



TransCanada Keystone Pipeline LP

# Keystone Pipeline Project – Phase 2 Cushing Extension Lessons Learned

Houston, TX March 21, 2011



**TransCanada**  
*In business to deliver*

# Project Management



- Include contractor in weekly schedule review meeting
- Contracting strategy put focus back on executing the work correctly rather than compromise

# Field Project Controls



- **Appropriate (required) training of field PC staff**
- **Collaborative training for Inspectors to ensure consistent and accurate progress measurement**

# Facilities Interface



- Incorporate phase 2 E&I RFI's into Phase 3&4 designs
- Ensure three valve cluster and piping within fence line scope and specs are consistent and clear in both the facilities and pipeline SOW/contracts ex compaction, material delivery
- Communication requirements while working in proximity to each other – venting during hydro/pigging, NDE tie ins, fence
- Walk downs of RMLV sites conducted with commissioning field engineer, E&I contractor - success

# Materials



- **Field receiving inspection must be performed by competent individual with cross check to tags, drawings and inspection for damage**

# Field Engineering



- **Issue CP test lead installation bulletin**
- **Inspect HDPE used for buoyancy before installed inside HDD pipe, potential integrity test**
- **Actuation Failure**
  - Eliminate cycling with high power drill to ensure not over-torqued/travel past stops when operating during fabrication and construction
  - Engineering Bulletin to be issued by Supplier to all groups for incorporation in construction documents

# Construction Inspection



- **Inspection team doesn't always take time to study construction drawings and specifications. Too many of more "seasoned" inspectors have attitude that old ways acceptable**
  - Project should developed materials and multiple choice test on construction drawings and specifications.
- **It must be considered that either an additional utility inspector dedicated to only coating or that the welding inspector receive training on tasks other than just welding so multi task crews such as a tie-in crew receives the coverage for all the tasks being preformed**

# Construction Inspection



- **Inspector training (OQ task qualifications, excavation competency, environmental/safety training) should be completed at the project office as a part of inspection personnel mobilization. This would ensure that all inspection team members receive all required training and that they are prepared to go to work on the spread without and disruptions due to training.**



# Land (during construction)



- **Contractor should look ahead so that change order requests are submitted at least 7 days before needed as per the process**
- **Develop a plan prior to acquisition on how to handle temporary fencing**
- **Trees cleared on off ROW tracts due to assumptions made that fences were on property lines when staking was done**
  - Property line markers should be located to verify property lines prior to staking
- **Construction agreement has too many items where landowner request items at time of easement signing and then changes his mind during construction**
  - Revise construction agreement so as to not offer landowners so many options and rather build per CMRP requirements
- **Provide the use of qualified appraiser to determine fair market value for the trees**
- **Encourage landowner to use own contractor to repair terrace or hire local contractor to do terrace repairs**



## **The UPI QA leads in coating and welding were carried over from PH 1 construction.**

- Recommendation: Once the QA Mgr is determined he/she should have input into building the Quality Assurance / Audit team
- Need more field based / trouble shooting personnel rather than office focused team members

## **The Coating & Welding QA leads worked for UPI but reported daily to the Keystone QA Manager.**

- Although this was a step in the right direction there were many instances where the two UPI employees were caught in between getting direction from Keystone and being directed by UPI Construction Manager to do other tasks.
- **Recommend to separate QA team from construction management supplier – use a third party to hire QA team employees. This would allow an independent QA / audit team from the construction management team.**

# Quality - Documentation



**Near the end of construction it was noted that not all welds had corresponding coating documentation (C11A & C11B forms).**

- Recommendation: At construction start – Sr Welding Inspector and Sr Coating Inspector need to get linked in and plan a weld log / coating review. The frequency is flexible (every 1 or 2 weeks).

**Coating documentation (C11A & C11B) were found to be incorrectly filled out on an on-going basis.**

- Some inspectors believed the C11A form was too confusing for the contractor coating personnel to follow. (The coating personnel are usually the least experienced workers on the spread)
- Review the forms to make them more user friendly for field personnel

# Quality - Documentation



**Both welding and coating documentation forms were modified by the end users; this resulted in inconsistencies in reporting.**

- Recommendation – all excel forms need to be protected so that the format and data required can not be changed.
- In a lot of cases I do not believe there was intent to change the form but sections were deleted due to lack of computer experience by some inspection staff.
- Spread Construction Managers felt it would be easier for the inspectors if they could hand write the forms – this was approved on a case by case basis after explaining that the office manager would have to complete a review on these individuals to ensure the data was legible.

# Quality – Documentation



- **Weld log data between the three spreads was inconsistent and inaccurate. Weld numbering system developed in the UPI Quality Manual was not well liked by the NDE auditors. They adapted to make it work for themselves.**
- Recommendation – allow the NDE auditors to have input into the development of the NDE log. They are the end users it must be workable.

# Quality - Qualification of Coating & Welding Personnel



**The contractor would try to qualify applicators and welders on a daily basis on some spreads. This would cause the SWI & SCI to be tied up in the yard and not out on the line.**

- Recommendation – Require the contractor to develop a weekly personnel qualification plan. Dedicate a day each week to qualify personnel. (This was more of an issue for coating as the SWI could assign a welding inspector to qualify welders)

# Safety - Highlights of items submitted



**JSA Quality**

**Eye and Face Protection**

**Pipe rolling off skids**

**OQ personnel identification and span of control**

**Case Management**

**Excavation Practices**

**Buried Utility Locates**

**Overhead Powerline Avoidance**

**TapRoot**

**Vehicle Safety**

**Leadership Involvement**

**Positive Recognition**



## Is the Foreman given the tools for success

- Too often the contractor supplied forms are too general
- Simply a *check box*...don't require crew to look beyond the obvious
- Don't help initiate discussion and involvement

## Were hazards effectively identified

- Large percentage of TapRoot investigations identified pre-job planning as either a root cause or contributing factor

## Process in place to identify insufficient JSAs

- Contractors used a *check-off* practice for their safety reps
  - Largely ineffective process
  - Not able to observe delivery
- Keystone Safety Reps were not in the field during JSA delivery





## Process in place to increase delivery and effectiveness

- Need to develop process where leadership *and* safety are in the field at time of JSA delivery (contractor and Keystone)
- Mentoring program

## Encourage employee participation

- Too often the foreman delivers and the crew listens...
- Employees need to be coached into looking for hazards aside from those mentioned by the Foreman
- Interdependence....

## Develop tomorrow's leaders

- Need to increase the delivery by the Foreman so they can effectively lead the development of others in delivering an effective JSA.

# Eye and Face Protection



## 2009 - 28 OSHA Recordable Eye Injuries

- 100% eye and face protection when welding/grinding
- Attempted to prohibit pancake style weld hoods – later allowed
- Continually fought for compliance
  - Little to no enforcement
  - Lacked support from UA

## 2010 - 5 OSHA Recordable Eye Injuries

- 100% eye and face protection when welding/grinding
- Prohibited pancake style weld hoods
- Effective pre-job (Keystone developed) by contractor
- UA support

# Eye and Face Protection



## Welding Hood Demonstration

- Spread 10 initiated
- Keystone elected to keep prohibition of hoods in 2010
- Committed to revisit prior to 2011 construction

## 2011

- Continue with 100% eye and face protection requirement
- Aligned support from Keystone and contractor management
- UA support is critical due to size of workforce, exposure, pressure etc...

# Pipe Rolls off Skids



## Selection of skids

- Reinforce training – importance of task
- Quality control process to ensure defective skids are disposed of

## Quality of stacks

- Skid rack integrity to include, but not limited to design, position and spacing.

## Placement of stacks

- In accordance with construction specs
- Adjusted as needed



# Pipe Rolls off Skids



## Factors for consideration

- Deteriorating ROW conditions from exposure to the elements such as sun and rain,
- Vibrations from the adjacent railroad tracks could have weakened the structural integrity of the skid stack,
- Expansion of the pipe from the heat causing the pipe to “walk” in the rack thus weakening the structural integrity, and
- Vibrations from heavy equipment tracking through the area and adjacent to the skid stacks.



# Operator Qualifications



**2010 – 5 tasks identified**

**2011 – 40 tasks potentially identified**

## **Bison lessons learned for both Keystone and PHMSA**

- Weaknesses have been identified
- Need to ensure proactive compliance

## **Span of control issues**

- Foreman were sometimes unaware of who was OQ'd for what task
- The “best” operator was chosen without verifying qualifications

## **Management of change**

- Crew members change crew creating gap for Foreman/Inspector

# Operator Qualifications



## Identification of personnel

- Field verification reports not maintained at the spreads
- Need to develop method of *spot ID* to identify trained personnel (hard hat sticker)
- Need to be able to identify qualified contractor and CM personnel
  - For both contractor leadership and Keystone personnel to quickly ensure work is performed only by qualified personnel
  - Increased exposure during audits?

## OQ Planning Meetings

- Lessons Learned shared from Bison
- Coordination between facilities and Pipeline
- Michels invited to share their program

# Case Management



**Need to ensure focus remains on preventing injury**

**Contractors and spreads that had effective case management were able to better control the level of loss incurred**

**Once the injured left the spread for treatment, the likelihood of severity increase was heightened**

- OTC pain relievers were now prescription = OSHA recordable

**Clinics were not operational in a timely manner**

- Perfect world – upon mobilization
- Operational prior to the onset of the pipegang at the latest

**Clinics were not used to effectively treat injury**

- Lack of communication/understanding/support from spread
- Used as a pass through prior to transport to offsite facility



# Excavation Practices



## Contractor and CM Excavation training

- Contractor delivered “refresher” training
- UPI delivered ETS training
  - short of competent persons

## Improved Quality of excavations to prior years

## Daily Inspection posted “at site”

## Lingering Issues...

- Supporting crews entering ditch w/
  - Survey, AUT, coating, etc...
- Employer certified competent persons on these teams



# Buried Utility Locates



2010 – struck 44 buried gas lines

## Lessons Learned from Bison

- Look beyond conventional locate methods

## Gap Analysis performed prior to SSSP approval

- Between excavation procedure and TCPL Excavation Spec
- Include a post contact policy



# Buried Utility Locates



## Spotter training

- Multiple TapRoot findings revealed that spotters were not fully trained and understanding was often minimum
  - Spotter positioning
  - Responsibilities and “big picture” of importance of task
  - Recognizing abnormal operating conditions (AOCs)

## Span of control was exercised

- Would suggest operator **and** spotter OQ evaluations

# OHPL Avoidance



2010 struck 3 OHPLs

## OHPL heights surveys

- Adequate time to employ actions to mitigate the hazard where possible
- Including OHPLs paralleling the ROW

## Gap analysis between OHPL Avoidance Procedure and TOP

### Avoidance Practices

- Proximity Warning Devices (SigAlarm)
- Install devices strong enough to withstand elements
- Properly installed
- Preventive maintenance
- Frequently inspected



# OHPL Avoidance



## Training

- Foreman and Inspection
  - To include selection of equipment
  - Identification of high risk areas
  - Look beyond the ROW
    - Lines that parallel the ROW
    - When loading/unloading equipment
- Spotters
  - Multiple TapRoot findings revealed that spotters were not properly trained and understanding was often minimum
    - Spotter positioning and ability to identify proximity to lines
    - Responsibilities and “big picture” of importance of task





## No formal root cause system used

- By project or by contractors
- Oftentimes the root cause was found to be “employee error”

## TapRoot adopted by Keystone in 2010

- Allowed for more in depth incident investigation techniques
- Enabled fact finding not fault finding investigations
- Explored techniques and procedures

## Proved useful in other disciplines

- Environmental incidents (sp10 success story)

## TapRoot required for all key personnel

- Safety Leads, Project Managers, Chief Inspectors, etc...

# Vehicle Safety



## Leadership commitment

- Varying response from spread to spread (sp9 vs sp10)
- gain support from spread mgmt early
- enforce disciplinary policy
- pre-job with unions as a requirement

## Driver's training

- defensive driver training (Smith System) for all supervisor positions - CM and contractor

## Backing avoidance

- Continual struggle year after year

# Vehicle Safety

## UPI policy

- A safety cone placed at the front and the rear of each parked vehicle
- Requires driver to perform a walk-around prior to operation
- Results
  - 75% reduction in vehicle incidents in past 2 years
  - Prior to implementation, UPI experienced an estimated 15 backing incidents per quarter
  - Improves driver awareness of surroundings





# Leadership Involvement



## Positive Leadership Involvement is paramount

- Union Stewards were very engaged on sp9
- Superintendent response to seatbelt/cell phone use
- Management (contractor and CM) response to PPE use or NonCompliance

## Negative Leadership Involvement...

- Spread personnel were negative and impacted project personnel and culture
- The culture of One Team, One Project, One Message was lost after the Summit
- Management response to seatbelts, cell phones, PPE, etc...

# Positive Recognition



## Immediate recognition items

- Available at kickoff
- New items introduced routinely
- Tracking system for expended items

## Championship Belt

- Introduced midway through construction.
- Provided boost in employee involvement



# Environment Phase 2 Lessons Learned



## Challenges/Lessons Learned

## Plan for Improvement

## Next Steps

- Discuss Follow-up and Decisions Needed



## 2009 Phase 1 Lessons Learned

- Majority of Lessons Learned from Phase 1 were incorporated into the work on Phase 2
- Significantly improved structure, organization, TransCanada presence on the spreads
- Completed construction of Phase 2 with no formal agency violations or work shutdowns
- Plenty of challenges remain

# Environment - Organizational Lessons Learned



## Lesson – Environmental Compliance Staff Levels

- Started construction with three EIs per spread
- Initial staff received 3 day environmental inspector training
- Construction progress quickly over-stretched EI field staff
- Additional qualified staff were difficult to find mid-year
- Subsequent EI staff did not receive full EI training

## Plan

- Identify and retain key staff positions early
- Recruit and train entire EI staff
- Bring all staff onto the project at the beginning
  - Build teamwork
  - Build relationships
  - Verify ROW and resources

# Environment - Field Resource Identification



## Lesson

- Stratified resource surveys conducted during regulatory process
  - All resources were not identified accurately
  - Additional costs and project regulatory exposure resulted, although improved from Phase 1
- **Pre-Clearing only first X miles = bad idea**
  - Most beneficial to pre-clear entire spread

## Plan

- Resource specialists assigned to each spread pre-construction
  - Verify all resources and install signage/flagging, etc.
  - Address surveys, unanticipated resources, etc.
  - Clear procedures need to be established for marking environmental resources

# Environment - Contractor Compliance – Project Exposure



## Lesson

- One spread experienced extremely high non-compliance record
- Minimal / lack of participation by construction management and construction inspection
- Lack of Contractor commitment to ensuring compliance
- Lack of Contractor involvement in training/communicating commitment to workers
- Need for a proactive approach to compliance
- Lack of accountability and contract teeth to enforce compliance

## Plan

- Improved contract language
  - Increased teeth included in project scope documents
- Increased Keystone management on spread will increase compliance
- Requirement of construction inspection staff to participate actively

# Environment - Contractor Compliance



## Lesson

- Lack of qualified Contractor Environmental Management staff
  - e.g., winch truck driver was contractor's environmental coordinator on one spread
  - e.g., winch truck driver straw was an environmental foreman

## Plan

- Contract language
  - Contractor required to qualified (approved by Keystone) environmental coordinator
  - Contractor required to conduct environmental training
  - Additional tailgate trainings required for each crew
  - Minimum environmental crew requirements



# Environment - Positive News



## Spread 9C

- Very good coordination, communication and compliance record
- Strong Contractor's environmental coordinator
  - Contractor made their expectations clear to workers at the morning environmental training program
  - Environmental issues were addressed quickly
  - Commitment by the Contractor to pre-planning
- This approach included in Scope of Work documents and clarifications



## Lessons

- Permits – Some permit issues had not been identified
  - HDD mud disposal
  - Public comment period for water withdrawal permits
- Hydrotest Dewatering Challenges – Discharges exceeded permitted limits
  - No internal coating on pipe
  - Single water source and discharge location – long duration of water inside pipeline
  - Dewatering location established on condemnation tract
  - Dewatering structure located on-ROW
  - All of the above created significant compliance and dewatering challenges



## Lessons - Environmental Inspection

- Consistent application between spreads
  - Proactive approach to compliance (part of the team)
  - Calibration between spreads/within spreads
  - Thorough review of NC issues for accuracy
  - Root Cause Analyses for environmental non-compliances
- Significant EI staff turnover during construction
  - Staff levels resulted in overextended/burned-out staff
  - Thorough EI training for new EIs critical, requires dedicated trainer for orientation
- Confusion on Role of Env. Consultant's Recruiter
  - Establish clarity on consultant's role & Keystone's expectation
- Challenges with environmental compliance support from UPI spread management
  - Will be improved with Keystone staff management on spreads



## Lessons – Preparation of Bio/Cultural/Tribal Monitors

- Tribal monitoring scope was fluid
  - Scope expanded by factor of 3 during construction
  - Management of tribal monitors reduced project exposure
    - Monitor immediately behind grade & trench
    - Avoid monitoring immediately in front of crews
  - Full-time cultural monitor on spread during tribal monitoring
- Bio & Cultural Monitors came to field unprepared
  - Monitors need to come to field with maps & plan
    - Extra maps/alignment sheets will be in spread offices
  - Monitors will participate in portion of EI training



## Environmental Training

- EI Training
  - Comprehensive training
  - Environmental inspector handbook for procedures, forms & expectations
  - Thorough training needed for new staff
- Contractor's Supervisor Training
  - Contractor needs to communicate expectations to foremen
  - More interactive training and testing
- Contractor's Crew Training
  - Need Contractor's Coordinator to conduct training/communicate expectations to workers
  - Additional tailgate trainings needed in the field for each individual crew

# Environment - Additional



## Critical to have TC leadership involvement

- Phase 2 direct involvement was significant improvement

## Turf battles on spread and Keystone management

## Addressing non-compliance issues

- Defined procedures for addressing environmental non-compliances
- Define plan for dealing with contractor that does not take non-compliances seriously
  - Contractor needs to have a commitment
  - Accountability needed for foremen, individual workers, spread management