

ExxonMobil Pipeline Company
Southern Operations

SAFETY AND WORK PROCEDURE
Pegasus System-Conway to Corsicana 20”
Crude Oil S-110A and S-110B
Mayflower Incident
Remove and Replace Damaged Segment
(Updated 4/8/13 per PHMSA request)

Location #: C252778

MOC #13-0172

Project #: P7.2013.00190

Submitted for Approval by: Kyle Manley and Rodney Reed

Date: 4/8/2013

Reviewed and Approved By:

Watkins Contract Superintendent (Bobby Davis) Copy _____

ERST Tech Copy _____

OCC Copy _____

Crude and Products Field Supervisor (WEB) Copy _____

Crude and Products Area Supervisor (DPC) Copy _____

Major Projects Manager (CVB) Copy _____

PHMSA Review/Take no exception _____

Incident Commander (Mark Weesner) Review _____

Project Engineer (KDM) Review _____

Tech Leader (RLB) Review _____

Project Safety and Execution Lead (RMR) Approve _____

COMMENTS: Conduct JSAs, SPSAs, TGSMs daily and prior to each work task and after work stoppage. Adhere to Work Permitting Guidelines, LO/TO procedures, Safe Excavation Guidelines and Work Procedures.

Critical Steps:

1. Communicate with Incident Command, PHMSA and other affected parties
2. Follow guidelines for welding under no-flow conditions
3. Communicated all underground utilities to work teams
4. Removal and Handling of damaged segment

Any revision to these procedures must be approved by Rodney Reed.

HOT WORK PERMITS REQUIRED

Yes No

Project Overview

BACKGROUND

On March 29, 2013, during normal operations of the Mobil Pipe Line Company 20" Pegasus Crude Oil System, damage occurred at ~Station # 16621+55. The release occurred downstream of the Conway Pump Station in a subdivision of Mayflower, Arkansas.

SYSTEM DESCRIPTION

The segment is part of the Pegasus Crude Oil pipeline system which begins at Patoka, IL and terminates in Nederland, TX. This segment is shown on alignment sheet series S-110A and S-110B. Work will be performed in Arkansas. The alignment sheets show the pipeline's main features, including launch and receive traps, as well as all intermediate mainline valves. The pipeline is remotely operated via the EMPCo Operations Control Center (OCC).

PURPOSE

These safe work procedures define the steps that are necessary to safely remove and replace the damaged segment of pipe. Highlights of these procedures are shown in the CONTENTS below. The work is scheduled to take place upon approval of these procedures.

CONTENTS

The following key tasks are covered in this procedure:

- Identify LO/TO isolation points
- Excavation and installation steps for welding TDW 2" Thread-O-Ring (TOR) fittings at ~Station # 16624+55 (upstream) and ~Station # 16616+25 (downstream) to allow for drain down for damaged pipe segment removal and replacement (*contingency installation of stopples*)
- Excavation steps for exposing damaged pipe segment and exemplary segment (adjacent pipe joint north/east of damaged segment – choice for exemplary segment made to minimize impact on neighborhood). *Contingency to excavate, remove and replace additional piping segments to be subsequently determined if evidence of external damage and added to procedures as applicable (potential impact to driveways, streets and utilities)*
- Surveying and documenting existing pipe orientation, including elevation and horizontal positions prior to cold cutting
- Surveying and documenting pipe orientation during cold cutting operation
- Removal steps to properly preserve damaged pipe segment for delivery to metallurgical laboratory for analysis
- Tie-in procedures for new pipe replacement
- Backfill and Clean Up of all work locations

Excavation and examination of pipe anomalies for the purpose of in-line inspection validation are covered by a separate procedure (Attached as: HCA Assessment: Validation Digs – TFI ILI Tool).

TIMING

Following is a summary of order for key tasks/events:
Excavate and install Thread-O-Ring fittings

Excavate damaged pipe area
Remove damaged pipe
Install flanges
Replace/Tie-in new section of pipe

LOCATION

The project will take place in Mayflower, Arkansas, within the Pegasus Pipeline System right-of-way, between approximate station numbers 16624+55 and 16616+25. The pipeline route and valve locations are shown on alignment series S-110A and S-110B.

MOVEMENTS AFFECTED

The work will be completed while the pipeline is shut down. OCC will be informed of the work.

PIPE DATA

See Pipe Data summary sheet.

VALVE DATA

Locations shown on Alignment Sheets

BEND DATA

See Pipe Data summary sheet

SYSTEM INFORMATION

Job Task Name	Mayflower Incident Repair
Location	Mayflower, AR
Location Code	C252778
Pump Station	Conway
Product	Crude Oil

Safety Procedure

PERMITTING

Air Permits

There are no permitting issues.

Wastes

Used material and waste from line displacements and cleaning and other processes must be stored in covered and labeled container and properly disposed of at an EMPCo approved waste site.

The damaged pipe will be transferred to a metallurgical lab for testing following procedures in Evidence Control Protocol – Pegasus Pipeline, Mayflower, AR

PRODUCT INFORMATION (See MSDS for further details.)

- Crude Oil:
 - Appearance: Brown or Black Liquid
 - Odor: Sulfur
 - Viscosity at 40 degrees C, cSt: < 7.0

MINIMUM SAFETY EQUIPMENT (Crude and Products Systems):

Basic personal protective equipment shall be worn at all times when performing work for EMPCo. The minimum acceptable PPE consists of, safety toed work boots, hard hats, safety glasses with side shields and gloves suitable for the task being performed. (See EMPCo Safety Manual – PPE Policy - Requirements table on page 12 to assist with proper glove selection.) The selected gloves are required to be “on-person” at all times. This may be achieved with a belt ‘clip’ type glove holder with breakaway capability. Glove holders attaching to the employee’s belt with Velcro straps are expressly forbidden. Fire Retardant Clothing (FRC) shall be required while performing hot work during all phases of the project.

If skin contact with liquid Products or Crude Oil is possible then the following personnel equipment is required:

- Appropriate full face respirator
- Chemically impervious gloves
- Rubber Boots
- Chemically impervious clothing is required (e.g. Kappler™/CPF III Suit and Boots, Coated Tyvek™, raingear or equivalent, worn over FRC).

GENERAL SAFETY REQUIREMENTS

- All work shall be in accordance with the EMPCo Safety Manual, EMPCo Excavation Manual, EMPCo Respiratory Protection Policy, OSHA Standards and Other Company and Governmental Agency Requirements.
- Direct reading Gas Monitors will be used to determine the lower explosive limits of the work areas, H₂S and Oxygen levels prior to any work being performed. Monitors shall be calibrated monthly and bump tested daily prior to use. All calibration data will be recorded in accordance with EMPCo Safety Manual. When a potential exposure to benzene is possible, a Draeger™ CMS meter will be used to test for levels of benzene in the work environment.

- Two (2) fire extinguishers and a direct reading gas monitor will be placed at the various work locations and shall be monitored continuously as required. A designated fire watch shall be assigned for all Hot Work and remain on watch for 30 minutes after the Hot Work has ended.
- Employees are required to have and use proper personal protective equipment for other non-chemical hazards experienced during the course of completing the work. The PPE necessary includes, but is not limited to:
 - Ear Plugs and/or ear muffs for protection from high noise levels. Either type of protection must be worn for protection when working in areas with noise levels in excess of 85 dB. Both types (double protection) must be worn simultaneously for protection from noise levels in excess of 95 dB.
 - Steel toed rubber boots or covers for safety toed boots are required while working in wet conditions for long periods of time or while working in cement stabilized sand, lime or wet concrete.
 - At a minimum, a half mask respirator with a black organic vapor cartridge for protection from exposure to benzene vapors will be used every time a scraper trap on a products system is opened.
- Magnetically attached jumpers will be used for bonding to eliminate static electricity during the breaking of flanges, opening or closing of launcher/receiver doors, cold cutting of process equipment or piping.
- No smoking, welding or other ignition sources will be allowed near a potentially hazardous work area, including gasoline powered equipment until a Work Permit is authorized and issued. Smoking will be allowed only in a predetermined 'Designated Smoking Area'.
- Work Permits will be issued by required personnel prior to the commencement of work and shall be authorized by the appropriate Field Supervisor. A copy of the Work Procedure(s) and other pertinent documents are required to be sent to OCC prior to the commencement of work. OCC will be contacted daily and the name of the person contacted will be noted on the permit in the appropriate location.
- EMPCo Lock Out/Tag Out procedures will be followed at all times.
- Every effort should be made to schedule work so that it does not exceed a 14-hour workday for contract employees. When this is not practical, multiple shifts should be scheduled to cover operational needs requiring staffing in excess of 14 hours.
- On site safety meetings will be held with job personnel prior to the commencement of the various work phases. Tailgate Safety Meetings (TGSM) shall be held DAILY and documented. LPS compliant JSA's will be reviewed prior to completing an LPS Designated Task. All non-designated tasks will require each crew member to conduct a **Safe Performance Self-Assessment (SPSA)** on each aspect of the task they are performing. Any scope changes during the workday will require additional TGSM's and SPSA's to be held when applicable, along with possible re-permitting or development of a task specific JSA.
- Fire retardant clothing (FRC) will be required during all Hot Work activities and while personnel are working in meter sites where HVL's are present.
- MSDS's shall be reviewed during the pre-job Safety Meeting and attached to these work procedures. MSDS's will be attached to the end of this document.

Standard Emergency Signals

The EMPCo Safety Manual "Hot Work Procedure" under Fire Watch Responsibilities states that Fire Watch Personnel must know and be able to activate an alarm and initiate emergency evacuation and action procedures, as applicable. In order to comply with this requirement, the following Standard Emergency Signals are used during all 'Hot Work' activities.

- An audible warning alert device such as a horn blast (portable/aerosol push button type as recommended for boats by the USCG) or a siren should serve as the emergency signal to indicate that all personnel should leave the Hot Work Permit Area.
- The following standard hand signals shall be used at ANYTIME if:
 1. It is necessary to raise one's voice in order to talk to others at a distance of 3 feet or less.
 2. In case voice communications are not operable:

Hand gripping throat	=	"Out of air, can't breathe"
Hands on top of head	=	"Need assistance"
Thumbs up	=	"OK, I am all right, I understand"
Thumbs down	=	"No, negative"
Grip partner's wrist/arm or	=	"Leave area immediately"
Both hands around wrist		

These signals are presently included in the EMPCo Emergency Response Plan, Core Manual Volume One, Appendix D, Site Safety & Health Plan; Page D-8 dated April 2000.

NORM Handling Guidelines

During any pigging and cleaning operation it is possible to encounter **Naturally Occurring Radioactive Material (NORM)**. It is necessary to establish the presence or absence of **NORM** in all rouge or dust collected during the pigging operations. Keeping the material confined in heavy-duty plastic sheeting or bags so that it does not become an environmental release can control the hazards of exposure to **NORM**. Crews working on the decontamination of filter pots or pipeline equipment, (valves, traps, etc.) **Refer to the JSA in the project database "Cleaning NORM Contaminated Equipment."** If you have any questions or need to test for the presence of **NORM** in the rouge, contact the area ERST Tech.

Oxide Handling Guidelines

When working on products and crude pipelines, **Iron Oxide** or **Iron Sulfide** accumulations are frequently present inside of sending and receiving traps, pipes, filters, strainers, and spent displacement pigs. When exposed to air, these substances chemically react with air (oxidize) and generate enough heat to be a fire hazard. Precautions shall be taken to deal with these iron compounds unless it is known with certainty that the compounds are not present. **The precautions to be taken will require some advanced planning and preparations.** The precautions to be taken are as follows:

General

- Do not allow these compounds to get on skin or clothing.
- Wash or dispose of gloves, which may be contaminated with these compounds.
- Make sure these compounds do not get inside or in the back of a vehicle.
- If in doubt about the best way to handle these compounds in a particular situation, consult with others who have encountered them and can provide various mitigative options.

Contaminated items which can be immersed in water

To the maximum extent possible, immediately upon exposure to air, immerse iron contaminated items such as rouge from inside a line, pigs, and filter cartridges in clean potable water. Leave the iron-contaminated items immersed in the water at least overnight. After such immersion, remove the iron-contaminated items from the water and place them in a non-combustible tub or trough to air dry by evaporation. Locate the tub or trough in a safe place where there will be no danger to persons or property if the iron-contaminated items later ignite. Immersion in water at least overnight should neutralize the iron compounds and prevent them from becoming a fire hazard; however, remain on alert after the contaminated materials are removed from the water. Make sure the immersion water is initially free of outside contaminants that could make future disposal more difficult. Do not dump or spill the water on the ground; remove the contaminated materials from the water carefully and individually and drain the water back into the container. Once the contaminated materials are dry, they will be tested, along with the water bath, profiled, and disposed of in an appropriate manner.

Contaminated items which can **NOT** be immersed in water

Large iron-contaminated items such as a long piece of pipe which cannot be immersed in water as described above must be moved to a safe location where any heat generated, or fire, will pose no threat to persons or property.

Note: Any revision(s) to these procedures will require prior approval by Rodney Reed

EMERGENCY NUMBERS:

**PRIMARY CONTACT FOR ALL EMERGENCIES (POLICE, FIRE,
AND AMBULANCE): 911**

MAYFLOWER, ARKANSAS EMERGENCY CONTACT

NAME	PHONE
Fire Department	501-470-1200
Regional Hospital (Conway, AR)	501-329-3831

CONWAY, AR EMERGENCY CONTACT

NAME	PHONE
Fire Department	501-450-6147
EMS	501-327-5658
Police Department	501-679-6323
Conway Regional Hospital	501-329-3831

Detailed Work Procedure

Planning / Preparation

1. Survey and document existing leak site area prior to excavation, including; existing pipe depth of cover, existing soil topography, existing lines/utilities, etc.
2. Perform geotechnical survey of leak site prior to excavation
3. Perform One Calls for excavations at leak site and proposed tap locations
4. Procure materials; 20" replacement pipe, 2" Tread-O-Rings, flanges, gaskets, studs / nuts, etc.
5. Schedule Carber Services, X-Ray, Watkins Construction, Vacuum Services, Gulf Coast Pipeline Services
6. Perform 4 hour pre-test of 20" replacement pipe at Conway Station
7. Obtain permission from affected land owners for right of way access to both tap locations
8. Insure that 2-20" stopple fittings and equipment is available for contingency purposes
9. Excavate at both of the tap locations making the excavation large enough for installation of contingency stopple fittings
10. Excavate at leak site once permission has been given to proceed
11. Provide copy of these procedures and obtain permission to proceed prior to performing any excavation or pipe removal with Incident Command, PHMSA and any other relevant parties

Repair Team LO/TO Valves and Rectifiers

1. Confirm valve 1 and MOV 19 are closed and apply/document LO/TO @ Conway Station (Operations LO/TO after incident)
2. Confirm valves MOV 312 and 12" north bypass valve are closed and apply/document LO/TO @ Arkansas River (Operations LO/TO after incident)
3. Verify LO/TO of four rectifiers by operations: MP311.8 #1A-25, MP311.1 #1A-27, MP319.0 #1A-11, MP322.5 #1A-12

Cold Cut Line to Remove Damaged Segment

1. PHMSA will be monitoring these work activities and will be informed of any substantive procedural changes.
2. Obtain Work Permit and notify OCC of work plans.
3. Hold TGSM and review applicable JSAs prior to the start of each work day and during the day for any scope changes including:
 - **JSA or contractor equivalent – Cold cut in service pipeline (Attachment #17)****Record site specific conditions on the JSA form for each use.**
4. Schedule Vacuum trucks.
5. Conduct all necessary hydrocarbon and oxygen tests to ensure that no flammable vapor is present.
6. Establish a fire watch.

- 7. Ground Vacuum trucks.
- 8. Connect Vacuum truck hoses to valves attached to TORs – On standby
- 9. Set up vacuum truck near first cut out
- 10. Place plastic sheeting, drain pan, and absorbent pads below the location to be cut to catch any residual product.
- 11. After the excavations are completed, follow the pipe coating removal guidelines (**JSA or contractor equivalent – Removing Asbestos Containing Pipe Coating (Attachment #12)**) to remove the pipe coating in location of cold cuts. Bag and dispose of coating per EMPCo requirements. “Small scale, short duration provisions”
- 12. Set Carber pneumatic cutter in place at predetermined location of first cold cut
- 13. As prescribed in Evidence Control Protocol, document section of pipe to be removed (Reference: Attachment #3)
- 14. Set up survey instrument to be able to determine any lateral movement after first cold cut
- 15. Using magnetic jumpers to avoid static spark, make first cold cut of pipe at marked location.
- 16. Document any lateral movement after cold cut
- 17. Re-survey at previous locations, repeating procedures completed before excavation to determine any vertical movement
- 18. Set Carber pneumatic cutter in place at predetermined location of second cold cut
- 19. Using magnetic jumpers to avoid static spark, make second cold cut of pipe at marked location.
- 20. Set up equipment to remove section of pipe to be replaced
- 21. Prior to removing pipe section, file ends of all four cut locations to eliminate cut hazard after cold cuts.
- 22. Depending on pipe section length, determine if a third cut is required for transportation purposes - may require additional bell hole to allow for additional cold cut
- 23. Remove the pipe section(s)
- 24. Install foreman plugs or CARBER isolation plugs on both ends of the remaining line
- 25. Prepare to preserve and transport removed pipe section – Reference: Evidence Control Protocol (Attachment #3)

Weld Flanges to Existing Line

- 1. PHMSA will be monitoring these work activities and will be informed of any substantive procedural changes.
- 2. Obtain Work Permit and notify OCC of work plans.
- 3. Hold TGSM and review applicable JSAs prior to the start of each work day and during the day for any scope changes including:
 - **JSA or contractor equivalent – Welding New Pipe/Fitting to in service Pipeline (Attachment #18)****Record site specific conditions on the JSA form for each use.**
- 4. Schedule NDT (X-ray examination)
- 5. Schedule Vacuum Truck.

- 6. Hold a coordination meeting with the all field personnel and outline work scope.
- 7. Reference GP 18-87-21. Ensure welders are qualified under API-1104.
- 8. Conduct all necessary hydrocarbon and oxygen tests to ensure that no flammable vapor is present.
- 9. Establish a designated fire watch with two fire extinguishers. Fire watch to remain in place throughout process and thirty minutes after completing welding.
- 10. Set CARBER isolation plugs on both ends of pipe. CARBER will provide isolation verification prior to beginning welding
- 11. Prepare beveled ends for welding and lower first flange into position for fit-up
- 12. Ensure two hole alignment of flange. Tack weld and complete proper alignment of flange.
- 13. Perform welding in accordance with GP 18-87-21 and using qualified welding procedure
- 14. Perform NDT (X-ray) inspection of completed weld
- 15. Repeat steps 7-13 for installation of second flange
- 16. Obtain measurements for installing replacement pipe spool between flanges
- 17. Install temporary blinds while preparing replacement pipe spool

Fabricate and Install Flanged End Replacement Pipe Spool

- 1. PHMSA will be monitoring these work activities and will be informed of any substantive procedural changes.
- 2. Obtain Work Permit and notify OCC of work plans.
- 3. Hold TGSM and review applicable JSAs prior to the start of each work day and during the day for any scope changes including:
 - **JSA or contractor equivalent – Welding New Pipe/Fitting in service Pipeline (Attachment #18)**
 - **JSA or contractor equivalent – Fit Pipe for Tie-in (Attachment #19)****Record site specific conditions on the JSA form for each use.**
- 4. Schedule NDT (X-ray examination)
- 5. Schedule Vacuum Truck.
- 6. Hold a coordination meeting with the all field personnel and outline work scope.
- 7. Reference GP 18-87-21. Ensure welders are qualified under API-1104.
- 8. Conduct all necessary hydrocarbon and oxygen tests to ensure that no flammable vapor is present.
- 9. Fabricate and weld pipe spool to predetermined length
- 10. Perform NDT (X-ray) inspection of completed weld(s)
- 11. Position lifting equipment with proper rigging and prepare to lower pipe spool in place using two tag lines
- 12. Lower the pipe spool into position and align flanges to allow for proper fit-up
- 13. Insert inner-ring gaskets, studs and nuts, ensure proper alignment and begin torquing process

Torque Flanges

1. PHMSA will be monitoring these work activities and will be informed of any substantive procedural changes.
2. Obtain Work Permit and notify OCC of work plans.
3. Hold TGSM and review applicable JSAs prior to the start of each work day and during the day for any scope changes including:
 - **JSA or contractor equivalent – Bolt / Unbolt Flanges (Attachment #20)****Record site specific conditions on the JSA form for each use.**
4. CARBER services will perform torqueing of both sets of flanges to manufacturer specifications

Install 2” TOR Plugs/Caps

1. PHMSA will be monitoring these work activities and will be informed of any substantive procedural changes.
2. Obtain Work Permit and notify OCC of work plans.
3. Hold TGSM and review applicable JSAs prior to the start of each work day and during the day for any scope changes including:
 - **JSA or contractor equivalent – Hot Tapping with 2 inch T-101 (Attachment #15)**
 - **JSA or contractor equivalent – Vacuum Truck Loading/Unloading (Attachment #16)****Record site specific conditions on the JSA form for each use.**
4. Schedule Vacuum Truck.
5. Establish a designated fire watch with two fire extinguishers. Fire watch to remain in place throughout process and thirty minutes after completing welding.
6. Place plastic sheeting, drain pan, and absorbent pads below the location to be cut to catch any residual product.
7. Using magnet, install T-101 tapping machine with finishing plug on existing 2” valve
8. Open the 2” valve and lower the plug into position and screw into TOR
9. Open side vent to ensure plug is set
10. Raise bar to allow for closing of 2” valve
11. Slowly remove T-101 tapping machine capturing residual oil with absorbent pads
12. Repeat above steps for the remaining TOR location

Remove Repair Team LO/TO Valves and Rectifiers

1. Remove valve 1 and MOV 19 LO/TO @ Conway Station (Operations LO/TO to remain)
2. Remove valves MOV 312 and 12” north bypass valve LO/TO @ Arkansas River (Operations LO/TO to remain)
3. Notify operations of preparedness to reenergize four rectifiers: MP311.8 #1A-25, MP311.1 #1A-27, MP319.0 #1A-11, MP322.5 #1A-12

Perform Final Clean Up

1. Obtain Work Permit and notify OCC of work plans.
2. Hold TGSM and review applicable JSAs prior to the start of each work day and during the day for any scope changes including:
 - **JSA or contractor equivalent – To be developed on-site**
3. Apply primer, tape, and mastic to welds and flanges and pipe as needed.
4. While backfilling, install appropriate covers over TORs and barriers around flanges.
5. Backfill excavation and complete all necessary clean-up.
6. Cleanup work site and inform ROW agent of completed status.
7. Discard removed coating per waste guidelines. Contact EMPCo ERST Tech for documentation and future disposal of materials.

Post Job Documentation

1. PL-2200 Work Permit – All Work
2. Revise and reapprove Procedures (as needed)
3. PL-751 document including all applicable information such as pipe-to-soil potentials, soil resistivity, etc. – All excavations
4. PL-0018 including new line pipe and removed pipe
5. PL-2241 Equipment Data Form – Document TOR locations w/ station numbers (stopples, if applicable)
6. NDT documentation (i.e. Mag Particle, UT, X-ray)
7. NDT Inspector certifications / procedures
8. PL-709 for pretested pipe
9. Welder Qualifications
10. MTR's for pipe, flanges, (stopples, if applicable)
11. Welding procedures (pipe and fittings)

ATTACHMENTS:

- Attachment 1. WPS for Fillet Welding – “No Flow” Conditions
- ~~Attachment 2. Lift Plan~~
- Attachment 3. Evidence Control Protocol
- ~~Attachment 4. Welding GPs: 18-87-21, 18-87-31, 18-87-35~~
- ~~Attachment 5. T.D. Williamson – Installation of Full-Circumference Fittings~~
- ~~Attachment 6. TDW Services – Stopple Plugging Procedure/Checklist~~
- ~~Attachment 7. Crude Oil MSDS~~
- ~~Attachment 8. Trunk Line Charts~~
- ~~Attachment 9. Pipe Data Summary Sheet~~
- ~~Attachment 10. PL-2400 Equipment/Operator Qualification Checklist~~
- ~~Attachment 11. JSA – Excavating around Live Pipelines~~
- Attachment 12. **JSA** – Removing Asbestos Containing Pipe Coating
- ~~Attachment 13. JSA – Full Encirclement Sleeve Repair (No Flow Condition)~~
- ~~Attachment 14. JSA – Welding Full Wrap or Stopple Fitting~~
- Attachment 15. **JSA** – Hot Tapping with 2 inch T-101
- Attachment 16. **JSA** – Vacuum Truck Loading/Unloading
- Attachment 17. **JSA** – Cold Cut In-service pipeline
- Attachment 18. **JSA** – Weld New Pipe/Fitting to In-Service Pipelines

Attachment 19. **JSA** – Fit Pipe for Tie-in

Attachment 20. **JSA** – Unbolt or Bolt Flanges

Attachment 21. ~~HCA Assessment: Validation Digs – TFI/ILI Tool~~

Attachment 22. ~~Example TOR Installation and Hot Tap Work Procedures~~

ATTACHMENT 1

WPS for Fillet Welding - "No Flow" Conditions

Don E Drake/Dallas/Mobil-Notes

12/08/05 08:33 AM

Gentlemen:

Per past testing in the Corsicana office to develop a "no-flow" welding procedure, we are in the process of establishing a new WPS for this service. Data from the Corsicana test was acceptable and the following can be used as a preliminary WPS:

a) The new WPS for "no-flow" conditions will follow the same procedure now given in GP 18-87-31 "Applying End Fillet Welds on Stopples, Sleeves, and Weld +Ends Under Flow Conditions" formerly FW-10. For any groove welding, use GP 18-87-35 "Groove Welding the Side Seams of Stopples Fittings and Sleeves using Low Hydrogen Electrodes " with a backing strip.

b) This new WPS will be restricted to pipelines with a nominal wall thickness of 0.250" or greater to minimize the danger of burnthrough and is to be used only for crude and refined products service pipelines, not chemical pipelines at this time.

c) Before any welding proceeds, the affected area will be ultrasonically tested for adequate wall thickness.

d) Once each pass has been completed, the use of either temperature indicating "crayons" or a temperature-indicating laser gun will be needed to monitor the weldment. Begin each subsequent pass only when the interpass temperature has cooled to 300 degrees F. If cooled to temperatures less than 200 degrees F, appropriate heat should be applied before the next welding pass is started.

e) If small pipe nipples are to be welded on a pipe under "no-flow" conditions, remove the protective screw cap prior to welding. Tests performed in Corsicana indicated that high temperatures can exist "inside the nipple" as compared to temperatures measured around the outside circumference of the nipple. With the cap of the nipple removed, extra care should be taken to prevent weld spatter from depositing in the threads.

Please let me know if you need additional information.

Best regards,
Don Drake

Evidence Control Protocol Pegasus Pipeline, Mayflower, AR

2 April 2013

1.0 Introduction and Background

On March 29, 2013, during normal operations of the Mobil Pipe Line Company 20" Pegasus Crude Oil System, damage occurred at ~Station # 16621+55. The release occurred downstream of the Conway Pump Station in a subdivision of Mayflower, Arkansas.

The following document and its attachments outline the methodology for sample extraction, identification, documentation, and preservation of the damaged segment and any pertinent associated debris.

Because of the dynamic nature of salvage, it may be necessary to adjust the following protocol to allow for unanticipated conditions. EMPCo will keep all interested parties informed to allow on site approvals to any procedure modifications before they are implemented.

2.0 General Documentation

The following general documentation practices will apply to all steps of sample extraction, preservation, transport, and analysis.

1. Key work steps will be photographed as determined by EMPCo on-site personnel.
2. Rulers and/or surveying pocket rods will be included in all photographs when practical.
3. All images will be recorded in a digital format. A separate photo card log will be maintained to record the date, photographer, and objects depicted in the images, Attachment B.
4. Any physical evidence collected at the scene by EMPCo will be labeled and cataloged in the Master Evidence Log.
5. Physical evidence will be protected, as possible, from contamination by appropriate packing/wrapping.
6. Physical evidence will be stored (if needed) prior to transportation in secure location at job site

3.0 Excavation and Extraction of Segment

The following tasks address the evidence control and protection aspects of the damaged pipe excavation and extraction. Detailed procedures for the excavation and extraction itself are included in "Mayflower Incident Repair Procedures".

1. Photographic evidence will be collected as appropriate during excavation and extraction to document the damaged pipe and other pertinent details regarding the failure. Including, but not limited to:
 - a. Failure site – local topography
 - b. Line pipe failure area

- c. Detail of fracture surface, magnified appropriately to show relevant features
 - d. Coating in area of failure
 - e. Internal or external corrosion near fracture surface
 - f. Residues or corrosion products near the fracture surface
 - g. Details of areas indicating outside force damage
2. Prior to excavation, surveyors will document the location of the pipe in “as-is” condition to monitor for any deflection through the excavation process.
 3. Throughout the excavation and extraction process, evidence will be removed one piece at a time to allow sequential labeling and documentation of relative location in context of incident scene.
 4. Any corrosion products found inside or outside the pipeline during excavation will be documented and collected for analysis (e.g. soil in the immediate area of the failure, dislodged soil adjacent to the pipe, and soil that adhered to the line pipe).
 5. Prior to the first cold cut of the line segment to be removed, labeling of the date, top dead center of the line, and direction of flow will be documented on the pipe joint using an indelible marker and will be photographed.
 6. Prior to the first cold cut of the line, surveyors will document the location of the pipe to monitor any deflection that occurred during excavation.
 7. After the first cold cut, any movement of the pipe segment will be documented via surveyors present.
 8. The location of the first cold cut will be documented on the pipe with indelible marker and photographed (surveyors to record location of all cuts).
 9. Prior to the second cold cut, record the relative location and distance between the cut ends after the first cut is completed (second cut approx. station #, location, and distance from first cut).
 10. For transportation purposes, a third cut will be made in the determined appropriate location so as not to adversely impact metallurgical testing of failure area, with input from subject matter experts and Law.

4.0 Documentation and Storage of Evidence After Extraction

The following tasks address the documentation and storage of the evidence after removal from site. Detailed procedures for the lifting/extracting the pipe section are not addressed here, and are included in “Mayflower Incident Repair Procedures”

1. As evidence is removed it will be logged in the Master Evidence Log, Attachment A
2. When removing the failed pipe sections from the ditch, minimize any additional mechanical damage. If mechanical damage does occur at any time from removal from the ditch to receipt at testing laboratory, please note the type of damage and its respective location on the pipes on the custody transfer form.
3. A copy of the Evidence Control Log, Attachment C, will be generated for each sample and will accompany the evidence as it travels to its destination. The Evidence Control Log will provide a complete Chain of Custody of the evidence.
4. Evidence not transported to the metallurgical lab will be stored in a protected and secured location at Mobil Pipe Line’s Conway Station.
5. Post metallurgical testing, remaining relevant pipe remnants (not consumed in process) will be preserved and stored in a secure location (e.g. Corsicana).

5.0 Pipe Section Sample Preservation

Following extraction, the pipe section will be preserved for transportation to a laboratory for testing. The fracture site on the pipe will be coated with a benign preservative coating (e.g. lubricating oil), and the entire pipe section will be wrapped with plastic (such as visqueen) in “as is condition” without removal of surface deposits beforehand. The preservation process will be documented via photography.

6.0 Transport of Evidence

Pad adequately to prevent mechanical damage during any part of the transit from the “ditch” to the testing laboratory (including during loading and securing for transport). PHMSA “Evidence Custody Control Procedures” should be used to provide guidance in controlling evidence.

An “Evidence Control Form” will be used to track the failed pipe from the “ditch” to the testing laboratory. This form will include the following information:

1. Description of Item
2. Action Log incorporating the following:
 - Date
 - Action(Checked out, returned, shipped)
 - Person/Organization responsible for specific action (e.g. EMPCO personnel, trucking company transporting pipe to testing laboratory, personnel receiving pipe at testing laboratory, etc.)
 - Current Location of Pipe
 - Notes

7.0 Metallurgical Failure Analysis of Pipe Segments

EMPCo will produce to PHMSA a detailed metallurgical testing protocol pursuant to item 3 of the corrective action order.

Attachment A

Master Evidence Log

ExxonMobil Pipeline Company
Pegasus Pipeline, Mayflower, AR

Tag #	Date Recovered	Description	Location Relative to Damage	Photo #	Transfer		
					To	Date	Method

Attachment B

Photo Card Log

ExxonMobil Pipeline Company
Pegasus Pipeline, Mayflower, AR

Card #	Date	Photographer	Image# Start	Image# Finish	Object

Attachment C

Evidence Control Log

ExxonMobil Pipeline Company
Pegasus Pipeline, Mayflower, AR

Tag #	Date Recovered	Description		Photo #
Date	Action (eg. Shipped, returned, testing, etc.)	Destination	Person/Organization	Signatures
				Released:
				Accepted:
				Released:
				Accepted:
				Released:
				Accepted:
				Released:
				Accepted:
				Released:
				Accepted:
				Released:
				Accepted:
				Released:
				Accepted:
				Released:
				Accepted:

ATTACHMENT 12 – JSA – Removing Asbestos Containing Pipe Coating

JOB SAFETY ANALYSIS		DATE November 2, 2006	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	Control No. JSA905920040056
JSA TYPE CATEGORY Pipeline Shipping and Receiving	WORK TYPE Texas HCA	WORK ACTIVITY Removing Asbestos Containing Pipe Coating <small>WORK (Description)</small>		
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Steve Williams	Contractor	David Hammes	FLS	
Eric Jorgensen	ERST Tech	Rodney Reed	Area Supervisor	
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES _____	<input type="checkbox"/> PPE CLOTHING _____ <input checked="" type="checkbox"/> GLOVES _____ <input type="checkbox"/> CARTRIDGE RESPIRATOR <input type="checkbox"/> SUPPLIED AIR / SCBA	<input type="checkbox"/> GAS MONITOR <input type="checkbox"/> OTHER _____	
¹JOB STEPS	²POTENTIAL HAZARDS	³RECOMMENDED ACTION OR PROCEDURE		
Note: This JSA assumes that the P/L has been previously excavated and exposed through compliance with other JSA. It also assumes that the coating has been tested and confirmed to contain asbestos or it is characteristic of coating which may contain asbestos.				
1. Conduct Site Inspection	<ul style="list-style-type: none"> • Unsafe Excavation • Poor Housekeeping creating walking / working hazards 	<ul style="list-style-type: none"> • Inspect the excavation to make sure it is safe. • Confer with the excavation competent person. 		
2. Conduct SPSA	<ul style="list-style-type: none"> • Poor / unsafe working conditions. • Inadequate tools or equipment • Inadequate training or skills for the task. • Poor mindset, such as, rushing, fatigue or complacency 	<ul style="list-style-type: none"> • Assess the Hazards. Ask yourself “What could go Wrong?” Next Ask Yourself, “If it did go wrong, What is the Worst Thing that could Happen?” • Analyze how to reduce the risk. What do you need to make the job safe? • Act to ensure safe operations. Take all actions necessary to make the job safe. • If it is not completely safe, do not proceed until it is! 		
3. Assemble all tools and equipment needed for the abatement of coating.	<ul style="list-style-type: none"> • Strains and Sprains from working and walking on uneven terrain. • Cuts from handling sharp tools. 	<ul style="list-style-type: none"> • Use proper body mechanics for lifting and carrying tools and equipment to the worksite. • Wear gloves for handling the equipment. • Gather pump-up sprayer, sheet plastic, stretch wrap, pre-labeled disposal bags, hammers, scrapers and machetes. 		
4. Enter the excavation.	<ul style="list-style-type: none"> • Slips, trips and falls 	<ul style="list-style-type: none"> • Clean-up excavation. Make sure that the access and egress is good. 		
5. Spread sheet plastic under the P/L to catch any coating falling from the P/L.	<ul style="list-style-type: none"> • Strains 	<ul style="list-style-type: none"> • Wear gloves while cutting the plastic to size. • Use caution when cutting the plastic to avoid cutting yourself or other workers. • Use teamwork to avoid having to crawl under the P/L to spread the plastic. 		
6. Spray the coating to be removed with water from the pump-up sprayer.	<ul style="list-style-type: none"> • Strains • Pinch Points 	<ul style="list-style-type: none"> • Use good body mechanics when handling the sprayer. • Avoid pinching fingers and other body parts when pumping up the sprayer. • Use caution climbing into the excavation to avoid falling. 		
7. Wrap all coating to be removed with stretch wrap to contain the coating as it is broken loose from the P/L.	<ul style="list-style-type: none"> • Strains 	<ul style="list-style-type: none"> • Use teamwork to wrap the pipeline. • Use good body mechanics when leaning down to reach under and over the pipeline. Avoid over reaching and straining the lower back. 		

8. Use hammers to break the coating loose from the pipeline by hammering on the stretch wrapped coating.	<ul style="list-style-type: none"> • Exposure to noise • Contusion – line of fire • Damage to Pipeline 	<ul style="list-style-type: none"> • Wear hearing protection adequate for the noise that the hammering creates. • Use caution to avoid striking fellow workers if more than 1 person is hammering at once. • Be careful not to use too much force with the hammer, such that the hammering causes dents to the pipeline. • All involved personnel must use full face protection throughout the hammering process to prevent being struck in the face and eye by flying debris. • Make sure all tools are in good condition. No broken hammer handles or chipped faces on the hammer surface.
9. Use knife or machete to cut stretch wrap from the pipe.	<ul style="list-style-type: none"> • Laceration 	<ul style="list-style-type: none"> • Wear gloves and use caution to avoid cutting yourself or fellow workers. • Catch the stretch wrap as it is cut loose to keep it from falling to the ground, creating airborne dust.
10. Spray pipe with water and scrape off all residual coating with scrapers or machetes.	<ul style="list-style-type: none"> • Laceration 	<ul style="list-style-type: none"> • Wear gloves and use caution to avoid cutting yourself or fellow workers. • Catch all coating as it is scraped off in the plastic liner below the pipe.
11. Place all of the plastic and coating waste in marked Asbestos Disposal Bags.	<ul style="list-style-type: none"> • Strains 	<ul style="list-style-type: none"> • Collect all plastic and coating in the pre-printed Asbestos Waste Bags. • Use caution carrying the collected waste from the excavation. • Avoid slips and trips which could cause strains to the lower back.
12. Double bag the coating waste. make sure it does not become an environmental hazard during transport to the collection site.	<ul style="list-style-type: none"> • DOT violation 	<ul style="list-style-type: none"> • Make sure it does not become an environmental hazard during transport to the collection site.

¹Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

²A hazard is a potential danger. Break hazards into five types: **Contact** - victim is struck by or strikes an object;

Caught - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards.

³Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk.

List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift".

Avoid general statements such as, "be careful".

ATTACHMENT 15 – Hot Tapping with 2 inch T-101

JOB SAFETY ANALYSIS		DATE November 2, 2006	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	Control No. JSA905920050005	
JSA TYPE CATEGORY Pipeline Shipping and Receiving	WORK TYPE Texas HCA	WORK ACTIVITY Hot Tapping a Pipeline with a 2 “ T-101			
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE		
Steve Williams	Contractor	David Hammes	FLS		
Eric Jorgensen	ERST Tech	Rodney Reed	Area Supervisor		
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES _____		<input checked="" type="checkbox"/> PPE CLOTHING ___FRC’s_ <input checked="" type="checkbox"/> GLOVES ___Leather_____ <input type="checkbox"/> CARTRIDGE RESPIRATOR <input type="checkbox"/> SUPPLIED AIR / SCBA	<input checked="" type="checkbox"/> GAS MONITOR <input type="checkbox"/> OTHER _____
1JOB STEPS	2POTENTIAL HAZARDS	3RECOMMENDED ACTION OR PROCEDURE			
This JSA assumes that the line has already been exposed, the coating removed and the Thread-O-Ring (TOR) welded onto the pipeline in accordance with other JSAs and procedures. Each and every step of this JSA is critical to the successful completion of the ‘Hot Tap’. Refer to the Engineering Procedures and the attached “TOR Installation and Hot Tap Work Procedures” Checklist while completing this task.					
1. Complete pre-job planning and communication.	Inadequate planning, communication and coordination can result in hazards to EMPCo, contractors and others.	<ul style="list-style-type: none"> • Confirm that the annual TDW inspection of the T-101 tapping machine is current. • Order a 2” full opening threaded connection valve for isolation between the pipeline and the tapping machine. • Order a 2” nipple to be installed between the valve and the tapping machine. Make sure that the valve and nipple are rated for the pipeline on which they will be used. • Notify OCC and send them a copy of the procedure covering the task. • Refer to the Engineering Procedures and the attached “TOR Installation and Hot Tap Work Procedures” Checklist while completing this task. 			
2. Travel to Work site	<ul style="list-style-type: none"> • Traffic Hazards • Vehicle Condition Hazardous 	<ul style="list-style-type: none"> • Use SMITH System to address all driving hazards while traveling. <ul style="list-style-type: none"> • Aim High in Steering • Get the Big Picture • Keep Your Eyes Moving • Leave Yourself and Out • Make Sure they See You • Conduct daily vehicle inspection before beginning trip. Check all lights, tires, brakes, etc., to assure that they are in good, safe condition. • Assure that trailer lights are connected and working before getting on the road. 			
3. Conduct SPSA	<ul style="list-style-type: none"> • Poor / unsafe working conditions. • Inadequate tools or equipment • Inadequate training or skills for the task. • Poor mindset, such as, rushing, fatigue or complacency 	<ul style="list-style-type: none"> • Assess the Hazards. Ask yourself “What could go Wrong?” Next Ask Yourself, “If it did go wrong, What is the Worst Thing that could Happen?” • Analyze how to reduce the risk. What do you need to make the job safe? • Act to ensure safe operations. Take all actions necessary to make the job safe. • If it is not completely safe, do not proceed until it is! 			
4. Inspect and prepare the worksite	<ul style="list-style-type: none"> • Slip or Trip hazards in the work area. • Laceration • Exertion 	<ul style="list-style-type: none"> • Inspect the work area to make sure it is free of slip and trip hazards. • Wear gloves while handling tools and equipment • Remove the completion plug from the TOR. • Clean the threads of the TOR • Check to make sure that the drill bit is sharp and in good condition. • Install bleeder assembly on the T-101 barrel after cleaning the threads, wrapping the threads w/ Teflon tape and using pipe dope compound on the tape to enhance the threaded connection. • Install the 2” nipple on the T-101 assembly using the same cleaning, taping and doping process. 			
5. Calculate the travel distance of the bit	<ul style="list-style-type: none"> • Fire / Explosion • Contact with rapidly vaporizing HVL’s or toxic products • Drilled too far and pierced through the bottom of the pipeline. 	<ul style="list-style-type: none"> • Measure the travel of the bit through the TOR to the pipe surface. Make sure that there is enough travel left to cut through the wall of the pipe. • Make written notes of the maximum travel to the bottom of the cut. • Make a note of the top of the travel when retracting the bit. 			

<p>6. Install the 2" full opening valve and T-101 assembly on the TOR connection.</p>	<ul style="list-style-type: none"> • Cut fingers on the threads • Exertion 	<ul style="list-style-type: none"> • Wear leather gloves while handling the valve and tools for the task. • Use the same cleaning, taping and doping process on the threads explained above. • Secure the valve assembly using a pipe wrench. <p>Note: If using a 2 part ball valve, make sure that the pressure side of the valve is to the pipeline.</p>
<p>7. Test the installed assembly w/ nitrogen before beginning the tapping process.</p>	<ul style="list-style-type: none"> • Contact w/ hose breaking loose under pressure. • Internal damage to the P/L from over pressuring the assembly test. • Fall from ladder. 	<ul style="list-style-type: none"> • Contact OCC to confirm the operating pressure of the P/L at the time of the test. • Secure all hose connections w/ whip checks. • Install a pressure gauge on a 'T' on the bleeder valve to verify that the test pressure is not exceeded. • Apply nitrogen pressure slowly. Test at the internal pressure + 15 psi. • Inspect the ladder prior to use. Make sure it is on a stable surface. Do not use the top 2 steps. Have 2 employees steady the ladder while it is in use. • SNOOP all threaded connection and the top of the T-101. Do Not forget to SNOOP the bleeder valve assembly. • Isolate the assembly to be sure that it will hold the test pressure for at least 15 minutes. • After the test is complete, remove the nitrogen hose and bleed the pressure off of the system. Make sure that nobody is in the line of fire before opening the bleeder valve. • Use adequate hearing protection.
<p>8. Open the 2" valve and confirm the travel calculations in step # 6.</p>	<ul style="list-style-type: none"> • Not enough travel calculated to penetrate the pipe. • Not able to isolate the T-101 because the 2" valve will not close with the bit retracted. 	<ul style="list-style-type: none"> • Run the bit down to the pipe surface and confirm the calculations in step # 6. If they were incorrect, adjust them as needed. • Run the bit back up and confirm that the valve will close completely. If it will not, adjust the calculations accordingly. • Mark the measured barrel of the T-101 to indicate the top of the retracting run calculated above.
<p>9. Open the 2" valve and begin tapping the pipeline.</p>	<ul style="list-style-type: none"> • Exertion • Fall from ladder • Fire / Explosion • Contact with rapidly vaporizing HVL's or toxic liquids 	<ul style="list-style-type: none"> • Inspect the ladder prior to use. Make sure it is on a stable surface. Do not use the top 2 steps. Have 2 employees steady the ladder while it is in use. • Wear leather gloves throughout the task. • Assign fire watches to be on stand-by until the job is complete. • Verify that the bleeder valve is on the T-101 is closed before beginning to tap the line. • Use the speed cap on top of the T-101 to crank the drill bit down to near the top of the pipeline. • Remove the speed cap and begin drilling through the top of the pipeline using the crank enclosed in the T-101 kit. • Monitor the pressure gauge on the T-101 bleeder assembly. When the drill bit has pierced the top of the pipeline, the pressure inside the T-101 assembly will increase to line pressure. • Continue cutting the hole in the pipeline until there is no resistance. • Check the indicator marking on the T-101 to verify that the bit has traveled through the top of the pipeline according to your original calculations. Confirm by measuring to the top of the retracting run mark on the barrel of the T-101.

<p>10. Retract the drill bit above the 2" full opening valve, to the top mark made on the barrel in step # 6. Bleed pressure from the T-101 and remove the tapping assembly from the valve.</p>	<ul style="list-style-type: none"> • Fire / Explosion • Contact with rapidly vaporizing HVL's or toxic liquids. • Exertion • Laceration on sharp tools 	<ul style="list-style-type: none"> • If the system contains toxic products (butadiene or benzene, etc.) the contents of the T-101 assembly must be blown down to atmosphere or the liquid from crude and products lines captured in a container. In order to do this, have all potentially exposed personnel in the appropriate respiratory protection for the potential hazard. Refer to the respective EMPCo safety procedure for the levels of protection needed and the necessary levels of control to minimize exposure to unprotected personnel. • Verify that the 2" valve is holding by slowly opening the bleeder valve. The pressure should drop and ultimately go flat. • Use magnetically attached jumper cables across the 2" valve to assure that no sparks arc across the threaded connection when the T-101 is removed. • Place a lock on the 2" valve so that it cannot be accidentally bumped open, releasing HVL's or liquid products to atmosphere. • Always use a back up pipe wrench on top of the 2" valve above the TOR to be sure that the valve does not back off of the pipeline. • NOTE: Be sure to use the back up on top of the valve especially if a 2 part full opening ball valve has been used. • Be prepared with rags to catch any residual liquids dripping from the T-101 barrel when it is removed. • Be careful not to contact the sharp drill bit when cleaning and removing the T-101
<p>11. Prepare to set the completion plug. Note: If the completion plug is not being set in the TOR, skip to step 13.</p>	<ul style="list-style-type: none"> • Contact with rapidly vaporizing HVL's or toxic liquids. • Exertion • Laceration on sharp tools • Fall from Ladder 	<ul style="list-style-type: none"> • Remove the drill bit adapter from the tapping machine. Be sure to wear leather gloves when performing this task. • Press the completion plug onto the square drive head of the T-101 shaft. • Retract the completion plug back inside the assembly nipple so that it will not interfere with the operation of the 2" valve. • Clean, tape and dope the threads of the assembly nipple. • Thread the assembly back on top of the 2" valve. Tighten with a pipe wrench, using a back-up wrench on top of the 2" valve. • Close the bleeder valve on the TOR body. • Re-Test the T-101 assembly with nitrogen to the top of the 2" valve and SNOOP all threaded connections as in step 7 above. • After verifying no leaks on the assembly, bleed the pressure off of the assembly through the bleeder valve. • Unlock and Open the 2" valve. The gauge on the assembly will increase to indicate line pressure. • Run the completion plug down to the top of the TOR using the T-101 speed cap. • Remove the speed cap from the T-101 and continue cranking the plug securely into place. • Open the bleeder valve on the assembly using the precautions outlined in step # 11. If the completion plug is properly seated in the TOR, the pressure in the assembly will go flat.
<p>12. Retract the T-101 shaft and remove the tapping machine and 2" valve from the TOR.</p>	<ul style="list-style-type: none"> • See # 10 above. 	<ul style="list-style-type: none"> • See # 10 above.
<p>13. Cap the TOR or plug the 2" valve and clean up the work area.</p>	<ul style="list-style-type: none"> • Exertion • Slips, trips and falls 	<ul style="list-style-type: none"> • Clean, tape and dope the threads of the TOR or bull plug for the valve. Remember, the bull plug must have a bleeder valve in the center for future safe removal of the plug. • Use good body mechanics while cleaning up the work area. • Contact OCC to inform them that the work is complete.

¹Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

²A hazard is a potential danger. Break hazards into five types: **Contact** - victim is struck by or strikes an object;

Caught - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards.

³Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk.

List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

ATTACHMENT 16 – JSA – Vacuum Truck Loading/Unloading

JOB SAFETY ANALYSIS		DATE 8-2-2011	NEW <input checked="" type="checkbox"/> REVISED	JSA905920070006	
JSA TYPE CATEGORY Pipeline Shipping/Receiving	WORK TYPE Maintenance / Repair	WORK ACTIVITY (Description) Vacuum Truck Unloading			
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE		
Rodney M. Reed	Area Supervisor	Eric Jorgensen	ERST Tech		
David Hammes	FLS	Donnie Holder	Welder		
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES	<input checked="" type="checkbox"/> PPE CLOTHING <input checked="" type="checkbox"/> GLOVES <input type="checkbox"/> CARTRIDGE <input type="checkbox"/> RESPIRATOR	<input checked="" type="checkbox"/> GAS MONITOR SUPPLIED AIR / SCBA <input type="checkbox"/> OTHER _____		
Conduct SPSA before each and every task					
¹JOB STEPS	²POTENTIAL HAZARDS	³RECOMMENDED ACTION OR PROCEDURE			
Unloading a Vacuum truck at Baytown Crude Slop tank					
1. Ground truck	• Fire/explosion due to static electricity	• Drive grounding rod into ground using proper PPE • Attach cable from truck to grounding rod			
2. Connect truck hoses to unloading connection and secure connections/cam locks with tie wraps/tape/wire	• Pinch points • Slips, trips, and falls	• Wear leather or nitrile gloves. • Secure hose connections • Mitigate any tripping hazards			
3. Open valves to line up flow into slop tank	• Wrong line up • Closed valve • Overpressure hoses	• Double check line up before engaging pump			
4. Start pump to unload truck, monitor tank level	• Pinch points. • Hose leaks/spills • Hazardous atmosphere	• Vent truck tank exhaust down wind of work area • Wear leather or nitrile gloves. • Continue to monitor area for LEL • Continue SPSA process			
5. Shut down pump, close valves, and disconnect hoses when unloading is completed	• Possible leaks/spills	• Wear leather or nitrile gloves. • Place a catch pan under the tank and truck hose connections to prevent leaks or spills.			
6. Disconnect ground rod	• Back strain	• Maintain proper body position and use proper tools. • Wear leather or nitrile gloves.			
7. Drive truck from area	• Backing or driving into stationary object • Leaving hoses, catch pan, gloves, or debris	• Clean up area • SPSA • Perform vehicle walk around • Smith System			
8. Return permit to Station Operator, and sign out at station log	• Slips trips and falls • Emergency accountability	• Permit closeout requirements			

ATTACHMENT 17 – JSA – Cold Cut In-service Pipeline

JOB SAFETY ANALYSIS		DATE 4/14/11	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED	Control No. JSA??????????????
JSA TYPE CATEGORY Pipeline Construction/Maintenance		WORK TYPE Maintenance/Integrity	Cold Cutting In-service Pipeline	
DEVELOPMENT TEAM		POSITION / TITLE		DEVELOPMENT TEAM
POSITION / TITLE		DEVELOPMENT TEAM		POSITION / TITLE
Rod Reed		Area Supervisor		Eric Jorgensen
David Hammes		FLS		Jim Becknell
				Tech Leader
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES <u>STEEL TOE</u>		<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING <u>FRC</u>
				<input checked="" type="checkbox"/> GLOVES <u>LEATHER</u> <input type="checkbox"/> OTHER
JOB STEPS		POTENTIAL HAZARDS		CRITICAL ACTIONS
This JSA is used in conjunction with other JSAs and procedures that ensures the pipeline is out of service and de-commissioned.				
Conduct SPSA before each and every task				
1. Perform required gas testing of work area prior to performing work.	<ul style="list-style-type: none"> Exposure - fire/explosion, health hazards. 	<ul style="list-style-type: none"> Ensure ZERO LEL before performing required tasks or allowing employees to enter excavation. 		
2. Remove coating from area of pipe that will be cut.	<ul style="list-style-type: none"> Asbestos exposure Eye injury Hand Injury Noise 	<ul style="list-style-type: none"> Use EMPCo and OSHA guidelines for removing asbestos containing pipe coating Wear Safety Glasses and Face shield Wear leather gloves Done hearing protection 		
3. Mark areas on the pipe where cold cuts are to be made	<ul style="list-style-type: none"> Slips / trips and falls Back strain 	<ul style="list-style-type: none"> Ensure sure footing while entering and exiting excavations or waling surfaces Use proper ergonomics 		
4. UT pipe at cold cut marks, using hand held ultrasound equipment	<ul style="list-style-type: none"> Back strain 	<ul style="list-style-type: none"> Use proper ergonomics 		
5. Drill a 3/8" hole in pipe to check LEL prior to making cold cut	<ul style="list-style-type: none"> Wrong pipeline Eye injury Hand injury Electrical shock from drill motor 	<ul style="list-style-type: none"> Use ALL paperwork available (Alignment maps, ILI Run data, P&IDs, TLC) to ensure you are on the correct pipeline. Wear Safety glasses Wear leather gloves IF using electric drill motor, use GFCI protection on extension card Use pneumatic drill 		
6. Place cold cutters in ditch and on pipe	<ul style="list-style-type: none"> Fire / explosion Pinch points Back strain Slips / trips and falls 	<ul style="list-style-type: none"> Use magnetic jumpers for static electricity hazard Be aware of placement of hands while placing cold cutters on pipe Use track hoe if needed to lower cold cutters in the ditch Use proper ergonomics Wear leather gloves 		
7. Line up cold cutters wheels and check for alignment/tracking	<ul style="list-style-type: none"> Cold cutter wheel could break Requires more effort to cut pipe Cold cutters are harder to move around the pipe 	<ul style="list-style-type: none"> Flying debris Wear Safety glasses Wear leather gloves 		
8. Cold cut pipe	<ul style="list-style-type: none"> Pipe could move when cut is made Pinch points Line of fire Overexertion 	<ul style="list-style-type: none"> Make sure personnel cold cutting pipe place themselves out of the line of fire Use Track hoe or other equipment to hold/support pipe while making cold cut to keep it from moving while cutting. Use lifting techniques Good work pace 		
9. Remove cold cutters after cut has been made	<ul style="list-style-type: none"> Pinch points Back strain Slips / trips and falls 	<ul style="list-style-type: none"> Be aware of placement of hands while placing cold cutters on pipe Use track hoe if needed to lower cold cutters in the ditch Use proper ergonomics Wear leather gloves 		
10. File sharp edges from both sides of cold cut	<ul style="list-style-type: none"> Abrasions 	<ul style="list-style-type: none"> Wear leather gloves Inspect hand tools prior to use 		

ATTACHMENT 18 – JSA – Weld New Pipe/Fitting to In-service Pipelines

JOB SAFETY ANALYSIS		DATE 4/14/11	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED	Control No. JSA??????????????
JSA TYPE CATEGORY Pipeline Construction/Maintenance		WORK TYPE Maintenance/Integrity	Weld New Pipe to In-Service Pipelines	
DEVELOPMENT TEAM		POSITION / TITLE	DEVELOPMENT TEAM	POSITION / TITLE
Rod Reed		Area Supervisor	Eric Jorgensen	ERST Tech
David Hammes		FLS	Greg Erbel	Welder
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES <u>STEEL TOE</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING <u>FRC</u> <input checked="" type="checkbox"/> WELDING PPE	<input checked="" type="checkbox"/> GLOVES <u>LEATHER</u> <input checked="" type="checkbox"/> GLOVES <u>WELDING</u> <input type="checkbox"/> OTHER	
JOB STEPS		POTENTIAL HAZARDS	CRITICAL ACTIONS	
This JSA is used in conjunction with other JSAs and procedures that ensures the pipeline is out of service and de-commissioned.				
Conduct SPSA before each and every task				
11. Perform required gas testing of work area prior to performing work.	<ul style="list-style-type: none"> • Exposure - fire/explosion, health hazards. 	<ul style="list-style-type: none"> • Ensure ZERO LEL before performing required tasks or allowing employees to enter excavation. 		
12. Ensure proper fit to complete welding	<ul style="list-style-type: none"> • Track Hoe / equipment for proper line up • Pinch points • Slips / trips, and falls 	<ul style="list-style-type: none"> • ONE person communicating between personnel in the ditch and the equipment operator • Keep hands/fingers out of the line of fire • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • Wear leather or welding gloves 		
13. Tack weld top or bottom of pipe	<ul style="list-style-type: none"> • Arc flash • Burns 	<ul style="list-style-type: none"> • Use welding hood with Safety glasses with side shields • Wear leather or welding gloves • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • Keep hands/fingers out of the line of fire 		
14. Remove High / low from pipe fit	<ul style="list-style-type: none"> • Manual line up needed using 2 pound hammer / wedges / hydraulic bottle jacks • Pick up or move pipe side to side with Track hoe • Pinch points 	<ul style="list-style-type: none"> • Keep personnel out of the line of fire • Be aware of where you place your hands/fingers • Ensure good line (center line) of pipe • Good solid base under jacks • ONE person communicating between personnel in the ditch and the equipment operator 		
15. Tack weld other side of pipe	<ul style="list-style-type: none"> • Arc flash • Burns 	<ul style="list-style-type: none"> • Use welding hood • Wear leather or welding gloves • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • Keep hands/fingers out of the line of fire 		
16. Remove line up clamps	<ul style="list-style-type: none"> • Pinch points • Back strain 	<ul style="list-style-type: none"> • Wear leather gloves • Correct number of people doing the job • Use proper ergonomics • Good work pace 		
17. Weld bead, hot pass, filler passes, and cap pipe	<ul style="list-style-type: none"> • Arc flash • Burns 	<ul style="list-style-type: none"> • Use welding hood • Wear leather or welding gloves • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • Keep hands/fingers out of the line of fire 		
18. Grind bead in preparation for next weld pass	<ul style="list-style-type: none"> • Noise • Grinding • Line of fire • Slips / trips and falls 	<ul style="list-style-type: none"> • Donn hearing protection • Wear face shield with Safety glasses and side shields • Wear leather gloves • Use proper ergonomics • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • No loose clothing / shirts tucked into pants • Ensure personnel is out of line of fire 		

19. Visually inspect finished weld	<ul style="list-style-type: none">• Burns• File weld cap	<ul style="list-style-type: none">• Wear leather or welding gloves• Good housekeeping with cutting torch hoses, welding leads, extension cords etc...• Keep hands/fingers out of the line of fire• Inspect hand tools before each use
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ATTACHMENT 19 – JSA – Fit Pipe for Tie-in

JOB SAFETY ANALYSIS	DATE 4/14/11	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED	Control No. JSA???????????????
Pipeline Construction/Maintenance	Maintenance/Integrity	Fit Pipe for Tie In	
DEVELOPMENT TEAM	POSITION / TITLE	DEVELOPMENT TEAM	POSITION / TITLE
Rod Reed	Area Supervisor	Eric Jorgensen	ERST Tech
David Hammes	FLS	Greg Erbel	Welder
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT			
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES <u>STEEL TOE</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING <u>FRC</u> <input checked="" type="checkbox"/> WELDING PPE	<input checked="" type="checkbox"/> GLOVES <u>LEATHER</u> <input checked="" type="checkbox"/> GLOVES <u>WELDING</u> <input type="checkbox"/> OTHER
JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS	
This JSA is used in conjunction with other JSAs and procedures that ensures the pipeline is out of service and de-commissioned.			
Conduct SPSA before each and every task			
20. Perform required gas testing of work area prior to performing work.	<ul style="list-style-type: none"> • Exposure - fire/explosion, health hazards. 	<ul style="list-style-type: none"> • Ensure ZERO LEL before performing required tasks or allowing employees to enter excavation. 	
21. Lower new line pipe into excavation	<ul style="list-style-type: none"> • Track Hoe/equipment operation • Swinging pipe • Pinch point • Back strain • Slips / trips and falls 	<ul style="list-style-type: none"> • ONE person communicating between personnel in the ditch and the equipment operator • Use tag lines to steady pipe as it is being lowered into excavation • Wear leather/welding gloves • Use proper ergonomics • Proper footing around excavation • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... 	
22. Place new pipe along side old pipe and make mark for final cut	<ul style="list-style-type: none"> • Pinch points • Back strain • Moving pipe 	<ul style="list-style-type: none"> • ONE person communicating between personnel in the ditch and the equipment operator • Align pipe on top or along side of each other to get good measurement • Wear leather gloves • Correct number of people doing the job • Use proper ergonomics • Good work pace 	
23. Cut pipe with beveling machine and cutting torch	<ul style="list-style-type: none"> • Explosion / fire • Pinch points • Back strain • Slips / trips and falls 	<ul style="list-style-type: none"> • Appoint qualified fire watch personnel • Wear leather or welding gloves • Use proper ergonomics • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • Be aware of where you place your hands/fingers 	
24. Grind / clean up weld bevels	<ul style="list-style-type: none"> • Noise • Grinding • Line of fire • Slips / trips and falls 	<ul style="list-style-type: none"> • Donn hearing protection • Wear face shield with Safety glasses with side shields • Wear leather or welding gloves • Use proper ergonomics • Good housekeeping with cutting torch hoses, welding leads, extension cords etc... • No loose clothing / shirts tucked into pants • Keep personnel out of the line of fire 	
25. File inside of bevel to remove burr	<ul style="list-style-type: none"> • Abrasions • Line of fire • Swinging or moving pipe • 	<ul style="list-style-type: none"> • Wear leather gloves • Use proper ergonomics • Keep personnel out of the line of fire • Keep hands / fingers out of the line of fire • Have someone hold to steady the pipe while removing the burrs 	
26. Place two ends of pipe in line up clamps	<ul style="list-style-type: none"> • Manual line up needed using 2 pound hammer / wedges • Pinch points • Back strain 	<ul style="list-style-type: none"> • Wear face shield • Wear leather or welding gloves • Be aware of where you place your hands/fingers • Use proper ergonomics 	

<p>27. Make pipe line up and fit pipe to weld</p>	<ul style="list-style-type: none"> • Track hoe / equipment used to make line up • Hydraulic bottle jacks • Manual line needed using 2 pound hammer / wedges • Pinch points 	<ul style="list-style-type: none"> • One person giving operator hand signals • Slings in good shape • Ensure good line (center line) of pipe • Good solid base under jacks • Keep personnel out of the line of fire • Be aware of where you place your hands/fingers
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ATTACHMENT 20 – JSA – Unbolt or Bolt Flanges

JOB SAFETY ANALYSIS		DATE 10/11/2011	<input checked="" type="checkbox"/> NEW <input type="checkbox"/> REVISED	Control No. JSA???????????????
JSA TYPE CATEGORY Pipeline Construction/Maintenance		WORK TYPE Maintenance/Integrity	Unbolt or Bolt up Flanges	
DEVELOPMENT TEAM		POSITION / TITLE	DEVELOPMENT TEAM	POSITION / TITLE
Rod Reed		Area Supervisor	Eric Jorgensen	ERST Tech
David Hammes		FLS	Steve Coker	FLS
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES <u>STEEL TOE</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING <u>FRC</u>	<input checked="" type="checkbox"/> GLOVES <u>LEATHER</u> <input type="checkbox"/> OTHER	
JOB STEPS	POTENTIAL HAZARDS	CRITICAL ACTIONS		
Conduct SPSA before each and every task				
1. Unbolting or bolting up flanges	<ul style="list-style-type: none"> • Fire explosion • Exposure • Over-Exertion • Slips/trips and falls • Pinch Points 	<ul style="list-style-type: none"> • Use magnets to eliminate static electricity. • Confirm safe atmosphere using calibrated 3 gas monitor • Donn proper PPE • Use drain pan to catch residual product. • If the levels of Benzene, NORM, or H2S will exceed the EMPCo limit, ALL personnel must wear proper respirator, and the area restricted to prohibit unauthorized access to unprotected personnel. • Always loosen bolts on the bottom of the flange first while working your way up to the top evenly on both sides. • If using a pneumatic impact wrench, hearing protection is required. • When working around temporary spools, traps or odd shaped fabrication with more than one flange, insure flanges are held in position by leaving the top 2 bolts in the flanges until the piping is ready to be removed. • Work on only one flange at a time while the other flanges and piping remain secure. • Use lifting equipment with proper rigging or jack stands to support the piping. • Use line-up bar or pins to realign bolt holes for bolt removal. • Wear leather gloves and keep hands and fingers clear of the line of fire. • Ensure socket is stamped and approved for Impact use. If equipped, install ring/pin to secure socket to the drive. Install whip checks to hoses. • When possible push down instead of pulling up on a wrench to avoid back injuries. Bend your knees, not your back • If possible, avoid using the open ended part of a wrench. • Inspect all tools to ensure they are in good working order. • Keep all tools not being used out of walkways. • Wear proper gloves 		
2. Using poppet's or pry bar to spread flanges	<ul style="list-style-type: none"> • Pinch points • Exertion • Poppet's/pry bar falling 	<ul style="list-style-type: none"> • Ensure proper setting of poppet's in the flange prior to ratcheting or spreading flanges. • Ensure all bolts are loose before spreading flanges. 		
3. Install line up pins to keep flanges two holed	<ul style="list-style-type: none"> • Pinch points • Use of two pound hammer 	<ul style="list-style-type: none"> • Wear leather gloves • Wear face shield while using hammer • Keep hands/fingers out of the line of fire 		

4. Remove or replace gasket.	<ul style="list-style-type: none"> • Pinch points • 	<ul style="list-style-type: none"> • DO NOT use fingers to remove old gasket. • Use a pliers or screwdriver to remove the old gasket, NEVER putting fingers between spread flanges.
5. Tighten bolts	<ul style="list-style-type: none"> • Exertion • Pinch points 	<ul style="list-style-type: none"> • Tighten bolts evenly • Keep hands/fingers out of the line of fire
6. Torque bolts to manufactures specifications	<ul style="list-style-type: none"> • Exertion • Pinch points 	<ul style="list-style-type: none"> • Use proper torque sequence • When possible push down instead of pulling up on a wrench to avoid back injuries. Bend your knees, not your back • Inspect all tools to ensure they are in good working order.