

Longhorn Partners Pipeline, L. P.

Summary Report of 2008 Operational Reliability Assessment (ORA) Developments

This report summarizes developments relating to the 2008 ORA, and is shared with the public in accordance with the Longhorn Mitigation Plan (LMP) Section 3.2.14, “*Longhorn’s Continuing Commitment.*” Keifner and Associates, Inc. (KAI), the ORA Contractor selected by Longhorn Partners Pipeline, L. P. (Longhorn), and approved by the Department of Transportation (DOT), Pipeline and Hazardous Materials Safety Administration (PHMSA)/Office of Pipeline Safety (OPS), performed the annual assessment for 2008 of the operational reliability of the Longhorn pipeline system.

The ORA Contractor analyzed the data collected by the Longhorn Pipeline System Integrity Plan (LPSIP) activities and integrity inspections conducted in 2008, evaluated the analytical results, and provided recommendations in its report to preserve the long term integrity of the Longhorn pipeline system. The ORA Report specifically addressed the following subjects:

- Threats and Potential Threats to the Pipeline
 - Pressure-Cycle-Induced Fatigue
 - Corrosion
 - Laminations and Hydrogen Blisters
 - Earth Movement and Water Forces
 - Third-Party Damage
 - Stress-Corrosion Cracking
 - Facilities Other than Line Pipe
- Technical Assessment of the Effectiveness of the LPSIP

The analyses of operational pressure cycles to date show the intensity of pressure cycles is relatively nonaggressive in relation to benchmarks established on the basis of typical liquid petroleum products and crude oil pipelines. If this continues to be the mode of operation, integrity reassessment from the standpoint of electric-resistance weld (ERW) seam anomalies will not be necessary until the year 2030. This represents a 15 year increase from our previous calculation performed for the 2007 annual report. Our 2007 analysis used the previous hydrostatic test pressure levels to define a set of flaws that could have survived the test. The Transverse Field Inspection (TFI) tool run, completed in 2007 and early 2008, is now used to define a flaw size that will determine the reassessment interval. 86 seam weld features were identified and remediated during the 2007 and 2008 program. Therefore, the reassessment interval uses the seam weld feature detection threshold value from the TFI tool vendor.

The commitment to run a high-resolution magnetic flux leakage (HRMFL) inspection in the Existing Pipeline was completed in February 2007. The remediation associated with the HRMFL inspections was completed in 2007 with two sections requiring additional studies. The first additional study was a stray current survey at MP 351 that was completed in 2007.

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The second additional study was an alternating current (AC) induced corrosion mitigation assessment that was necessary to evaluate AC currents within the first nine miles where the new 1998 pipeline extension lays in a high-voltage electric-power transmission corridor. A report was published in January of 2009, and the results need to be integrated with AC remediation and AC potential surveys performed in the corridor.

Two sections of HRMFL inspections between Crane and El Paso were finished in 2008. The inspection from Crane to Cottonwood was completed in late 2008, and the inspection from Cottonwood to El Paso was completed earlier in 2008. Remediation for both sections will be completed in 2009. The inspections were delayed because the first attempt to run the HRMFL inspection, although not completely successful, did find 40 miles with severe internal corrosion in pipe that was constructed only 8 years earlier. 42 miles of pipe was replaced between Crane and Cottonwood remediating the most severely corroded section of pipeline, allowing the pipeline to be cleaned and the HRMFL inspection to be completed.

The condition of any laminations and blisters that may still exist in the 1950 pipe material will be evaluated within the first five years after start up (no later than January 27, 2010) using an ultrasonic (UT) wall thickness in-line inspection (ILI) tool. This tool is scheduled to be run in 2009. In the meantime, no degradation of laminations into blisters or growth of existing blisters is expected because sour crude oil, the primary source of hydrogen that causes blisters, is no longer present in the pipeline.

From the standpoint of earth movement, the primary integrity concerns are soil erosion and scouring from floods and the ground movement from aseismic faults at specific points along the pipeline. Scour surveys on the Colorado River and its tributary, Pin Oak Creek, show no evidence of soil erosion or scouring. No other river crossing inspections were required in 2008. Periodic measurements from 2004 through 2008 show no evidence of any measurable movement of any of the monitored faults. Therefore, no remedial action is recommended.

Longhorn's third-party damage (TPD) prevention program far exceeds the minimum requirements of federal or Texas state pipeline safety regulations, and it represents a model program for the industry. The aerial surveillance and ground patrol frequencies mostly exceeded the frequencies set forth in the LMP except when prevented from doing so by weather. In our opinion, the damage prevention program is a major contributing reason why no hits occurred on the pipeline in 2008 in spite of the fact that 15,309 One-Call notifications were received by the operator of the pipeline.

No occurrence of stress-corrosion cracking (SCC) has ever been recorded on the pipeline, including the 449 miles of the Existing Pipeline. In accordance with the Operational Reliability Assessment Process Manual (ORAPM), Longhorn performed investigative digs each year for the three years from 2005-2007 in areas potentially susceptible to SCC. No SCC was found. Longhorn continues to carry out checks as part of the normal dig program by performing an SCC examination program using magnetic particle testing at each dig site.

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From the standpoint of facilities data acquired in 2008, one can conclude that pump station and terminal facilities had no adverse impact on public safety. The three incidents reported to DOT in 2008 did occur in a facility; however, there was no risk to public safety since the spills were contained on the property.

Three DOT-reportable incidents occurred in 2008. They were caused by not tightening isolating flanges properly after removing isolation skillets during a tank inspection at Crane Station, an O-ring failure at Galena Park caused by failure to observe proper maintenance procedures, and an improper weld and subsequent poor inspection from a tank repair at Crane Station. All were related to human error during maintenance procedures at facilities.

The technical assessment of the LPSIP indicates that Longhorn is achieving the goal of the LPSIP, namely, to prevent incidents that would threaten human health or safety or cause environmental harm. In terms of activity measures, Longhorn exceeded the goals of aerial surveillance and ground patrol based upon mileage patrolled (see Damage Prevention Program, below). In addition, public-awareness meetings were held, an equipment rental/farm store public education program was conducted, and right-of-way markers and signs were repaired or replaced. From the standpoint of deterioration measures, a number of metal-loss and seam anomalies were discovered and repaired. In terms of failure measures, there were three DOT-reportable incidents, releases at facilities mentioned above, and there were no known third-party hits.

Technical Assessment of LPSIP Effectiveness

The LPSIP contains twelve process elements. Seven of these elements are listed below along with an assessment of their effectiveness. These elements are most closely related to the threats addressed by the ORAPM and are summarized in detail with recommendations. The assessments for the remaining five elements can be found in the 2008 Annual LPSIP Self-Audit Report for Longhorn Partners Pipeline.

Longhorn Corrosion Management Plan

The corrosion management plan was effective at preventing corrosion degradation in 2008. Previous year's efforts are ongoing.

Corrosion was observed in the first nine miles where the pipeline shares a corridor with multiple pipelines and multiple high voltage power lines. The corrosion was first observed from ILI excavations and later confirmed by comparing two ILI runs. Initial investigations conducted in 2007 confirmed probable AC corrosion, and mitigative grounding systems were installed at that time. A follow-up study was recommended and initiated with Kiefner & Associates in November 2007 to model the AC corrosion threat and ensure it is addressed. This study is ongoing.

Unexpected internal corrosion between Crane and El Paso was discovered in August 2007 when results were reported from a May 2007 HRMFL inspection run. The worst corroded

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section showed extensive internal metal loss which caused Longhorn to take a pressure reduction until a 42-mile section was replaced October 15, 2008. Reports from a 2007 excavation at MP 517 suggest that microbiologically influenced corrosion (MIC) played a role in causing or accelerating the internal metal-loss in corrosion up to 62% of wall thickness (wt) deep. A root cause analysis, conducted in 2008 by Stork Metallurgical Consultants on a section of the line at MP 502 that suffered less severe corrosion than at MP 517, concluded that corrosion was likely the result of water left in the pipeline following the initial hydrostatic test and concluded that the corrosion was currently inactive.

Because most of the deep corrosion was removed in the 42-mile replacement it appears most of the potentially active MIC has been removed. Because of this KAI no longer recommends the EM coupon internal corrosion surveys recommended in the 2007 ORA Annual Report. It is recommended that monitoring for pitting using internal corrosion coupons be performed downstream of the worst corrosion in the Crane and El Paso segment until it can be demonstrated through subsequent ILI runs that internal corrosion has been mitigated.

In-Line-Inspection and Rehabilitation Program

Longhorn continues to meet its ILI commitments with the completion of the TFI excavations from the 2007-2008 TFI runs and completion of the HRMFL runs between Crane and El Paso. The program has been effective in fulfilling the requirements in the LMP.

KAI believes Longhorn has made significant advances inspecting and remediating corrosion with the completed ILI runs to date. Longhorn should continue to use ILI to diagnose and initiate mitigation of any future corrosion problems, guided by the probability of exceedance (POE) analysis and supplemental measurements when needed, as in-line inspection is one of the most effective ways to monitor the effectiveness of corrosion management on a pipeline.

Damage Prevention Program

The absence of reportable incidents involving mainline pipe and the absence of third party contact with the pipe suggests that Longhorn's proactive damage prevention and maintenance plans (including the aerial surveillance frequency) have been effective and are functioning as intended. The aerial surveillance program had two time periods in 2008 where surveys could not be conducted in the required 72 hours because of bad weather. During these periods aerial surveillance needs to be supplemented with ground patrols, which document the length of each individual ground patrol, or if the weather is bad enough to prevent ground patrols, then this needs to be documented.

Encroachment Procedures

There were 67 encroachments recorded in 2008 of which 3 were unauthorized. The program's encroachment agreements have been effective at keeping authorized

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encroachments from damaging the pipeline. This is demonstrated because none of the authorized encroachments resulted in a near miss, while each of the three unauthorized encroachments did result in a near miss. In addition, the absence of reportable incidents involving mainline pipe and the absence of third party damage also support that the program has been effective.

Incident Investigation Program

Longhorn is performing incident investigations on all DOT reportable incidents and on many more non-reportable incidents. Although KAI finds these incident investigations effective, KAI recommends additional investigations in order to better understand TPD “near misses”. Each and every TPD near miss should be investigated to determine whether or not the near miss was caused by a breakdown of the One-Call system, the excavator was exempt, the excavator simply chose not to call, or the excavator was unaware of the requirement. How near misses are detected is also important, whether they were found from ground observation, aerial patrol, or some other means. This information will be useful for determining the quantitative effectiveness of the damage prevention program going forward.

The incident investigation section of the LMP also discusses the need to investigate repairs to determine the root cause. These are currently reported as maintenance reports. KAI finds the documentation of pipeline repairs is being more effectively performed. The better sizing of defects during repair will allow Longhorn to make more quantitative and effective decisions when using the POE process for ILI assessment measurements. For instance, if the tool is found to be measuring corrosion depth with less tool error than expected, then fewer POE excavations will be required.

Depth of Cover Program

A Depth of Cover (DOC) survey was carried out in 2007 from Galena Park to Crane. The Third Party Damage Prevention Program Annual Assessment identified 11 new exposures, of which 5 were repaired in the first quarter 2008, 6 were analyzed using risk assessment and classified as “monitor”. We find this program effective at identifying shallow pipe that may increase the threat of outside force damage.

Fatigue Analysis and Monitoring Program

The 2008 fatigue analysis performed by KAI incorporated results from the 2007-2008 TFI tool runs and was effective at monitoring the potential of fatigue cracking failures from pressure-cycle-induced growth.

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Recommended Intervention Measures and Timing

Pressure-Cycle-Induced Fatigue

For the threat of pressure-cycle-induced fatigue, a reassessment in the year 2030 was calculated based on the pressure cycles for 2008 and using the results from the 2007-2008 TFI tool runs.

Corrosion

For the threat of corrosion, a 5 year reassessment interval was calculated for the pipeline segments containing the Existing Pipeline. This reassessment interval represents the time from the HRMFL inspection until the next HR-ILI tool run for corrosion inspection. The planned UT inspection can be used to set this reassessment interval, and in addition the data should be used to verify the estimated corrosion rates used in the growth portion of the POE analysis. The recommended anomaly evaluations beyond the POE anomaly evaluations (those that are estimated to grow to a probability value that exceeds 1×10^{-5} within 5 years) may change due to improvements in the corrosion rate estimation process based on matching multiple ILI tool data.

Laminations and Hydrogen Blisters

It is possible some laminations or blisters may still exist given the history of the pipeline. However, the pressure tests in 2000 and 2002 eliminated any blisters close to failure, and because the line no longer transports sour crude, we do not expect new blisters to form in the future. The UT tool inspection scheduled for 2009 should confirm this and allow the operator of the pipeline to remediate any remaining, potentially injurious, blisters.

Earth Movement and Water Forces

The earth-movement analysis continued to show no measurable movement in 2008 on any of the four aseismic faults under observation in Harris County. Inspections showed no signs of erosion or scour damage at stream crossings from storm water flooding. We believe the time interval between fault monitoring can be increased to once per year based on the lack of movement for 4.5 years. Stream crossing monitoring should continue every five years and after storm events for identified stream crossings. The scour inspection for the Colorado River and Pin Oak Creek should continue biannually and after every second standard flood as specified by studies referenced in LMC 19.

Third-Party Damage

For the threat of TPD, Longhorn should continue both prevention and inspection activities. Prevention activities include Right-of-way (ROW) surveillance and public-awareness activities that continued to be successful in 2008. Inspection activities include almost all ILI inspections required as part of the ORA, including the MFL-geometry inspection carried out in 2004-2007, the TFI-geometry inspection in 2007-2008, and the UT-geometry inspection

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planned in the latter half of 2009. LMC 12A requires inspections with a “smart” geometry tool be carried out within 3 years of a previous inspection. These inspections are occurring more frequently because they also fulfill other Longhorn Mitigation Commitments.

Stress-Corrosion Cracking

As no evidence of SCC has been detected, it is not necessary to recommend an intervention measure. Longhorn should continue to monitor for this threat through their current method, which consists of looking for evidence of SCC when maintenance excavations are performed.

Threats to Facilities Other than Line Pipe

The Longhorn facilities maintenance program represents a very thorough and comprehensive means of facility inspection and preventive maintenance. Progress has been made from prior years in the documentation of facility integrity processes and completion of the facility preventive maintenance program. Results from this year’s evaluation highlight human error as the primary cause of the eight facility spills, three of which were DOT-reportable.

Longhorn should continue to carry out inspections and maintenance of facilities with the same diligence and frequency and should follow efforts, such as the one being conducted by the API Operations Technical Committee workgroups, still underway to develop specific facilities assessment advisories. These should be given due consideration once final processes and procedures are completed and addressed in the ORA relevant to the appropriate timeframe.

A formal report of the ORA has been submitted to the OPS. As provided by the LMP, OPS will determine whether or not it will approve the recommendations of the ORA Contractor. Upon the approval by OPS, Longhorn will implement the recommendations of the ORA Contractor.