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# CPUC Meeting Materials

Weekly Non-Destructive Examination Program Updates

December 13, 2013

DRAFT For Discussion Purposes Only

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# Discussion Topics

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- PG&E/SE Alignment
  - L-114
  - Extent of Conditions for TCI Inspections
  - NDE Program Enhancements
  - NDE Program Validation Protocols/Extent of Conditions (LLNL)
  
- Completed Activities To Date
  
- Next Steps
  - Schedule
  - Immediate Needs



- L-114 Final Report complete (See “Noncompliant Weld Inspection Techniques, L-114 Non Destructive Examination Final Report, December5, 2013”)
- L-114 Findings:
  - Pipeline currently in service
  - PG&E found NOWeld Integrity issues present on L-114
  - PG&E found on-site vendor performing noncompliant Non-Destructive Examinations

<sup>1</sup>Activity progress/completion is discussed in the Completed Activities To Date section

<sup>2</sup>Dates are contingent on weather, permit, and/or construction schedules



- See presentation dated 12/6/13 for past items
- Re-Inspection site status:
  - WV-06A(L-108/L-401) (12/9/2013)
    - 12 welds “finger-printed” and inspected per API 1104
  - WV-03AB(L-108/DFM-0613-06) (12/11/2013)<sup>2</sup>
    - 2 welds “finger-printed” and inspected per API 1104
  - WV-05D(E-L-108) (12/13/2013)<sup>2</sup>
    - 4 Welds to be removed as part of pipe replacement project
    - Welds will be radiographed in place and sent to ATS for further testing
- Leak Survey details
  - Leak Survey began on 600 miles of identified Gas Transmission pipeline (12/2/2013)
  - To date 360 Miles have been assessed (as of 12/10/13)
    - 1 Leak indication has been found on segment within Los Medanos Station
      - Further validation required as it may just be vent gas (power gas)
    - 2 indications pending further investigation (thought to be non-PG&E)
    - 3 indications determined to be non-PG&E

<sup>1</sup>Activity progress/completion is discussed in the Completed Activities To Date section

<sup>2</sup>Dates are contingent on weather, permit, and/or construction schedules



## NDE Program Enhancements

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- Increased job observation frequency from quarterly to weekly (Q1 2013)
- Expanded job observations outside of new construction (Q1 2013)
  - Station Projects
  - Integrity Management Inspection Projects
- Issuance of Gas Welding Control Manual (TD-4160M) (Q2 2013)
  - Sets minimum Requirements for qualifications, procedures, and materials for NDE
- Development of Gas NDE Control Manual (TD-4190M) (Started Q2 2013)
  - Establishes procedures for all NDE inspections
- Comprehensive review of all NDE Contractor procedures and qualifications (Q2 2013)
- Engagement of 3<sup>rd</sup> Party experts for the review and execution of new contracts with NDE service providers (Q2 2013)
- Integrity Management NDE vendor's procedures were reviewed and personnel proficiency tested for the performance of inspections (Q3 2013)
- Facility and NDE program audits were conducted for existing and prospective NDE service providers (Q3 2013)
- Online OQ Training modules (Veriforce) developed for contractor NDE personnel (Q3 2013)



# NDE Program Validation Protocols

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- Engaged 3<sup>rd</sup> Party experts (LLNL) to develop scope and provide historical understanding (11/21/2013)
- Working to establish contracts with Lawrence Livermore National Labs
  - Working to meet contract requirements, and fee structure requirements
- LLNL will work to provide the following:
  - Validation of statistical approach to TCI Extent of Conditions/Remediation
    - PG&E will work to incorporate LLNL improvements if any
  - Development of Extent of Condition for Post-'61 Transmission Pipe
  - Development of Validation Protocol for Post-'61 Transmission Pipe
    - Inspection methods
    - Girth weld integrity
- Leak Analysis Results
  - Total of 2182 Leaks on the Gas Transmission System (data covers 1939-2013)
  - Total of 47 Girth Weld Leaks on the Gas Transmission System (data covers 1939-2013)
    - Only 7 Girth Weld Leaks on the 600 miles in question (14%). This indicates the welds are generally of higher quality than those that pre-1961 installations
  - 2% of GT Leaks are on the Girth Weld (data covers 1939-2013)

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## Completed Activities to Date

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- See 11/22/13 presentation for items prior to 11/22/13
- Validation of 5 welds on L-132 (11/15/2013)
  - All 5 Welds passed radiographic inspection per API 1104
- Engaged Lawrence Livermore National Labs (LLNL)
  - Developed Scope of Work
  - Initiated contract/agreement
- Excavated/Tested/Passed 19 welds as of 12/12/13:
  - 5 welds on L-132
  - 12 welds at Vernalis Station
  - 2 welds at Redacted
- Completed L-114 Final Report
- Created Maps of pipeline segments to be Leak Surveyed as a result of L-114 Findings
  - Pipeline segments
  - Hydrotested sections
  - ILI Sections
- Began monthly Leak Survey of 600 miles of pipeline

<sup>1</sup>This population contained some 2010 and 2011 welds

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## Follow-Up Questions from 11/22/13

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- SED: How many contractors does PG&E have doing Radiographic Testing?
  - PG&E: PG&E Gas Operations currently has three vendors performing Radiography (WIX, JANX and Edge/ATS). We have also used two additional vendors (Team Industrial and Mistras) on the Whisky Slough project.
- SED: Has PG&E been looking at the ability to have all X-Ray images made electronic?
  - PG&E: Yes. PG&E is evaluating various technologies to allow for the digital imaging and storage of RT examinations.
- SED: As contractors are doing Radiography, how does the film get handed off?
  - PG&E: Film is handed off daily, along with reader sheets to the lead inspector or General Construction Foreman. Film/Reader Sheets are kept on-site until the end of the project.
- SED: How is film stored at the end of each job?
  - PG&E: Film is turned over to our record processing area in Walnut Creek (370 N. Wiget Lane). There it is checked, re-packaged and labeled. It is then shipped to a permanent storage facility located in Brisbane, CA (Bayshore Facility), where it is kept for the life of the asset.
- SED: When you need to look for X-Ray Films, where do you go to get the film?
  - PG&E: Any film needed to be retrieved is requested from the Bayshore Facility as detailed above.





## Follow-Up Questions from 11/22/13 (con't)

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- SED: What are the film requirements for PG&E/Contractors?
- PG&E: Please see below excerpt from the ~~attached~~ PG&E Technical Specification regarding the use of class I film only.
  - “5.2.8 For film radiography, radiographs shall be using ASTM Standard E 1815 Class I film of high contrast and relatively fine grain structure that will produce the results required. Example film may be such as AGFA D4 or D5 film. (Or equivalent)
  - 5.2.10 Class II film equivalent to AGFA D7 shall not be used except upon specific approval by PG&E NDT Level III and only where very long exposure times would be necessary (e.g., for extreme large diameter (>48” dia using DWS method) and extremely heavy wall sections).”



- High Level activities within the next 6 Weeks
  - See 11/22/13 presentation for prior items:
    - Issue L-114 Final Report [12/6/13] Submitted (12/6/2013)
    - Finalize LLNLcontract (12/13/2013)
    - Inspection of first 20 TCI Welds [12/31/13] (5 completed as of 11/15/2013)
    - Inspection of all 43 TCI Welds [3/31/14]
    - LLNLto validate TCI Dig plan and issue recommendations if necessary (43 digs) (1/15/2013)



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# Appendix I

Inspection Summary for WV-6 & WV-3 Welds:

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**Technical Services, Inc.**

P. O. Box 721139, Houston, Texas 77272-1139

Cell: Redacted  
Ph: Redacted

Email: Redacted @ndttechservices.com  
www.ndttechnicalservices.com

**SUMMARY AND ASSESSMENT OF EOC – RE-INSPECTION PERFORMED ON GIRTH WELDS**

In accordance with the approved PG&E Inspection Test Plan (ITP), on December 11, 2013 a re-inspection utilizing radiographic examination with AGFA D5 film was performed on two (2) girth welds on the WV-3 project at Redacted. Once each of the welds were re-radiographed they were “fingerprinted” (weld features compared against original images) to verify that the original radiographic film images of the weld matched the images of the re-inspected girth weld.

The following weld numbers were re-inspected:

<u>Original Weld Id Number</u>	<u>Re-inspection Weld Id Number</u>
W-75	W-75-RI
W-76	W-76-RI

The following were the results of these-inspections:

Weld Number: W-75-RI      Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-76-RI      Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

PG&E had initially identified three (3) welds (Location: WV-3A - Weld #41, & Location: WV-3B – Welds #75 & #76) to be inspected at this location. However, after reviewing the as-built drawing it indicated that Weld #41 to be a weld on 12” OD pipe, yet the original radiographic film and reader sheet for Weld #41 indicated that it had been taken on 8” OD pipe. After further investigation and review, PG&E determined that Weld #41 had actually been found to be located at a different site location. To support this conclusion, Western Industrial X-Ray (WIX) took field measurements of the pipe diameter for Welds #41, #75 and #76 to determine that they were in fact 12” OD, 16” OD, and 16” OD, respectively. The results of the measurements were confirmed and were recorded on the attached WIX inspection

report. A copy of WIX's Radiographic Testing Inspection report indicating the results of their evaluation of welds examined are attached.

This summary completes the evaluation and documentation of the re-inspections performed on the two (2) identified girth welds on the WV-3A & 3B project in Stockton, CA.

Let me know should you require any additional information concerning these reviews and approvals.

Respectfully,

Redacted

President  
ASNT Level III – 2820  
ACCP Professional Level III

DLC/Letter Concerning Results of PGE Reinspection & Findings at WV-3 – Stockton CA 12-11-2013



Western Industrial X-Ray, Inc.  
 P.O. Box 238 Fairfield, CA  
 (707) 425-4673  
 (888) For X-Ray  
 info@wixinc.net  
 www.wixinc.net

Date 12/11/2013 Page 1 Of 1  
 Radiographic Report or Control # RIG-D  
 Customer PGE  
 Address \_\_\_\_\_  
 Customer's P.O. Number 2500927507  
 Job Location STOCTON, CA  
 Job Number 41985295  
 Item Description 16" GIRTH WELDS  
 100% Insp.  Spot Insp. \_\_\_\_\_ Percent \_\_\_\_\_

Nondestructive Inspection Report

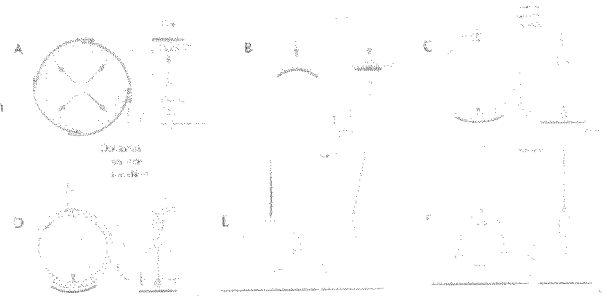
Piece or Joint #s	Weld Number	Film No.	A c c	R e j	Defect Code	Comments	Work Summary	
							Amount	Description
16"X.375	W-75-RI	3	✓				<u>2</u> Travel Hours	<u>3</u> # Persons
							<u>0800</u> In Time	<u>1630</u> Out Time
16"X.375	W-76-RI	3	✓				<u>2.5</u> Work Hours	
							<u>6</u> Standby Hours	
							<u>10.5</u> Total Hours	
LOC-A VERIFIED							<u>NO</u> Per Diem	_____ # Persons
PIPE IS 12.750 O.D.							<u>100</u> Mileage: One Way _____ Round Trip <input checked="" type="checkbox"/>	
LOC-B VERIFIED							<u>2</u> Weld <u>16"</u> in. dia. _____ Weld _____ in. dia.	
PIPE IS 16" O.D.							_____ Weld _____ in. dia. _____ Weld _____ in. dia.	
							_____ Weld _____ in. dia. _____ Weld _____ in. dia.	
							Film _____ x _____ Type _____	
							Film _____ x _____ Type _____	
Technique Date/Procedure Qualification								
Inspection Specification _____							<u>API-1104</u>	
Acceptance Standard _____							<u>20TH</u>	
RT Procedure No. <u>RT-7</u> Shooting Sketch (RSSS) <u>D</u>								
View: <u>DWF</u> <u>SWV</u> Source <u>Ir192</u> Curies <u>67</u>								
Physical Source Size: <u>106X.126</u> Effective Focal Spot: <u>.165</u>								
Pb Screens: Front <u>.005</u> Center <u>N/A</u> Back <u>.005</u>								
Dia. <u>16"</u> Material Type: <u>C/S</u> Thickness: <u>.375</u> Reinf: <u>.125</u>								
SFD: <u>16"</u> Source To Obj: <u>15.625</u> IQI Essential Wire: <u>.013</u>								
Exp. Time: <u>3</u> min. <u>0</u> sec. Dev. Time: <u>5</u> @ <u>68</u> deg.								
Film Manufacturer: <u>Agfa</u> Speed: <u>D-5</u> No. of Exp. <u>3</u> Film <u>3</u>								
Geometric Unsharpness (Ug): <u>.008</u> Avg. Density: <u>2.5</u>								
Dia. _____ Material Type: _____ Thickness: _____ Reinf: _____								
SFD: _____ Source To Obj: _____ IQI Essential Wire: _____								
Exp. Time: _____ min. _____ sec. Dev. Time: _____ @ _____ deg.								
Film Manufacturer: _____ Speed: _____ No. of Exp. _____ Film _____								
Geometric Unsharpness (Ug): _____ Avg. Density: _____								
Dia. _____ Material Type: _____ Thickness: _____ Reinf: _____								
SFD: _____ Source To Obj: _____ IQI Essential Wire: _____								
Exp. Time: _____ min. _____ sec. Dev. Time: _____ @ _____ deg.								
Film Manufacturer: _____ Speed: _____ No. of Exp. _____ Film _____								
Geometric Unsharpness (Ug): _____ Avg. Density: _____								

Defect Code

- BT - Burn Through
- C - Crack
- CV - Root Concavity
- CX - Root Convexity
- DT - Drop Through
- ICP - Inadequate Cross Penetration
- IF - Incomplete Fusion
- IP - Incomplete Penetration
- PD - Inadequate Penetration Due to High-Low
- Ox - Oxidation
- P - Porosity
- SL - Slag Lines
- SI - Slag Inclusions
- UC - Undercut
- TI - Tungsten Inclusion

Redacted

Level III/II  
 Level I



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Redacted

Date 12/11/13

Customer's Signature



**Technical Services, Inc.**  
P. O. Box 721139, Houston, Texas 77272-1139

Cell: Redacted  
Ph:  

Email: [david.culbertson@ndttechservices.com](mailto:david.culbertson@ndttechservices.com)  
[www.ndttechnicalservices.com](http://www.ndttechnicalservices.com)

**SUMMARY AND ASSESSMENT OF EOC – RE-INSPECTION PERFORMED ON GIRTH WELDS**

In accordance with the approved PG&E Inspection Test Plan (ITP), on December 9, 2013 a re-inspection utilizing radiographic examination was performed on twelve (12) girth welds on the WV-6A project in Vernails, CA. Once each of the welds were re-radiographed they were “fingerprinted” (weld features compared against original images to verify that the original radiographic film images of the weld matched the images of the re-inspected girth weld.

The following weld numbers were re-inspected:

<u>Original Weld Id Number</u>	<u>Re-inspection Weld Id Number</u>
W-8	W-8-RI
W-9	W-9-RI
W-10	W-10-RI
W-11	W-11-RI
W-12	W-12-RI
W-13	W-13-RI
W-14	W-14-RI
W-15	W-15-RI
W-17	W-17-RI
W-18	W-18-RI
W-21	W-21-RI
W-22	W-22-RI

The following were the results of these-inspections:

Weld Number: W-8-RI      Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-9-RI      Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-10-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-11-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-12-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-13-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-14-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-15-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-17-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-18-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-21-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

Weld Number: W-22-RI Comments: Weld matched fingerprint and weld was determined to be acceptable to API 1104, 20th edition.

PG&E's Inspection Test Plan (ITP) states that PG&E shall utilize AGFA D7 (or equivalent) Class II film. It was reasoned that the original radiographs by TC Inspection (TCI) were taken with D7 film, and PG&E wanted to ensure the best comparator to the original Class II film images of the welds possible for the re-inspection. The inspection plan (ITP) also states in instance where a closer look at a weld may be deemed necessary to evaluate the weld then a Class I film may be used such as AFGA D4 or



D5 (or equivalent). During the initial inspection at site WV-6A, the first weld examined was performed utilizing both AGFA D7 & D5 and the weld images were compared to the original radiographs taken by TIC. The results of this examination determined that the D5 film greatly enhance the fingerprinting process and provide the best overall film images for evaluation of weld quality. After having a discussion with PG&E Director, Brian Daubin, the decision was made to use the high quality Class I film such as AGFA D5 (or equivalent) moving forward for all remaining welds identified by the re-inspection plan. As a result of this decision, all twelve (12) welds at this site were inspected utilizing AGFA D5 film.

A copy of WIX's Radiographic Testing Inspection report indicating the results of their evaluation of welds examined are attached.

This summary completes the evaluation and documentation of the re-inspections performed on the twelve (12) identified girth welds on the WV-6A project in Vernails, CA.

Let me know should you require any additional information concerning these reviews and approvals.

Respectfully,

Redacted

President  
ASNT Level III – 2820  
ACCP Professional Level III

DLC/Letter Concerning Results of PGE Reinspection & Findings at WV-6A – Vernails CA 12-92013



Western Industrial X-Ray, Inc.  
 P.O. Box 238 Fairfield, CA  
 (707) 425-4673  
 (888) For X-Ray  
 info@wixinc.net  
 www.wixinc.net

Date 12/09/2013 Page 1 Of 1  
 Radiographic Report or Control # RIG-D  
 Customer PGE  
 Address TRACY, CA  
 Customer's P.O. Number \_\_\_\_\_  
 Job Location S. BIRD ROAD TRACY, CA  
 Job Number 41960098  
 Item Description 16" GIRTH WELDS  
 100% Insp.  Spot Insp. \_\_\_\_\_ Percent \_\_\_\_\_

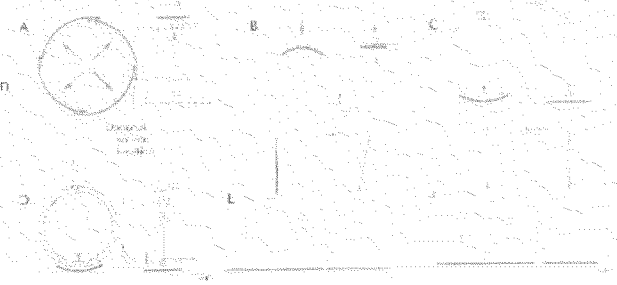
Nondestructive Inspection Report

Piece or Joint #s	Weld Number	Film No.	A c c	R e i	Defect Code	Comments	Work Summary										
							Amount	Description									
16"X.500	W-8-RI	3	✓				4	Travel Hours	2	# Persons							
							0700	In Time	1800	Out Time							
16"X.500	W-9-RI	3	✓				11	Work Hours									
							0	Standby Hours									
16"X.500	W-10-RI	3	✓				15	Total Hours									
							NO	Per Diem		# Persons							
16"X.500	W-11-RI	3	✓				175	Mileage One Way		Round Trip							
							12	Weld 16" in. dia.		Weld _____ in. dia.							
								Weld _____ in. dia.		Weld _____ in. dia.							
16"X.500	W-12-RI	3	✓					Weld _____ in. dia.		Weld _____ in. dia.							
								Film _____ x _____		Type _____							
16"X.500	W-13-RI	3	✓					Film _____ x _____		Type _____							
								Technique Date/Procedure Qualification									
16"X.500	W-14-RI	3	✓					Inspection Specification	API-1104								
								Acceptance Standard	20TH								
16"X.500	W-15-RI	3	✓					RT Procedure No.	RT-7	Shooting Sketch (RSSS)	D						
								View	DWF	SWV	Source	Ir192	Curies	67			
16"X.500	W-17-RI	3	✓			P@11.5" < 12		Physical Source Size	106X.126	Effective Focal Spot	165						
								Pb Screens: Front	005	Center	N/A	Back	005				
16"X.500	W-18-RI	3	✓					Dia.	16"	Material Type	GR-B	Thickness	500	Reinf.	125		
								SFD	16"	Source To Obj.	15.5	IQI Essential Wire	016				
16"X.500	W-21-RI	3	✓					Exp. Time	4	min.	0	sec.	Dev. Time	5	@	68	deg.
								Film Manufacturer	Agfa	Speed	D-5	No. of Exp.	3	Film	3		
								Geometric Unsharpness (Ug)	008	Avg. Density	2.56						
16"X.500	W-22-RI	3	✓					Dia.		Material Type		Thickness		Reinf.			
								SFD		Source To Obj.		IQI Essential Wire					
								Exp. Time		min.		sec.	Dev. Time		@		deg.
								Film Manufacturer		Speed		No. of Exp.		Film			
								Geometric Unsharpness (Ug)		Avg. Density							

Defect Code

- BT - Burn Through
- C - Crack
- CV - Root Concavity
- CX - Root Convexity
- DT - Drop Through
- ICP - Inadequate Cross Penetration
- IF - Incomplete Fusion
- IP - Incomplete Penetration
- PD - Inadequate Penetration Due to High-Low
- Ox - Oxidation
- P - Porosity
- SL - Slag Lines
- SI - Slag Inclusions
- UC - Undercut
- TI - Tungsten Inclusion

1. Redacted  
 Level \_\_\_\_\_  
 2. Redacted  
 Level \_\_\_\_\_



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Date 12/9/13