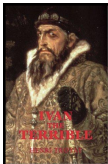


2005 Offshore Hurricane Readiness and Recovery Conference

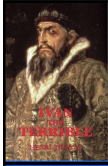
Recovery From Ivan

Tom Wicklund
BP Pipelines NA
July 27, 2005

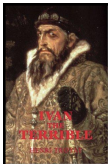
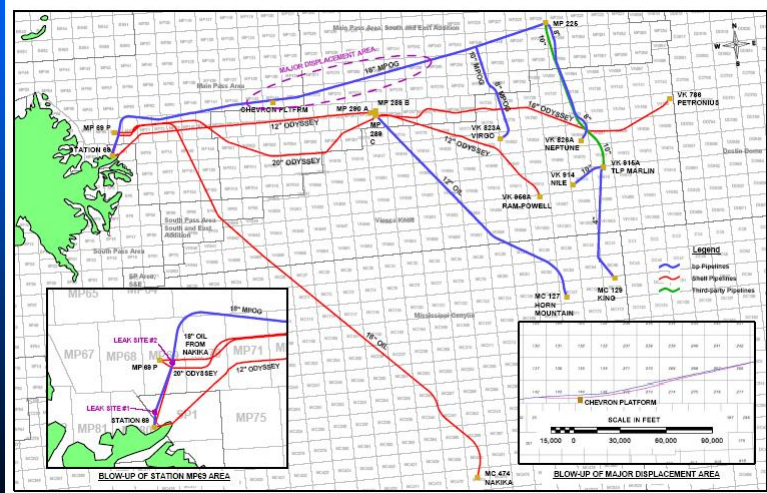


Recovery → Return to Service

- 3 Phases of Recovery
 - Assessment
 - Mitigation
 - Return to operations
- What went well
- What needs improvement

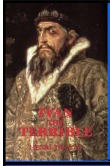


Scenario – Displaced Line

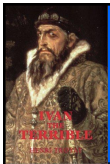
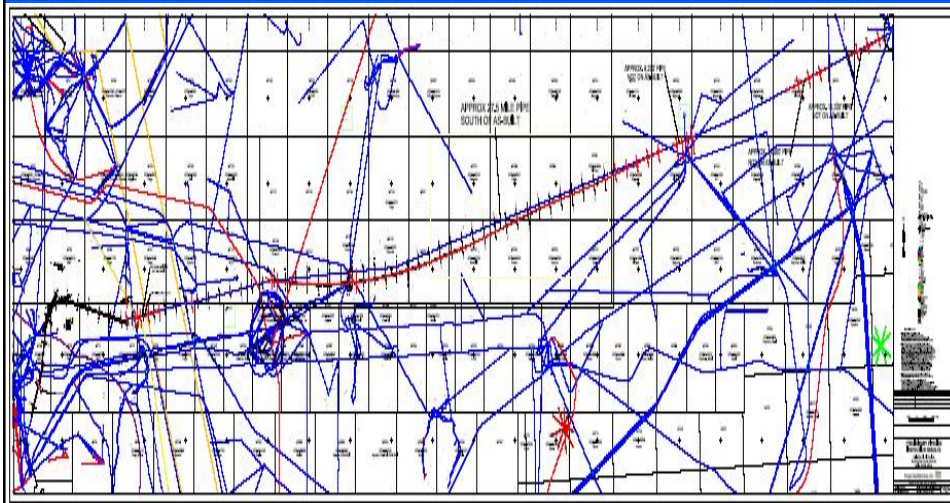


Assessment

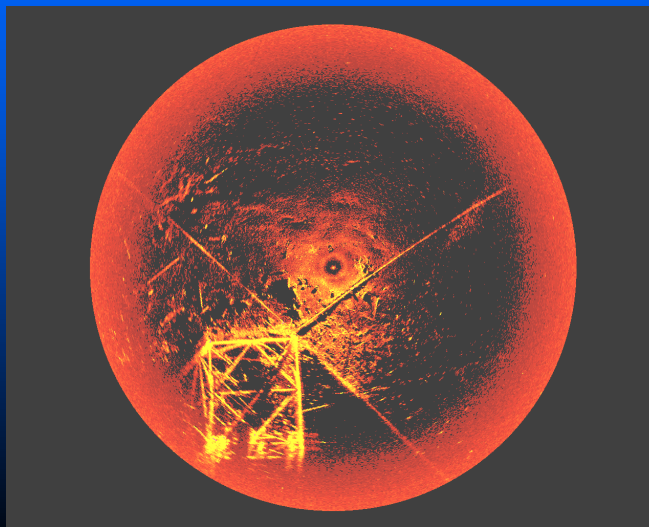
- » Office
 - Review SCADA data (immediately after storm)
 - Consultant studies (as data becomes available)
- » Field
 - Visual of topsides
 - Over flights
 - Sonar
 - ROV surveillance
 - Diver inspection
 - Pressure test
 - Pigging

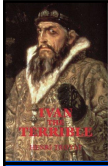


Sonar Data of Displaced Pipe



Sonar Image @ MP144



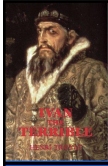


Diver Photo



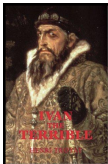
Mitigate

- Equipment inspection & cleanup (topsides)
- Stabilization
- Pipe repair
- Pipe replacement
- Lift & move
- Lay new pipe
- Line lowering
- Spill response support

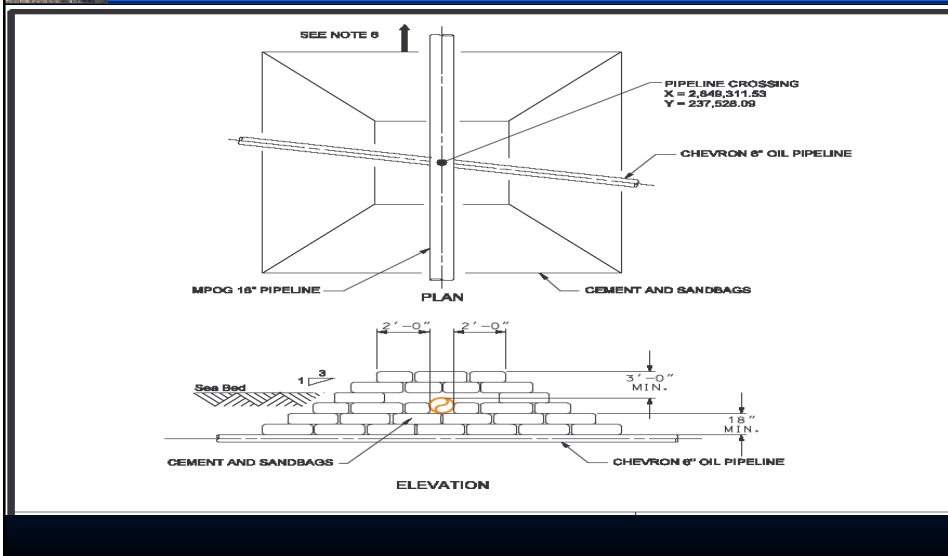


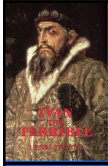
Regulator approval required

- MMS for pipe in OCS
 - » Pressure test
 - » Repairs
 - » Relays
 - » New lay
 - » Modify/relinquish RoW
- OPS for pipe in state waters
- LaF&W for pipe in marshlands

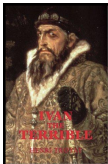


Rebuild Crossings



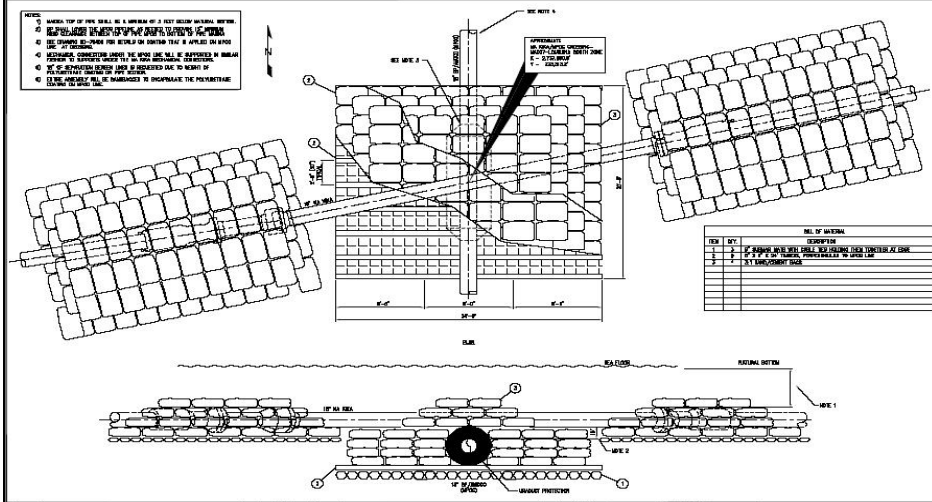


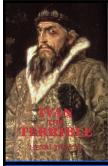
Low Pressure Band Clamp



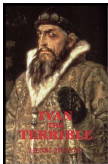
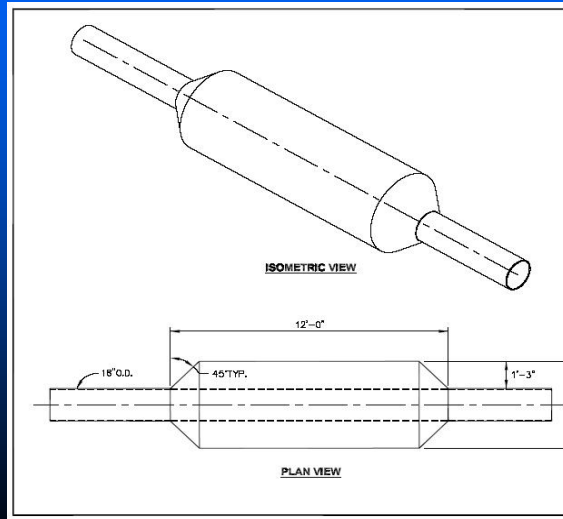
Pipe Replacement

- 1) MAKE TOP OF PIPE SEAL AS A MINIMUM OF 2 FEET BELOW NORMAL WATER TABLE.
- 2) PLACE BAND CLAMP ON TOP OF PIPE AND SEAL WITH POLYURETHANE SEALANT.
- 3) PLACE BAND CLAMP ON TOP OF PIPE AND SEAL WITH POLYURETHANE SEALANT.
- 4) PLACE BAND CLAMP ON TOP OF PIPE AND SEAL WITH POLYURETHANE SEALANT.
- 5) PLACE BAND CLAMP ON TOP OF PIPE AND SEAL WITH POLYURETHANE SEALANT.
- 6) PLACE BAND CLAMP ON TOP OF PIPE AND SEAL WITH POLYURETHANE SEALANT.

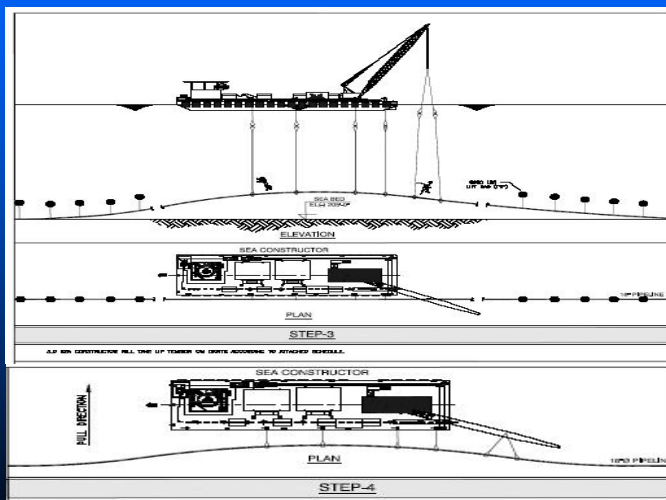


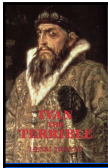


Separation/Coating

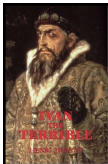
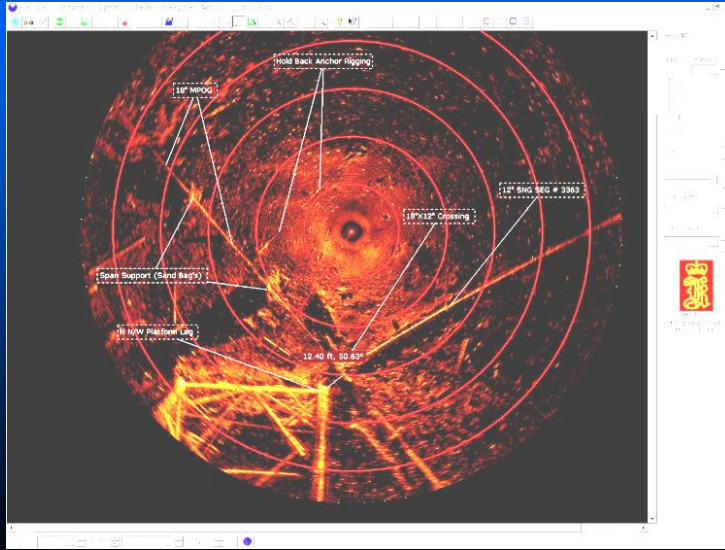


Lift & Move

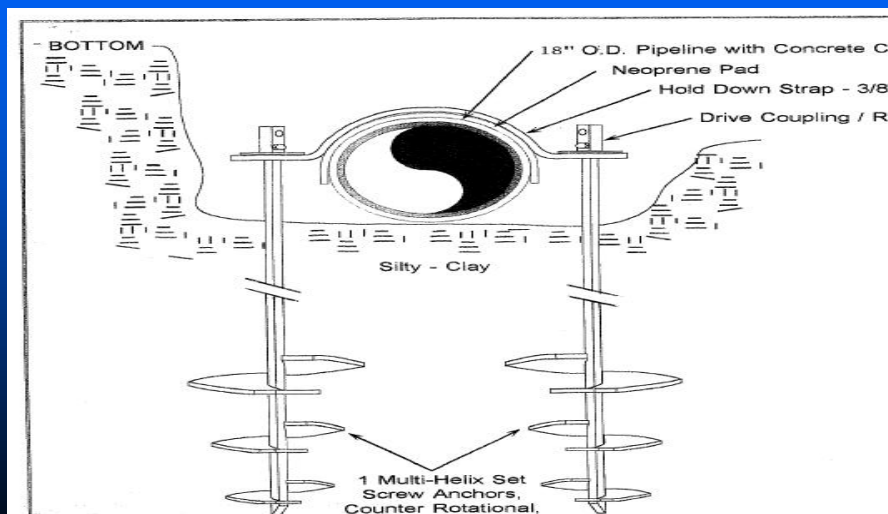


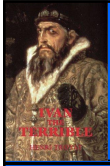


Sonar After Pipe Move



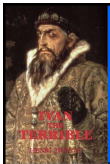
Stabilize w/Screw Anchors





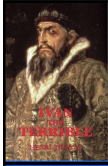
Return to Operations

- Temporary operations
 - Reduced pressures
 - Temporary connections
- Return to fully rated operations
- Idle/abandon



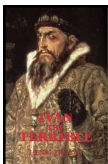
What Went Well

- Sonar – good 1st identifier of problem
- Interaction w/Agencies
- “Oil out” minimized during repairs



Areas for Improvement

- Post storm integrity plan
- Pre-storm sourcing
 - Vessels
 - Personnel
 - Materials
 - Services



Post Storm Integrity Plan

