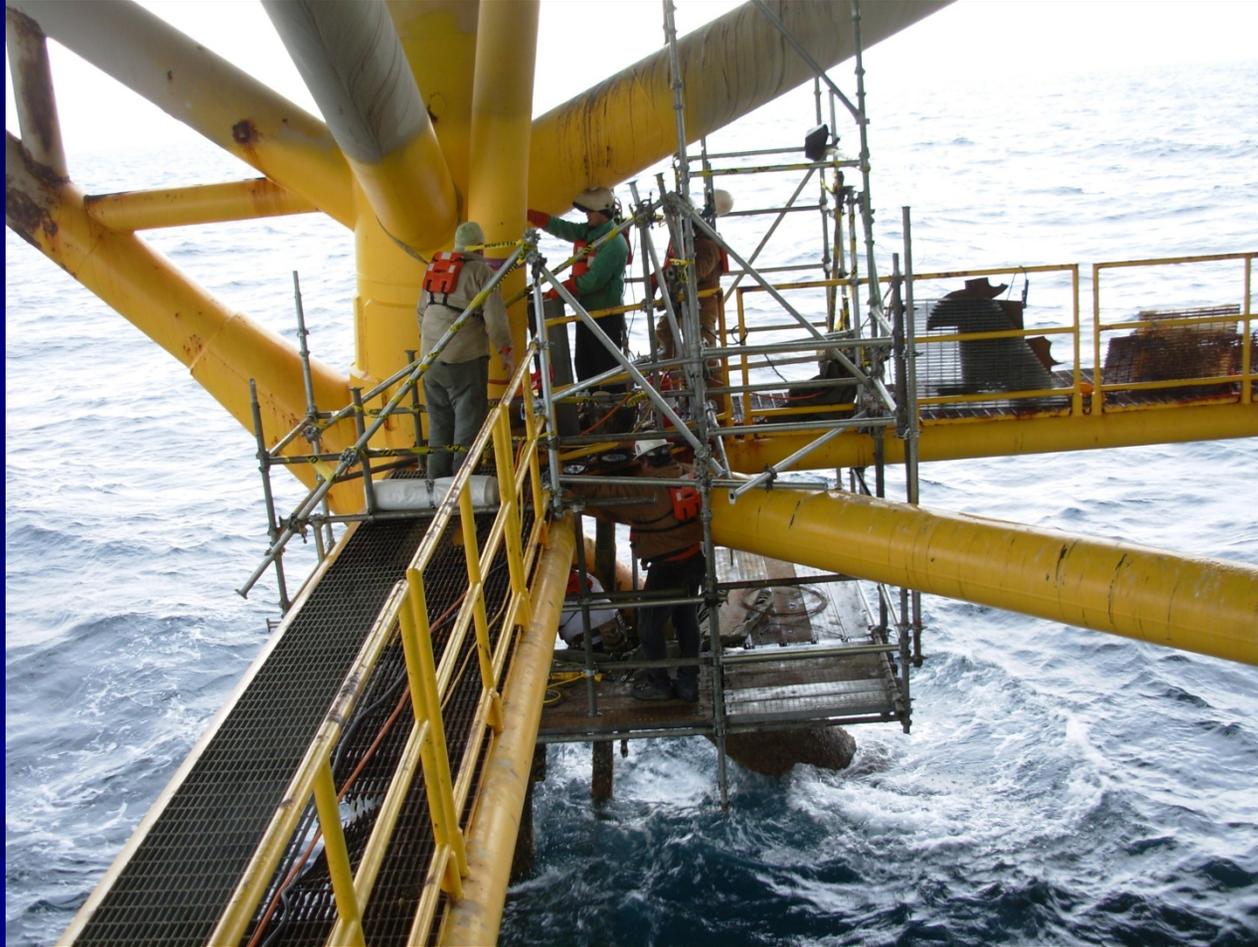
DEPTH BASED HISTOGRAM

Platform Elly to Beta Station
UltraScan WM Run 2AHB

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16 Inch Riser Repair



Lessons Learned

- Chemicals where needed. Mechanical alone not sufficient to remove hard wax.
- Continuous use of Waxtreat to arrest ongoing precipitation will eliminate need for aggressive chemical cleaning in the future.
- Next ILI run will not interfere with production.

Year in Review

- Smart pigging completed September 2007
- 16 inch riser at Elly repaired
- Relocated 1200 ft of 16 inch on Pier G
- New ROW Lease SPBP / CSLC
- UT / MFL inspection of intrafield lines (got it right the first time)
- RTP Eureka on April 14th 2008, one year 9 days
- PER received MMS Safety award during their first year of operation

Questions?

