

## PUBLIC UTILITIES COMMISSION

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February 10, 2017

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GI-2016-10-WGS36-08

SUBJECT: General Order 112 Transmission Integrity Management Program (TIMP) Inspection of Wild Goose Gas Storage

Dear Mr. Fournier:

On behalf of the Safety and Enforcement Division (SED) of the California Public Utilities Commission, Paul Penney and Fred Hanes conducted a General Order 112<sup>1</sup> inspection of the Wild Goose Storage TIMP from October 10-14, 2016. The inspection included a review of the TIMP plan as well as records associated with PHMSA's Form 16.

SED's findings are noted in the Summary of Inspection Findings (Summary), which is enclosed with this letter. The Summary reflects only those records and pipeline facilities that SED reviewed during the inspection.

Within 30 days of your receipt of this letter, please provide a written response indicating the measures taken by WGS to address the violations and concerns/ recommendations noted in the Summary.

If you have any questions, please feel free to contact Paul Penney at 415-703-1817.

Sincerely,

Kenneth Bruno  
Program Manager  
Gas Safety and Reliability Branch  
Safety and Enforcement Division

A handwritten signature in blue ink that reads "Kenneth A. Bruno".

Enclosure: Summary of Inspection Findings

cc: Gary Theberge, NISKA Gas Storage Partners ([Gary.Theberge@niskapartners.com](mailto:Gary.Theberge@niskapartners.com))  
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<sup>1</sup> GO112-E was in effect during the time of the audit. GO112-F became effective on January 1, 2017.

## SUMMARY OF INSPECTION FINDINGS

### A. Probable Violations

1. PHMSA Form 16, Question 10:

*“Validation of ILI Results (Confirm) From Observation of field activities, do employees and vendors validate ILI assessment results per their process? (AR.IL.ILIVALIDATE.O) (confirm) 192.921(a)”*

This question references 49 CFR §192.921(a)(1), which states:

*“Internal inspection tool or tools capable of detecting corrosion, and any other threats to which the covered segment is susceptible. An operator must follow ASME/ANSI B31.8S (incorporated by reference, see §192.7), section 6.2 in selecting the appropriate internal inspection tools for the covered segment.”*

In addition to selecting the appropriate inspection tool identified in the code section above, B31.8S, Section 6.2.6 discusses validation of ILI results:

*“Results of in-line inspection only provide indications of defects, with some characterization of the defect. Screening of this information is required in order to determine the time frame for examination and evaluation. The time frame is discussed in para. 7. (Underline Added)*

*Examination consists of a variety of direct inspection techniques, including visual inspection, inspections using NDE equipment, and taking measurements, in order to characterize the defect in confirmatory excavations where anomalies are detected. Once the defect is characterized, the operator must evaluate the defect in order to determine the appropriate mitigation actions. Mitigation is discussed in para. 7.” (Underline Added)*

49 CFR §192.947(d) discusses record keeping requirements for the elements of IM, including ILI validation. This code section states in part:

*An operator must maintain, for the useful life of the pipeline, records that demonstrate compliance with the requirements of this subpart. At minimum, an operator must maintain the following records for review during an inspection (Underline Added) ...*

*(d) Documents to support any decision, analysis and process developed and used to implement and evaluate each element of the baseline assessment plan and integrity management program. Documents include those developed and used in support of any identification, calculation, amendment, modification, justification, deviation and determination made, and any action taken to implement and evaluate any of the program elements;”*

The results of the two ILI inspections in 2007 and 2014 appear not to have been validated (i.e., direct examinations) and documented by WGS or its contractors at the time of this audit.<sup>2</sup> According to WGS, the first ILI run from 2007 did have a direct examination; staff from GTS Engineering and Consulting (GTS) did a direct examination on a section of the pipe near a pig launcher/ receiver. However, the results of this direct examination (validation) appeared not be known or documented by GTS or WGS staff. It is not known if there were any other direct examinations to validate the 2007 ILI run.

If WGS or GTS staff did validate the 2007 ILI results and has documentation for this validation, please provide the documented results and analysis that the results met specifications of the ILI vendor. In the absence of this documented validation, WGS has violated B31.8S-2004, Section 6.2.6. This code section is incorporated by reference into Part 192, Subpart O. WGS has also violated Part 192.947(d) for not maintaining records of all validation digs.

For the 2014 ILI run, WGS contracted with GTS. As identified in the GTS report<sup>3</sup>, the objective of the work was as follows: *“GTS has been tasked with comparing the data from two In-Line Inspections (ILI), from 2007 and 2014, to assess how the integrity of the pipe has changed and developing recommendations based on the results.”* There were numerous recommendations related to the GTS review, one of which was for WGS to do four direct examinations to validate the results of the 2014 ILI run.

If WGS has validated the 2014 ILI results per the recommendation of GTS, please provide the documented results and identify whether the results met the specifications identified in the GE ILI run report<sup>4</sup>, Appendix G (Inspection System Performance Specification), Table 1 on page 3. If WGS intends to validate the results, please provide a schedule for when this will be done. In the absence of this validation, WGS has violated B31.8S-2004, Section 6.2.6 for the 2014 ILI run.

If the results did not/ do not meet the specifications in Appendix G for detection, sizing and location accuracy, please identify what remedial actions WGS will take to account for this inaccuracy.

NOTE #1:

The ILI vendor (GE) did do “Data Quality Assessments” for the geometry tool run and the MFL tool run as a part of the 2014 ILI. For the geometry tool, GE considered several factors, including: Data Completeness, System Functionality and Data Quality. For the MFL tool run, GE considered the same factors identified for the geometry tool run. These factors assessed the quality of the geometry and MFL tools themselves during the ILI runs, and not the results of those runs. WGS staff provided documentation for these two “Data Quality Assessments.”

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<sup>2</sup> While not incorporated by reference into Part 192, API 1163 (In-Line Inspection System Qualification Standard), Section 8 provides guidance on one approach for ILI validation.

<sup>3</sup> The report is entitled “Wild Goose Report\_Rev3\_10-05-2016.”

<sup>4</sup> The report is entitled “2014 Colusa to Butte 438352\_30A MFC- GE Final Report.”

2. PHMSA Form 16, Question 14:

***“ILI Acceptance Criteria (detail) Do records indicate adequate implementation of the process for ILI survey acceptance? (AR.IL.ILIACCEPCRITERIA.R) (detail) 192.947(g) (192.921(a))”***

WGS does not have a documented process for ILI survey acceptance in its IMP, nor does WGS reference another documented process in its IMP (i.e., an appendix). If WGS has a documented process that is not documented or referenced in its IMP, please provide a copy of that process.<sup>5</sup> Part 192.947(d) requires WGS’s ILI survey acceptance process be documented. In the absence of a documented process, WGS has violated Part 192.947(d).

3. PHMSA Form 16, Question 18:

***“Compliance with ILI Procedures (detail) Are O&M and IMP procedural requirements for the performance of ILI assessments followed? (AR.IL.ILIIMPLEMENT.O) (detail) 192.921(a)(1) (192.620(d))”***

WGS does not have any procedures in its IMP for the performance of ILI assessments. However, WGS does have a general reference in the IMP manual pointing to the O&M plan and Environmental, Health and Safety (EH&S) procedures (see Section 5.3.4, page 20). This is based on the 1-12-2016 revision of the IMP (WGS\_IMP\_Manual\_Aug\_2015\_rev\_2016\_01\_12\_with\_changes\_accepted). Section 5.3.4 states:

*“Reassessments will be conducted in accordance with WGS Operating and Maintenance (O&M) procedures and Environmental, Health, and Safety (EH&S) procedures to ensure precautions will be implemented to protect employees, members of the public, and the environment from safety hazards during reassessments. Additional job specific procedures will be developed as needed and identified via the Management of Change procedures.”*

While not referenced above, 192.911(o) provides guidance for this requirement. The requirement states:

*“...The initial program framework and subsequent program must, at minimum, contain the following elements. (When indicated, refer to ASME/ANSI B31.8S (incorporated by reference, see §192.7) for more detailed information on the listed element.)...*

*(o) Procedures for ensuring that each integrity assessment is being conducted in a manner that minimizes environmental and safety risks.”*

If WGS has specific O&M and EH&S procedures for the performance of ILI inspections, please provide a copy of those procedures. In the absence of a process in the O&M manual and/or EH&S for the performance of ILI assessments/reassessments, WGS must develop and incorporate such procedures in its IMP, O&M manual, EH&S manual and/or some other documented reference. In the absence of a documented process for the performance of ILI surveys, WGS has violated Part 192.911(o) and Part 192.947(d).

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<sup>5</sup> Again, while not incorporated by reference into Part 192, API 1163, Section 8.2.2 (Process Verification or Quality Control) provides guidance for ILI process verification (a.k.a. ILI survey acceptance). See also Section 8, Figure 6 (Inspection Results Verification and Validation Process).

4. PHMSA Form 16, Question 5

**Pressure Test Results (confirm)** Do the test records validate the pressure test?

(AR.PTI.PRESSTESTRESULT.R) (confirm)

192.517(a) (192.505(a); 192.505(b); 192.505(c); 192.505(d); 192.505(e); 192.507(a); 192.507(b); 192.507(c); 192.513(a); 192.513(b); 192.513(c); 192.513(d); 192.517(b); 192.617; 192.619(a); 192.919(e); 192.921(a)(2))

For the sampling of records reviewed, the test records do validate that the pressure tests were conducted per the requirements of Part 192.

The original hydro-test was done in 2003; it was not an “integrity assessment.” WGS did the first ILI assessment in 2007; see the IMP<sup>6</sup>, Section 5.12, page 17. The second ILI assessment was done in 2014.

While reviewing data from WGS’s Master Data Sheet (MDS), we noted a discrepancy between the “System MAOP”, identified as 1050 psig, and the “System MAOP” SED staff calculated as 1022 psig. The calculation was made using Part 192.619(a) referenced above in the protocol question and reproduced here.

49 CFR §192.619(a) states:

*“No person may operate a segment of steel or plastic pipeline at a pressure that exceeds a maximum allowable operating pressure determined under paragraph (c) or (d) of this section, or the lowest of the following:*

*(1) The design pressure of the weakest element in the segment, determined in accordance with subparts C and D of this part...*

*(2) The pressure obtained by dividing the pressure to which the segment was tested after construction as follows...*

*(ii) For steel pipe operated at 100 p.s.i. (689 kPa) gage or more, the test pressure is divided by a factor determined in accordance with the following table...*”

Class location	Factors <sup>1</sup> , segment—		
	Installed before (Nov. 12, 1970)	Installed after (Nov. 11, 1970)	Converted under §192.14
1	1.1	1.1	1.25
2	1.25	1.25	1.25
3	1.4	1.5	1.5
4	1.4	1.5	1.5

The MAOP must be determined by the lowest value between the design pressure for the weakest element in the Class 3 HCA segments and the hydro-test pressure divided by the appropriate scaling factor.

As noted in the MDS, the class 3 location encompasses four segments (68, 69, 70 and 71). Three of these segments have a wall thickness of 0.438 inches and one has a wall thickness of 0.625 inches. Using the design formula in Part 192.105 for the thinnest pipe wall thickness of 0.438 inches, we have the following:

<sup>6</sup> The IMP is entitled “WGS\_IMP\_Manual\_Aug\_2015\_rev\_2016\_01\_12\_with\_changes\_accepted.”

$$P = (2 \text{ St/D}) \times F \times E \times T = (2 \times (70,000 \text{ psi}) \times (0.438 \text{ inch}) / 30 \text{ inch}) \times (0.5) \times (1) \times (1)$$
$$P = 1022 \text{ psi}$$

The design pressure is 1022 psig. The minimum hydro-test pressure was 1848 psig; using the appropriate scaling factor of 1.5 from the table above, the MAOP by hydro-test is 1232 psig. Per the requirements of 192.619(a), the lower of these two must be chosen. Thus, the “System MAOP” should be 1022 psig.

WGS is therefore in violation of 192.619(a).

5. PHMSA Form 16, Question 10

**“Field Inspection - Remedial Actions (IM) (detail) Is anomaly remediation adequate for the covered segments being observed? (AR.RC.REMEDIATION.O) (detail) 192.933(c) (192.933(a); 192.933(d))**

The written remediation schedule is covered in Section 5.5 of WGS’s IMP, and meets the requirements in 192.933. Section 5.5 also references B31.8S-2004, Figure 4 for those conditions not meeting the anomaly definitions covered in 192.933 (i.e. immediate, one-year, or monitored). During the 2014 ILI run, there were no anomalies meeting the requirements of 192.933(d)(1), 192.933(d)(2) or 192.933(d)(3) for immediate, one-year and/or monitored conditions.

There are no violations of the code sections cited above for anomaly remediation. However, WGS did identify a metal loss indication from the 2014 ILI run estimated at 12% of wall thickness in the HCA on Segment #69. In the future, this could potentially result in a violation of the reassessment timelines as described below in Concern #1.

CONCERN #1:

WGS has not validated the results of the ILI run to determine whether the MFL and Geometry tools meet the specifications in the GE ILI run report (entitled “2014 Colusa to Butte 438352\_30A MFC- GE Final Report”), Appendix G (Inspection System Performance Specification), Table 1 on page 3. As a result, the reported metal loss indications may be greater than predicted by the MFL tool and could potentially be outside of the tool specifications contained in Table 1 referenced above.

If the predicted metal loss indication on Segment #69 in the class 3 location is greater than predicted by the MFL tool, this could result in a reassessment schedule being less than once every 7 years. As noted in ASME B31.8S-2004, Section 7.2.1 (Metal Loss Indications for internal and External Corrosion), “*Indications characterized with a predicted failure pressure greater than 1.10 times the MAOP shall be examined and evaluated according to a schedule established by Fig. 4.*” Where metal loss indications are believed to be external corrosion and are greater than 1.10 (Pf/MAOP), but less than 1.5, this could result in a reassessment schedule less than 7 years for pipelines operating between 30% and 50% of SMYS. WGS has a defined “System MAOP” (i.e., System MOP) of 1050 psig<sup>7</sup>. This means

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<sup>7</sup> The 1050 psig value is documented on the spreadsheet “WGS\_IMP\_Mstr Data Set\_2014\_10-05-2016”, which is also referred to as the Master Data Sheet (MDS).

the MAOP is at 36% of the pressure at SMYS<sup>8</sup>. For example, if the deepest metal loss indication had a Pf/MAOP= 1.4 (not far from the Pf/MAOP of 1.531 in the MDS), this would mean a reassessment interval of 5 years instead of seven years (assuming no remediation of the anomaly takes place).

To summarize, WGS must validate the ILI results to confirm the performance specifications of the ILI tool. Without this validation, WGS may inadvertently exceed the required reassessment interval identified in ASME B31.8S-2004, Figure 4.

QUESTIONS #1 and #2:

1. When GE calculated the failure pressure Pf on HCA segment 69 (identified in the MDS as 1608 psig), did GE account for the performance specification in Appendix G to determine the failure pressure as the worst case scenario (i.e. the measured depth, length and width plus the sizing accuracy)?
2. If the answer to question #1 above is no, please provide an updated Pf taking accuracy into account for the 12% wall loss identified in the HCA on segment 69.

RECOMMENDATION #1 and #2:

If WGS has not already done so, SED staff recommends WGS directly examine the 12% external corrosion indication on Segment #69 in the HCA.

For monitored conditions identified in Section 5.5.4 of the IMP, WGS follows the language in in Part 192.933(d)(3). However, WGS does not provide guidance for engineering staff on how critical strain levels are determined. This is used in determining which dents fall within the “monitored” category identified in 192.933(d)(3). Therefore, SED staff recommends that WGS incorporate a reference for a documented engineering process into Section 5.5.4 for determining “critical strain.” For example, B31.8, Appendix R (Estimating Strain in Dents) is one process that could be used.

6. PHMSA Form 16, Question 6

*Assessment Method (High pH SCC) (detail) Do records demonstrate that an assessment was performed using one of the methods specified in B31.8S Appendix A3?  
(AR.SCC.SCCDAMETHOD.R) (detail)  
192.947(g) (192.929(b)(2))*

WGS’s discusses risk assessment for all threats in Section 4 of its IMP (Threats, Data Integration and Risk Assessment). Section 4.1.3 also states that “*A threat will not be eliminated from consideration for a specific segment **unless there is documented justification based on sound engineering practices...**” The risk assessment for High pH SCC discussed in B31.8S-2004, Appendix A3.3 (Criteria and Risk Assessment) uses five screening criteria for determining which segments are potentially subject to SCC. SED staff has two recommendations, which are discussed below.*

There are no violations of the code sections cited above, but the recommendations below will provide guidance on the potential threat of high pH SCC in the future.

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<sup>8</sup> The MAOP was at 36% of SMYS for the Class 3 HCA segment #68; this value for the “%SMYS at MAOP” is in the MDS.

RECOMMENDATIONS #1 and #2:

WGS should note in its TIMP plan that the screening criteria identified in ASME B31.8S-2004, Appendix A3, for the High pH Stress Corrosion Cracking (SCC) threat is not absolute. These criteria do not account for approximately 25-35% of historical SCC failures. As noted in the National Association of Corrosion Engineers (NACE) RP0204-2004 (Stress Corrosion Cracking Direct Assessment Methodology), Section 1.2.1, "...It is recognized that these screening factors will identify a substantial portion of the susceptible locations, but not all of them."

Therefore, while not a violation, SED staff recommends that WGS incorporate language in its TIMP plan that notes the screening criteria in ASME B31.8S, Appendix A3, Section A3.3, are not an absolute guarantee that there will not be High pH SCC in the future. SED staff further recommends that WGS incorporate testing for SCC into all direct examinations (i.e. Magnetic Particle Inspection). This will provide data for any potential SCC that might occur in the future. This data will also inform the threat analysis process, risk assessment and the need for additional assessment techniques to assess for High pH SCC (i.e. as noted in WGS's IMP, Table 6, an ILI tool with crack detection capability or hydro-testing are the two assessment techniques).

7. PHMSA Form 16, Question 18:

***Inspection of Materials (detail)*** Are pipe lengths and other pipeline components visually inspected to ensure they are not damaged? (DC.CO.INSPECTVISUAL.O) (detail)  
192.307

This question references 49 CFR §192.307, which states:

*"Each length of pipe and each other component must be visually inspected at the site of installation to ensure that it has not sustained any visually determinable damage that could impair its serviceability."*

In addition GO112-E, Rule 101.4<sup>9</sup>, which incorporates 49 CFR, Part 192 by reference states: *The utilities shall maintain the necessary records to ensure compliance with these rules and the Federal Pipeline Safety Regulations, 49 CFR, that are applicable. Such records shall be available for inspection at all times by the Commission or Commission Staff. [Underline Added]*

There were no records related to visual examination identified during the audit, but there were technical specifications in the book, Line 400 Pipeline, Volume 1 under the tab "Pipeline Construction." The document was entitled "Pipeline Construction Specifications." In that document was a general requirement under Section 3.1 to follow Part 192. Also, significant care in the specification was spelled out.

If WGS has records verifying visual examinations took place, please provide a sampling of those records. In the absence of these records, WGS has violated GO112-E, Rule 101.4.

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<sup>9</sup> GO112-E was the General Order in effect at the time of WGS's transmission line construction in 2003.



8. PHMSA Form 16, Question 8

***IM High Consequence Areas - Identification Method 1 (Class Locations) (detail)*** Do records demonstrate that application of the 192.903 High Consequence Area definition (1) for the identification of HCAs was adequate? (IM.HC.HCAMETHOD1.R) (detail)  
192.947(d) (192.903 (1)(i); 192.903(1)(ii); 192.903(1)(iii); 192.903(1)(iv))

CONCERN #1:

No violations of the code sections cited above for Method 1 have been identified so far. However, there does appear to be a discrepancy between the extents of the HCA based on two documents provided by WGS. These documents are the “Wild Goose Storage Line 400 MAOP Determination” and the MDS. For the MAOP Determination document, the extent of the Class 3 area is from Station 987+46 to Station 997+60. For the MDS, the extent is from 986+89 to 1057+27. Please explain the apparent discrepancy, and identify the true extent of the HCA based on Method 1 consistent with the engineering stationing format.

9. PHMSA Form 16, Question 12

***Exposed Pipe Coating (detail)*** Is exposed buried pipe coating inspected to determine if it is deteriorating? (TD.COAT.EXPOSEINSPECT.O) (detail)  
192.459

In addition to this code section, 192.13(c) states:

*“Each operator shall maintain, modify as appropriate, and follow the plans, procedures, and programs that it is required to establish under this part.”*

Please provide written procedures for examination of buried pipe when exposed that meets the requirements of 192.459. If buried pipe has been exposed, please provide sample records demonstrating compliance with 192.459. In the absence of a written procedure for examination of exposed buried pipe, WGS has violated 192.13(c).

10. PHMSA Form 16, Question 3

***Abnormal Operating Condition Recognition and Reaction (detail)*** (presented above)  
*Verify the individuals performing covered tasks are cognizant of the AOCs that are applicable to the tasks observed. (TQ.PROT9.AOCRECOG.O) (detail)*  
192.801(a) (192.809(a))

In addition to the above code sections for Subpart N, 192.803 defines a qualified individual as a person who can: (1) Perform assigned covered tasks; and (2) Recognize and react to abnormal operating conditions.

WGS’s AOCs for rectifier inspection include only general guidance. They are not specific to the covered task of rectifier inspection; in addition to the general guidance, the AOCs need to also include AOCs specific to the task of rectifier inspection. OQ enforcement guidance (entitled OQ Enforcement Guidance 12\_7\_2015) under 192.805(b) supports this finding. See Page 15, Item 5. Under probable violations, this item states, *“The written operator qualification program does not identify both generic and task specific AOCs.”*

SED staff believes that in addition to general guidance, specific guidance is needed for WGS staff to facilitate staff's recognition of AOCs. If WGS has specific guidance, please provide a copy of that guidance, and explain how it fits into the Operator Qualification program. In the absence of task specific AOCs, WGS is in violation of 192.805(b), which requires an operator to "*Ensure through evaluation that individuals performing covered tasks are qualified.*" As noted above, 192.803 defines a qualified individual as a person who can... (2) Recognize and react to abnormal operating conditions.

## **B. Other Concerns and Recommendations**

1. The GTS report identifies discrepancies between the MDS length and the 2014 ILI run. The 2014 ILI run identifies 368 feet more than is accounted for in the MDS spreadsheet. It is strongly recommended that these discrepancies be resolved and accounted for in the MDS to ensure the extent of the current and potential future HCAs are properly identified in terms of the specific segments in the HCA, and absolute distance from the designated zero location. This will also help ensure that correlation of data can be accomplished if different ILI vendors are used in the future.
2. The GTS report accounts for five wall thickness changes not accounted for in the MDS when compared to the 2014 ILI run. It is also strongly recommended that these discrepancies be resolved and accounted for in the MDS.