December 8, 2022

VIA ELECTRONIC MAIL TO: richard_prior@tcenergy.com

Richard Prior
TC Oil Pipeline Operations, Inc.
700 Louisiana Suite 700
Houston, TX 77002

Re: CPF No. 3-2022-074-CAO

Dear Mr. Prior,

Enclosed please find a Corrective Action Order (CAO or Order) issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety (OPS), in the above-referenced case. It requires TC Oil Pipeline Operations, Inc., to take certain corrective actions with respect to a pipeline failure that occurred on December 7, 2022, on the 36-inch Keystone pipeline three miles east of Washington, Kansas.

Service of the CAO by electronic mail is effective upon the date of transmission and acknowledgment of receipt as provided under 49 C.F.R. § 190.5. The terms and conditions of this Order are effective upon completion of service.

Sincerely,

Alan K. Mayberry
Associate Administrator
for Pipeline Safety

Enclosure: CAO

cc: Mr. Gregory Ochs, Director, Central Region, Office of Pipeline Safety, PHMSA

CONFIRMATION OF RECEIPT REQUESTED

U.S. DEPARTMENT OF TRANSPORTATION
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION
OFFICE OF PIPELINE SAFETY
WASHINGTON, D.C. 20590

In the Matter of	)	
TC Oil Pipeline Operations, Inc.,	)	**CPF No. 3-2022-074-CAO**
Respondent.	)	

CORRECTIVE ACTION ORDER

Purpose and Background

This Corrective Action Order (CAO or Order) is being issued by the Pipeline and Hazardous Materials Safety Administration (PHMSA), Office of Pipeline Safety (OPS), under the authority of 49 U.S.C. § 60112, to require TC Oil Pipeline Operations, Inc. (TC Oil or Respondent), to take necessary corrective actions to protect the public, property, and the environment from potential hazards associated with the December 7, 2022, crude oil pipeline failure that occurred on the 36-inch Keystone pipeline, approximately three miles east of Washington, Kansas (Failure).

The Keystone Pipeline is a 2,687-mile hazardous liquid pipeline system between Hardisty, Alberta, Canada, and Patoka, Illinois, and Port Arthur, Texas.[1] The 36-inch diameter Cushing Extension was Phase 2 of the Keystone pipeline. Construction was completed in 2011 for the Cushing Extension. The Cushing Extension begins in Steele City, Nebraska and goes to Cushing, Oklahoma, and is approximately 288 miles long. The MOP of the pipeline is 1,440 psig, and it operates under Special Permit PHMSA-2006-26617.

At approximately 09:01 PM CST a leak detection alarm (volume imbalance) was received. An Emergency-Line Trip alarm was received 6-minutes later. The pipeline was subsequently shut down and isolation valves were commanded closed at 09:08 PM CST. The location of the Failure is Cushing Extension, MP 14. The affected segment of the pipeline spans from Steele City pump station (MP 0.0) to Hope pump station (MP 95.7, approximately). Upon receiving the leak alarms, TC Oil personnel were dispatched and identified a crude oil odor north of U.S. Highway 36. The failure location was subsequently confirmed to be approximately two miles north of the highway crossing. Crude Oil from the pipeline has impacted Mill Creek, at approximate coordinates of 39-degrees, 50-minutes, 33-seconds, and -96-degrees, 59-minutes, 44-seconds.

[1] *See* Overview, TC ENERGY, https://www.tcenergy.com/operations/oil-and-liquids/keystone-pipeline-system/ (last accessed Dec. 8, 2022)

TC Oil was in the process of running an in-line inspection (ILI) tool. The ILI tool is currently downstream of the failure location. Respondent had bypassed the Hope, Kansas, pump station, the next station downstream, in preparation for the tool to pass when the failure occurred.

Pursuant to 49 U.S.C. § 60117, PHMSA has initiated an investigation of the Failure. The preliminary findings of the Agency's ongoing investigation are as follows:

Preliminary Findings

- On December 7, 2022, at approximately 09:01 PM CST a leak detection alarm (volume imbalance) was received. An Emergency-Line Trip alarm was received 6-minutes later.

- The pipeline was shut down and isolation valves were commanded closed at 09:08 PM CST.

- Upon receiving notification of the Failure, TC Oil personnel were dispatched and identified a crude oil odor north of U.S. Highway 36. The Failure location was subsequently confirmed approximately two miles north of the highway crossing.

- The location of the Failure is Cushing Extension, MP 14. The affected segment of the pipeline spans from Steele City pump station (MP 0.0) to Hope pump station (MP 95.7, approximately).

- The pipeline is a 36-inch diameter, 0.465-inch wall thickness, Grade X-70, and manufactured by Evraz. The MOP is 1,440 psig.

- The 36-inch diameter Cushing Extension was Phase 2 of the Keystone pipeline. Construction was completed in 2011 for the Cushing Extension. The Cushing Extension begins in Steele City, Nebraska and goes to Cushing, Oklahoma, and is approximately 288 miles long.

- Crude Oil from the pipeline has impacted Mill Creek crossing, at approximate coordinates of 39-degrees, 50-minutes, 33-seconds, and -96-degrees, 59-minutes, 44-seconds.

- Keystone pipeline traverses several High Consequence Areas and navigable rivers. The Keystone pipeline Cushing Extension traverses could affect HCA areas

- TC Oil was in the process of running an ILI tool. The ILI tool is currently downstream of the failure location. TC Oil had bypassed the Hope, Kansas, pump station, the next station downstream, in preparation for the tool to pass when the failure occurred.

- The initial estimated spill volume is approximately 14,000 barrels of crude oil.

- On May 7, 2011, a reportable accident occurred on pump station piping on the Keystone crude oil pipeline at the Ludden Pump Station. On May 29, 2011, a second reportable

failure incident occurred on piping at the Severance Pump Station. On June 3, 2011, PHMSA issued a Corrective Action Order requiring Respondent to take corrective actions (CPF No. 3-2011-5006H). On June 13, 2011, Respondent submitted a response to this CAO requesting a hearing. Following informal discussions between Respondent and PHMSA, based on the most up-to-date information, PHMSA agreed to make minor changes and clarifications to the original CAO in an Amended CAO issued June 28, 2011. The Order was closed on January 13, 2015, after TC Oil had completed all the required corrective actions.

- On April 2, 2016, a reportable accident due to a leak in a cracked tie-in weld occurred on the Keystone pipeline on the 48.1-mile segment between Freeman (Pump Station 23) and Hartington (Pump Station 24). On April 9, 2016, PHMSA issued a Corrective Action Order requiring Respondent to take corrective actions (CPF No. 3-2016-5002H). The Order was closed on March 30, 2017, after TC Oil had completed all the required corrective actions.

- PHMSA issued a Corrective Action Order (CPF No. 3-2017-5008H) to TC Oil on November 28, 2017, due to a fracture that initiated at an area of previous mechanical damage. This Order was closed on January 29, 2019, after Respondent completed all the required corrective actions.

- On October 30, 2019, a reportable accident occurred on the 41.9-mile Keystone pipeline segment that runs between the Edinburg Pump Station and the Niagara Pump Station, near Niagara, North Dakota. On November 5, 2019, PHMSA issued a Corrective Action Order requiring Respondent to take corrective action (CPF No. 3-2019-5023H). The Order was closed on February 3, 2022, after TC Oil had completed all the required corrective actions.

- On October 14, 2022, PHMSA issued a Notice of Probable Violation, Proposed Civil Penalty, and Proposed Compliance Order (CPF No. 3-2022-025-NOPV) following a special inspection of TC Oil's Lucas delivery facility in Beaumont, Texas, following a crude oil spill that occurred there on May 7, 2020. The proceeding remains open at this time.

- The investigation is on-going, and information could change. This order may be amended based on further findings during the investigation.

Determination of Necessity for Corrective Action Order and Right to Hearing

Section 60112 of title 49, United States Code, authorizes PHMSA to determine that a pipeline facility is or would be hazardous to life, property, or the environment and if there is a likelihood of serious harm, to expeditiously order the operator of the facility to take necessary corrective action, including suspended or restricted use of the facility, physical inspection, testing, repair, replacement, or other appropriate action. An order issued expeditiously must provide an opportunity for a hearing as soon as practicable after the order is issued.

In deciding whether to issue an order, PHMSA must consider the following, if relevant: (1) the characteristics of the pipe and other equipment used in the pipeline facility, including the age, manufacture, physical properties, and method of manufacturing, constructing, or assembling the equipment; (2) the nature of the material the pipeline facility transports, the corrosive and deteriorative qualities of the material, the sequence in which the material is transported, and the pressure required for transporting the material; (3) the aspects of the area in which the pipeline facility is located, including climatic and geologic conditions and soil characteristics; (4) the proximity of the area in which the hazardous liquid pipeline facility is located to environmentally sensitive areas; (5) the population density and population and growth patterns of the area in which the pipeline facility is located; (6) any recommendation of the National Transportation Safety Board made under another law; and (7) any other factors PHMSA may consider as appropriate.

After evaluating the foregoing preliminary findings of fact, and having considered the characteristics of the pipeline, including the prior failures of the pipeline; the hazardous nature of the material (crude oil) transported; the uncertainty as to the root cause(s) of the Failure; the existing and potential additional impacts to property, the environment, and wildlife; and the possibility that the same condition(s) that may have caused the failure remain present in the pipeline and could lead to additional failures; I find that continued operation of the *Affected Segment*, as defined below, without corrective measures is or would be hazardous to life, property, or the environment, and that failure to issue this Order expeditiously would result in the likelihood of serious harm.

Accordingly, this Order mandating immediate corrective action is issued expeditiously without prior notice and opportunity for a hearing. The terms and conditions of this Order are effective upon receipt.

Within 10 days of receipt of this Order, Respondent may request a hearing, to be held as soon as practicable, by notifying the Associate Administrator for Pipeline Safety in writing, with a copy to the Director, PHMSA, OPS Central Region. If a hearing is requested, it will be held in accordance with 49 C.F.R. § 190.211.

After receiving and analyzing additional data in the course of this investigation, PHMSA may identify other corrective measures that need to be taken. Respondent will be notified of any additional measures required and, if appropriate, PHMSA will consider amending this Order. To the extent consistent with safety, Respondent will be afforded notice and an opportunity for a hearing prior to the imposition of any additional corrective measures.

Required Corrective Actions

Definitions:

Affected Segment – The *"Affected Segment"* means approximately 96 miles of TC Oil's Keystone pipeline that contains the 36-inch diameter pipe from Steele City pump station (MP 0.0) to Hope pump station (MP 95.7, approximately). The *Affected Segment* traverses the following counties: Jefferson County NE, Washington County KS, Clay County KS, and Dickinson County KS.

Director – The "*Director*" means the Director, PHMSA, OPS Central Region.

Pursuant to 49 U.S.C. 60112, I hereby order TC Oil to take the following corrective actions:

1. ***Shutdown of the Affected Segment.*** The *Affected Segment* must remain shut-in and may not be operated until authorized to be restarted by the Director in accordance with the terms of this Order.

2. ***Operating Pressure Restriction.*** TC Oil must reduce and maintain a twenty percent (20%) pressure reduction in the actual operating pressure along the entire length of the *Affected Segment* such that upon restart the operating pressure along the *Affected Pipeline* will not exceed eighty percent (80%) of the actual operating pressure in effect at the failure location, immediately prior to the failure on December 7, 2022.

    a. This pressure restriction is to remain in effect until written approval to increase the pressure or return the pipeline to its pre-failure operating pressure is obtained from the Director.

    b. Within 15 days of receipt of the CAO, TC Oil must provide the Director the actual operating pressures of each pump station on the *Affected Segment* at the time of failure and the reduced pressure restriction set-points at these same locations.

    c. This pressure restriction requires any relevant remote or local alarm limits, software programming set-points or control points, and mechanical over-pressure devices to be adjusted accordingly.

    d. When determining the pressure restriction set-points, TC Oil must take into account any in-line inspection (ILI) features or anomalies present in the *Affected Segment* to provide for continued safe operation while further corrective actions are completed.

    e. TC Oil must review the pressure restriction monthly by analyzing the operating pressure data, taking into account any ILI features or anomalies present in the *Affected Segment.* TC Oil must immediately reduce the operating pressure further to maintain the safe operations of the *Affected Segment*, if warranted by the monthly review. Further, TC Oil must submit the results of the monthly review to the Director including, at a minimum, the current discharge set-points (including any additional pressure reductions), and any pressure exceedance at discharge set-points. Submittals may be made quarterly, in accordance with Item 15 below.

3. ***Review of Prior In-line Inspection (ILI) Results.***

    a. Within 30 days of receipt of the CAO, TC Oil must conduct a review of any previous ILI results of the *Affected Segment*. In its review, TC Oil must re-evaluate all ILI results from the past 10 calendar years, including a review of the ILI vendors' raw data and analysis. TC Oil must determine whether any features were present in the failed pipe joints from the December 7, 2022, failure. Also, TC Oil must determine if any features with similar characteristics are present elsewhere on the *Affected Segment*. TC Oil must submit documentation of this ILI review to the Director within 45 days of receipt of the CAO, as follows:

        i. List all ILI tool runs, tool types, and the calendar years of the tool runs.

ii. List, describe (type, size, wall loss, etc.), and identify the specific location of all ILI features present in the failed joint and other pipe removed.

iii. List, describe (type, size, wall loss, etc.), and identify the specific location of all ILI features with similar characteristics present elsewhere on the *Affected Segment*.

iv. Explain the process used to review the ILI results and the results of the reevaluation.

4. ***Mechanical and Metallurgical Testing***. Within 45 days of receipt of the CAO, TC Oil must complete mechanical and metallurgical testing and failure analysis of the failed pipe, including an analysis of soil samples and any foreign materials. Mechanical and metallurgical testing must be conducted by an independent third-party acceptable to the Director, and must document the decision-making process and all factors contributing to the failure. TC Oil must complete the testing and analysis as follows:

   a. Document the chain-of-custody when handling and transporting the failed pipe section and other evidence from the failure site.

   b. Within 10 days of receipt of the CAO, develop and submit the testing protocol and the proposed testing laboratory to the Director for prior approval.

   c. Prior to beginning the mechanical and metallurgical testing, provide the Director with the scheduled date, time, and location of the testing to allow for an OPS representative to witness the testing.

   d. Ensure the testing laboratory distributes all reports whether draft or final in their entirety to the Director at the same time they are made available to TC Oil.

5. ***Root Cause Failure Analysis*.** Within 90 days following receipt of the CAO, complete a root cause failure analysis (RCFA) and submit a final report of this RCFA to the Director. The RCFA must be supplemented or facilitated by an independent third-party acceptable to the Director and must document the decision-making process and all factors contributing to the failure. The final report must include findings and any lessons learned and whether the findings and lessons learned are applicable to other locations within TC Oil's pipeline system.

6. ***Remedial Work Plan (RWP).***

   a. Within 90 days following receipt of the CAO, TC Oil must submit a remedial work plan (RWP) to the Director for approval.

   b. The Director may approve the RWP incrementally without approving the entire RWP.

   c. Once approved by the Director, the RWP will be incorporated by reference into this Order.

   d. The RWP must specify the tests, inspections, assessments, evaluations, and remedial measures TC Oil will use to verify the integrity of the *Affected Segment*. It must address all known or suspected factors and causes of the December 7, 2022, failure. TC Oil must consider the risks and consequences of another failure to develop a prioritized schedule for RWP-related work along the *Affected*

Segment.

e. The RWP must include a procedure or process to:

i. Identify pipe in the *Affected Segment* with characteristics similar to the contributing factors identified for the December 7, 2022, failure, including the age and manufacture of the entire length of the *Affected Segment*.

ii. Gather all data necessary to review the failure history (in service and pressure test failures) of the *Affected Segment* and to prepare a written report containing all the available information such as the locations, dates, and causes of leaks and failures.

iii. Integrate the results of the metallurgical testing, root cause failure analysis, and other corrective actions required by this Order with all relevant pre-existing operational and assessment data for the *Affected Segment.* Pre-existing operational data includes, but is not limited to, design, construction, operations, maintenance, testing, repairs, prior metallurgical analyses, and any third-party consultation information. Pre-existing assessment data includes, but is not limited to, ILI tool runs, hydrostatic pressure testing, direct assessments, close interval surveys, and DCVG/ACVG surveys.

iv. Determine if conditions similar to those contributing to the failure on December 7, 2022, are likely to exist elsewhere on the *Affected Segment.*

v. Conduct additional field tests, inspections, assessments, and evaluations to determine whether, and to what extent, the conditions associated with the failure on December 7, 2022, and other failures from the failure history (see (e)(ii) above) or any other integrity threats are present elsewhere on the *Affected Segment*. At a minimum, this process must consider all failure causes and specify the use of one or more of the following:

1) ILI tools that are technically appropriate for assessing the pipeline system based on the cause of failure on December 7, 2022, and that can reliably detect and identify anomalies,
2) Hydrostatic pressure testing,
3) Close-interval surveys,
4) Cathodic protection surveys, to include interference surveys in coordination with other utilities (e.g., underground utilities, overhead power lines, etc.) in the area,
5) Coating surveys,
6) Stress corrosion cracking surveys,
7) Selective seam corrosion surveys; and
8) Other tests, inspections, assessments, and evaluations appropriate for the failure causes.

Note: TC Oil may use the results of previous tests, inspections, assessments, and evaluations if approved by the Director, provided the results of the tests, inspections, assessments, and evaluations are analyzed with regard to the factors known or suspected to have caused the December 7, 2022, failure.

vi. Describe the inspection and repair criteria TC Oil will use to prioritize, excavate, evaluate, and repair anomalies, imperfections, and other identified integrity threats. Include a description of how any defects will be graded and a schedule for repairs or replacement.

vii. Based on the known history and condition of the *Affected Segment*, describe the methods TC Oil will use to repair, replace, or take other corrective measures to remediate the conditions associated with the pipeline failure on December 7, 2022, and to address other known integrity threats along the *Affected Segment*. The repair, replacement, or other corrective measures must meet the criteria specified in (e)(vi) above.

viii. Implement continuing long-term periodic testing and integrity verification measures to ensure the ongoing safe operation of the *Affected Segment* considering the results of the analyses, inspections, evaluations, and corrective measures undertaken pursuant to the Order.

f. Include a proposed schedule for completion of the RWP.

g. TC Oil must revise the RWP as necessary to incorporate new information obtained during the failure investigation and remedial activities, to incorporate the results of actions undertaken pursuant to this Order, and to incorporate modifications required by the Director.

i. Submit any plan revisions to the Director for prior approval.

ii. The Director may approve plan revisions incrementally.

iii. All revisions to the RWP after it has been approved and incorporated by reference into this Order will be fully described and documented in the *CAO Documentation Report*.

h. Implement the RWP as it is approved by the Director, including any revisions to the plan.

7. ***CAO Documentation Report (CDR***). TC Oil must create and revise, as necessary, a CAO Documentation Report (CDR). When TC Oil has concluded all the items in this Order it will submit the final CDR in its entirety to the Director. This will allow the Director to complete a thorough review of all actions taken by SNG with regards to this Order prior to approving the closure of this Order. The intent is for the CDR to summarize all activities and documentation associated with this Order in one document.

a. The Director may approve the CDR incrementally without approving the entire CDR.

b. Once approved by the Director, the CDR will be incorporated by reference into this Order.

c. The CDR must include, but is not necessarily limited to, the following:

i. Table of Contents;

ii. Summary of the pipeline failure of December 7, 2022, and the response activities;

iii. Summary of pipe data, material properties, and all prior assessments of the *Affected Pipeline*;

iv. Summary of all tests, inspections, assessments, evaluations, and analysis required bythe Order;

v. Summary of the mechanical and metallurgical testing as required by the Order;

vi. Summary of the RCFA with all root causes as required by the Order;

vii. Documentation of all actions taken by TC Oil to implement the RWP, the results of those actions, and the inspection and repair criteria used;

viii. Documentation of any revisions to the RWP including those necessary to incorporate the results of actions undertaken pursuant to this Order and whenever necessary to incorporate new information obtained during the failure investigation and remedial activities;

ix. Lessons learned while completing this Order;

x. A path forward describing specific actions TC Oil will take on its entire pipeline system as a result of the lessons learned from work on this Order; and

xi. Appendices (if required).

8. ***Restart Plan.*** Prior to resuming operation of the *Affected Segment,* develop and submit a written *Restart Plan* to the Director for prior approval.

a. The Director may approve the *Restart Plan* incrementally without approving the entire plan, but the *Affected Segment* cannot resume operation until the *Restart Plan* is approved in its entirety.

b. Once approved by the Director, the *Restart Plan* will be incorporated by reference into this Order.

c. The *Restart Plan* must provide for adequate patrolling of the *Affected Segment* during the restart process and must include incremental pressure increases during start up, with each increment to be held for at least 2 hours.

d. The *Restart Plan* must include sufficient surveillance of the pipeline during each pressure increment to ensure that no leaks are present when operation of the line resumes.

e. The *Restart Plan* must specify a daylight restart and include advance communications with local emergency response officials and adjacent landowners.

f. The *Restart Plan* must provide for a review of the *Affected Segment* for conditions similar to those of the failure including a review of construction, operating and maintenance (O&M) and integrity management records such as ILI results, hydrostatic tests, root cause failure analysis of prior failures, aerial and ground patrols, corrosion, cathodic protection, excavations and pipe replacements. TC Oil must address any findings that require remedial measures to be implemented prior to restart.

g. The *Restart Plan* must also include documentation of the completion of all mandated actions, and a management of change plan to ensure that all procedural modifications are incorporated into TC Oil's O&M procedures manual.

9. ***Return to Service.*** After the Director approves the *Restart Plan*, TC Oil may resume operation of the *Affected Segment* according to the terms of the *Restart Plan*, but the operating pressure must not exceed the limit in accordance with Item 2 above.

Other Requirements:

10. ***Approvals.*** With respect to each submission under this Order that requires the approval of the Director, the Director may: (a) approve, in whole or part, the submission; (b) approve the submission on specified conditions; (c) modify the submission to cure any deficiencies; (d) disapprove in whole or in part, the submission, directing that Respondent modify the submission, or (e) any combination of the above. In the event of approval, approval upon conditions, or modification by the Director, Respondent shall proceed to take all action required by the submission as approved or modified by the Director. If the Director disapproves all or any portion of the submission, Respondent must correct all deficiencies within the time specified by the Director and resubmit it for approval.

11. ***Extensions of Time.*** The Director may grant an extension of time for compliance with any ofthe terms of this Order upon a written request timely submitted demonstrating good cause for an extension.

12. ***Reporting.*** Submit quarterly reports to the Director that: (1) include all available data and results of the testing and evaluations required by this Order; and (2) describe the progress of the repairs or other remedial actions being undertaken. The first quarterly report is due on March 8, 2023. The Director may change the interval for the submission of these reports.

13. ***Documentation of the Costs.*** It is requested that Respondent maintain documentation of the costs associated with implementation of this CAO. Include in each monthly report submitted, the to-date total costs associated with: (1) preparation and revision of procedures, studies and analyses; (2) physical changes to pipeline infrastructure, including repairs, replacements and other modifications; and (3) environmental remediation, if applicable.

Be advised that all material you submit in response to this enforcement action is subject to being made publicly available. If you believe that any portion of your responsive material qualifies for confidential treatment under 5 U.S.C. § 552(b), along with the complete original document you must provide a second copy of the document with the portions you believe qualify for confidential treatment redacted and an explanation of why you believe the redacted information qualifies for confidential treatment under 5 U.S.C. § 552(b).

In your correspondence on this matter, please refer to "CPF No. 3-2022-074-CAO" and for each document you submit, please provide a copy in electronic format whenever possible. The actions required by this Order are in addition to and do not waive any requirements that apply to Respondent's pipeline system under 49 C.F.R. Parts 190 through 199, under any other order

issued to Respondent under authority of 49 U.S.C. Chapter 601, or under any other provision of federal or state law.

Respondent may appeal any decision of the Director to the Associate Administrator for Pipeline Safety. Decisions of the Associate Administrator shall be final.

Failure to comply with this Order may result in the assessment of civil penalties and in referral tothe Attorney General for appropriate relief in United States District Court pursuant to 49 U.S.C. § 60120.

The terms and conditions of this Order are effective upon service in accordance with 49 C.F.R. § 190.5.

December 8, 2022

_____ _____

Alan K. Mayberry
Associate Administrator
for Pipeline Safety

Date Issued