

## QUALITY VALIDATION (QV) REPORT

### Red Hill Bulk Fuel Storage Facility Defuel

Validation Firm	HDR Environmental, Operations and Construction, Inc.	Repair No.	3
Address	9781 S. Meridian Blvd., Suite 400, Englewood, CO 80112	Repair ID	SGH.08
Contract No.	FA890315D0007, D.O. FA8903-19-F-0027	Report Date	09 FEB 2023
QV Engineer	(b) (6)	Phone	(b) (6)
		Email	(b) (6)

### VALIDATION

Source	PDF Page No.	Facility Geographic Area	Location Reference
SGH	337	Tank Gallery & UGPH	Various
Repair Description	Consult manufacturer on reverse pressure capability (vacuum) of Dresser Couplings installed around pumps in UGPH and tank gallery. Consider modifying the design if the manufacturer has an alternate sealing system and Dresser Couplings remain part of the design.		Source Contract Reference N62478-20-D-5036 Amendment No. 18
Description of Contractor QC Method(s) Used	Engineering report standard of care.		Contractor QC Records Reviewed N/A
Description of QA Validation and Observations	Reviewed and accepted by JTF-RH.  Final acceptance by government. Date: 09 FEB 2023		
Rework Needed		Photo Record Attached	Repair Work Validated as Complete
<input type="radio"/>	Yes	<input checked="" type="radio"/>	No
		N/A	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Comments**

SGH correspondence dated 27 OCT 22 determined manufacturer dresser report provides historic evidence on dresser coupling reverse pressure capability and no additional repairs were identified. No work was performed.

Reference: SGH email correspondence

### CERTIFICATION

I hereby certify that repair work validated in this report was personally substantiated and this report is true.	<b>QV ENGINEER SIGNATURE</b> (b) (6)	
	<b>DATE</b>	09 FEB 2023 / REVISED 14 MAR 2023

**From:**  
**To:**  
**Cc:**

(b) (6)

**Subject:** [URL Verdict: Neutral][Non-DoD Source] SGH Response to Dresser Coupling Capacity Under Vacuum Conditions  
**Date:** Thursday, October 27, 2022 8:54:37 AM  
**Attachments:** [TRC2613- St. 38.tif](#)

---

(b) (6)

As requested, we are providing this email to consolidate our assessment of the Dresser couplings' capacity to resist vacuum loads.

The process hazard assessment (PHA), as part of our April 2022 independent assessment, recommended evaluating the Dresser couplings' capacity to withstand vacuum conditions as a result of leak-by at the butterfly valves in the pumphouse. In our report, we then evaluated historic test data and performed an independent analysis to address the PHA recommendation.

As noted in our April report, we reviewed Test Report No. C2613 provided by Dresser Utility Solutions (shown in Section 2.2.2 of our report and attached to this email for reference). The Dresser report provides empirical evidence of the Dresser couplings' ability to maintain a seal under partial vacuum conditions. Although the vacuum pressure in the test report was 20-in of mercury which corresponds to 9.82 psia (i.e., 67% of atmospheric pressure rather than 100% of atmospheric pressure), Dresser's test demonstrated sufficient capacity under these conditions so long as the Dresser couplings' seals are properly maintained. We discuss these test results and our further analysis in Section 7.3.11.3 of our report. We independently performed a calculation demonstrating the adequacy of the piping portion of the coupling under vacuum conditions and determined the pipe sizes that are provided have sufficient capacity. Based on the test report from Dresser and the check we performed for the piping, we believe potential vacuum pressures in the system do not pose a significant risk to the sealing system for these types of Dresser couplings.

We consider this PHA recommendation addressed and closed.

Best regards,

Paul

(b) (6)

(b) (6)

(b) (6)

**SIMPSON GUMPERTZ & HEGER**

[sgh.com](http://sgh.com)

[Send Files](#)

## QUALITY VALIDATION (QV) REPORT

### Red Hill Bulk Fuel Storage Facility Defuel

Validation Firm	HDR Environmental, Operations and Construction, Inc.	Repair No.	4
Address	9781 S. Meridian Blvd., Suite 400, Englewood, CO 80112	Repair ID	SGH.14
Contract No.	FA890315D0007, D.O. FA8903-19-F-0027	Report Date	21 FEB 2023
QV Engineer	(b) (6)	Phone	(b) (6)
		Email	(b) (6)

### VALIDATION

Source	PDF Page No.	Facility Geographic Area	Location Reference
SGH	320	Red Hill tanks to Hotel Pier	Various
Repair Description	Evaluate the current ratings of all piping and hoses between RHL and piers to identify areas of concern due to deadhead pumps and static pressure when transferring or defueling RHL.		Source Contract Reference Contract: N3943020D2242 Task Order: N3943022F4333
Description of Contractor QC Method(s) Used	Engineering report standard of care.		Contractor QC Records Reviewed N/A
Description of QA Validation and Observations	NAVFAC EXWC Subject Matter Experts review and concurrence.  Final acceptance by government. Date: 07 NOV 2022		
Rework Needed		Photo Record Attached	Repair Work Validated as Complete
<input type="radio"/>	Yes	<input checked="" type="radio"/>	No
		N/A	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Comments**

The F-24, JP-5 root cause analysis identified no additional repairs and focused primarily on operational orders and sequencing. The UGPH assessment identified twenty-four (24) mandatory repairs which were added to the consolidated repair list. No work was performed.

Reference: Root cause analyses previously provided.  
REV: Dates corrected 28 FEB 2023.

### CERTIFICATION

I hereby certify that repair work validated in this report was personally substantiated and this report is true.	<b>QV ENGINEER SIGNATURE</b>	(b) (6)
	<b>DATE</b>	21 FEB 2023 / REVISED 14 MAR 2023

## QUALITY VALIDATION (QV) REPORT

### Red Hill Bulk Fuel Storage Facility Defuel

Validation Firm	HDR Environmental, Operations and Construction, Inc.	Repair No.	7
Address	9781 S. Meridian Blvd., Suite 400, Englewood, CO 80112	Repair ID	SGH.31
Contract No.	FA890315D0007, D.O. FA8903-19-F-0027	Report Date	08 FEB 2023
QV Engineer	(b) (6)	Phone	(b) (6)
		Email	(b) (6)

### VALIDATION

Source	PDF Page No.	Facility Geographic Area	Location Reference
SGH	319	Tank Gallery	Various
Repair Description	Evaluate underlying cause(s) of line sag creating vacuum and modify as warranted.  Codes & Criteria: ASME B31.3		Source Contract Reference Contract: N3943020D2242 Task: N3943021F4122
Description of Contractor QC Method(s) Used	Engineering report standard of care.		Contractor QC Records Reviewed N/A
Description of QA Validation and Observations	NAVFAC EXWC Subject Matter Experts review and concurrence.  Final acceptance by government. Date: 07 SEP 2021 (JP-5); 07 NOV 2022 (F-24)		
Rework Needed		Photo Record Attached	Repair Work Validated as Complete
<input type="radio"/>	Yes	<input checked="" type="radio"/>	No
		N/A	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Comments**

The F-24, JP-5 root cause analysis identified no additional repairs and focused primarily on operational orders and sequencing. No work was performed.

Reference: Rout cause analyses previously provided.  
REV: F-24 issue date corrected, 28 FEB 2023.

### CERTIFICATION

I hereby certify that repair work validated in this report was personally substantiated and this report is true.	<b>QV ENGINEER SIGNATURE</b>	(b) (6)
	<b>DATE</b>	21 FEB 2023 / REVISED 14 MAR 2023

## QUALITY VALIDATION (QV) REPORT

### Red Hill Bulk Fuel Storage Facility Defuel

Validation Firm	HDR Environmental, Operations and Construction, Inc.	Repair No.	12
Address	9781 S. Meridian Blvd., Suite 400, Englewood, CO 80112	Repair ID	SGH.LAT.32
Contract No.	FA890315D0007, D.O. FA8903-19-F-0027	Report Date	10 FEB 2023
QV Engineer	(b) (6)	Phone	(b) (6)
		Email	(b) (6)

### VALIDATION

Source	PDF Page No.	Facility Geographic Area	Location Reference
SGH	389	Tank Gallery	PS 27
Repair Description	Provide protection (metal cage) around the valve on the F24 mainline (b) (6) to avoid unintentional damage.		Source Contract Reference Work Order: H4LX9L - REDHIL-S21 - VALVE PROTECTION
Description of Contractor QC Method(s) Used	Visual examination.		Contractor QC Records Reviewed Project completion Memorandum for Record
Description of QA Validation and Observations	Visual examination by SGH 21 NOV 2022.  Final acceptance by government. Date: 10 FEB 2023		
Rework Needed		Photo Record Attached	Repair Work Validated as Complete
<input type="radio"/>	Yes	<input checked="" type="radio"/>	No
		See Page 2.	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Comments**

The Public Works Department provided a F-24 valve protection cage.

Reference: Field verified on 08 FEB 23.

### CERTIFICATION

I hereby certify that repair work validated in this report was personally substantiated and this report is true.	<b>QV ENGINEER SIGNATURE</b> (b) (6)
	<b>DATE</b> 10 FEB 2023 / REVISED 14 MAR 2023

**QUALITY ASSURANCE VALIDATION REPORT**

**Red Hill Bulk Fuel Storage Facility Defuel**



Before Repair



Completed Repair

## QUALITY VALIDATION (QV) REPORT

### Red Hill Bulk Fuel Storage Facility Defuel

Validation Firm	HDR Environmental, Operations and Construction, Inc.	Repair No.	78
Address	9781 S. Meridian Blvd., Suite 400, Englewood, CO 80112	Repair ID	PSC.44A
Contract No.	FA890315D0007, D.O. FA8903-19-F-0027	Report Date	07 FEB 2023
QV Engineer	(b) (6)	Phone	(b) (6)
		Email	(b) (6)

### VALIDATION

Source	PDF Page No.	Facility Geographic Area	Location Reference
NDAAs	65	Harbor Tunnel	Anchor Bulkhead between (b) (3) (A)
Repair Description	Concrete has been chipped out and removed on tank side around flange for the F-24 and JP-5 lines; concrete around F-24 line has broken out (but not fallen) on opposite side. Repair concrete.		Source Contract Reference N62478-20-D-5036 Amendment No. 18
Description of Contractor QC Method(s) Used	N/A - no work performed.		Contractor QC Records Reviewed N/A
Description of QA Validation and Observations	JTF-RH reviewed and approved SGH Memo 003.  Final acceptance by government. Date: 30 NOV 2022		
Rework Needed		Photo Record Attached	Repair Work Validated as Complete
<input type="radio"/>	Yes	<input checked="" type="radio"/>	No
		See Page 2.	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Comments**

SGH Memo 003 dated 30 NOV 22 determined the concrete repair is not necessary. No work was performed.

Reference: SGH Memo 003 dated 30 NOV 22.

### CERTIFICATION

I hereby certify that repair work validated in this report was personally substantiated and this report is true.	<b>QV ENGINEER SIGNATURE</b>	(b) (6)
	<b>DATE</b>	07 FEB 2023 / REVISED 14 MAR 2023

QUALITY ASSURANCE VALIDATION REPORT

Red Hill Bulk Fuel Storage Facility Defuel

(b) (3) (A)

NDAAs Deficiency Item PSC.44A

## QUALITY VALIDATION (QV) REPORT

### Red Hill Bulk Fuel Storage Facility Defuel

Validation Firm	HDR Environmental, Operations and Construction, Inc.	Repair No.	79
Address	9781 S. Meridian Blvd., Suite 400, Englewood, CO 80112	Repair ID	PSC.71A
Contract No.	FA890315D0007, D.O. FA8903-19-F-0027	Report Date	07 FEB 2023
QV Engineer	(b) (6)	Phone	(b) (6)
		Email	(b) (6)

### VALIDATION

Source	PDF Page No.	Facility Geographic Area	Location Reference
NDAAs	65	Harbor Tunnel	Anchor Bulkhead between (b) (3) (A)
Repair Description	Concrete has been chipped out and removed on tank side around flange for the F-24 and JP-5 lines; concrete around F-24 line has broken out (but not fallen) on opposite side. Repair concrete.		Source Contract Reference N62478-20-D-5036 Amendment No. 18
Description of Contractor QC Method(s) Used	N/A - no work provided.		Contractor QC Records Reviewed N/A
Description of QA Validation and Observations	JTF-RH reviewed and approved SGH Memo 003.  Final acceptance by government. Date: 30 NOV 2022		
Rework Needed		Photo Record Attached	Repair Work Validated as Complete
<input type="radio"/>	Yes	<input checked="" type="radio"/>	No
		See Page 2.	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Comments**

SGH Memo 003 dated 30 NOV 22 determined the concrete repair is not necessary. No work was performed.

Reference: SGH Memo 003 dated 20 NOV 22.

### CERTIFICATION

I hereby certify that repair work validated in this report was personally substantiated and this report is true.	<b>QV ENGINEER SIGNATURE</b>	(b) (6)
	<b>DATE</b>	07 FEB 2023 / REVISED 14 MAR 2023

QUALITY ASSURANCE VALIDATION REPORT

Red Hill Bulk Fuel Storage Facility Defuel

(b) (3) (A)

NDAAs Deficiency Item PSC.71A



# Memorandum

Date: 30 November 2022

To: (b) (6) (US Navy, NAVFAC, Joint Task Force, Red Hill)

From: (b) (6)

CC: (b) (6)

Project: 221162 – Red Hill Defueling Support, Joint Base Pearl Harbor-Hickam, Honolulu, HI

Subject: Recommended Repairs at Two Concrete Pipe Anchor Bulkheads Prior to Defueling (NDAA Deficiency Item Nos. PSC.44A and PSC.71A)

## 1. PURPOSE

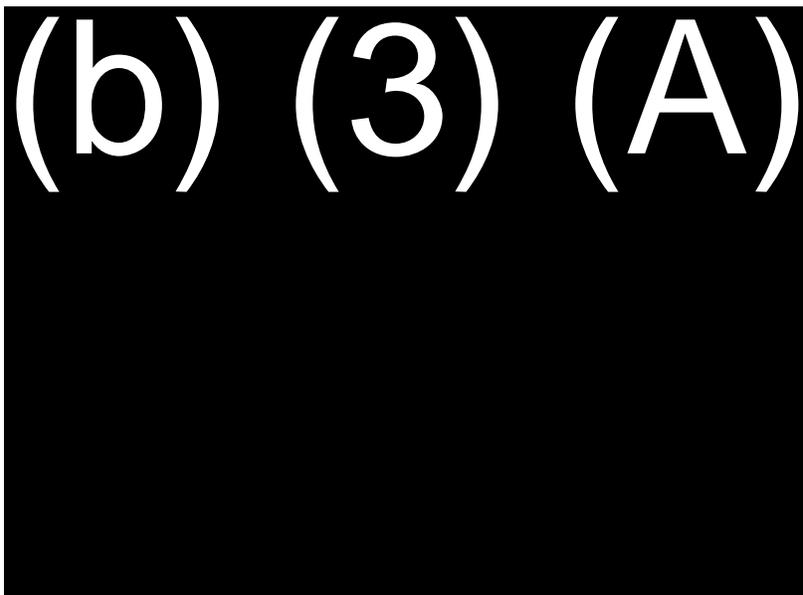
The purpose of this memorandum is to provide Simpson Gumpertz & Heger Inc.'s (SGH) opinion regarding the recommended repairs at two concrete pipe anchor bulkheads prior to defueling as listed in "FY22 National Defense Authorization Act (NDAA) Section 318 Fuel Transfer System Inspection Report". These two Items (NDAA Deficiency Item Nos. PSC.44A and PSC.71A) are listed on Page 60 of the NDAA Section 318 Report and are repeated for convenience in Figure 1 of this memorandum. NDAA's recommended repairs, as shown in Figure 1, were to remove and replace concrete at the anchor bulkheads.

Table 11 - F-76 Pipe Support Findings and Recommendations							
Item No.	Appendix C - API 570 Report – Cross Reference Deficiency (InterSpec, LLC)	SGH Report Cross Reference	Geographic Area	Location	Description	Urgency	Recommended Repairs
PSC.44A			(b) (3) (A)		Concrete has been chipped out and removed on tank side around (b) (3) (A) broken out (but not taller) on opposite side.	Urgent	Remove and replace concrete at anchor bulkhead.
PSC.71A			(b) (3) (A)		Concrete at (b) (3) (A) has been broken out on tanks side, no flange visible.	Urgent	Remove and replace concrete at anchor bulkhead.

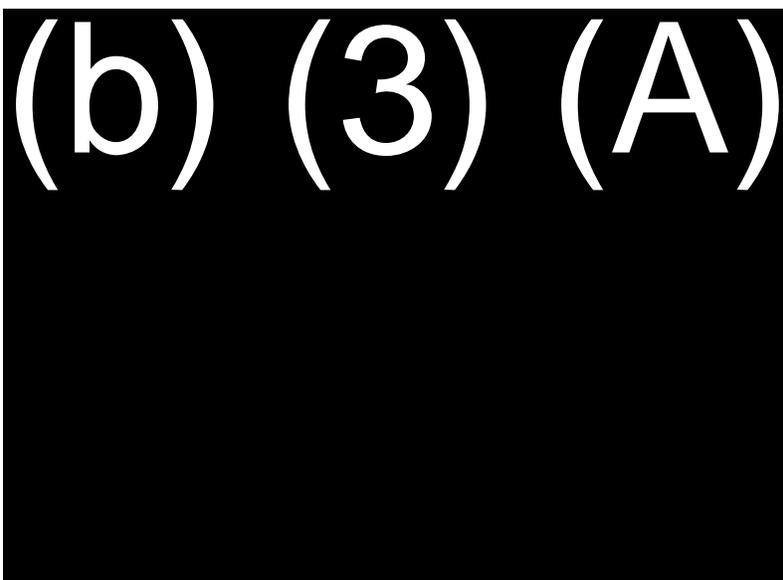
Figure 1 – NDAA Deficiency Item Nos. PSC.44A and PSC.71A

**2. PRESENT CONDITION OF NDAA ITEM NOS. PSC.44A AND PSC.71A**

The damaged concrete is shown in the photos of NDAA Item Nos. PSC.44A and PSC.71A, see Figure 2 and Figure 3, respectively.



**Figure 2 –NDAA Deficiency Item PSC.44A (located next to Pipe Support [PS] 144)**



**Figure 3 –NDAA Deficiency Item PSC.71A (located next to PS 171)**

The diameters of both the F-24 and JP-5 pipes are reduced at PSC.44A (Figure 2), likely due to previous repairs. The reduced pipe sections are likely sleeved through the (b) (3) (A)

(b) (3) (A)

In contrast, it appears that the anchorage at the location of PSC.71A remains largely intact for

(b) (3) (A)

### 3. ASSESSMENT OF CONCRETE PIPE ANCHORS

#### 3.1 Original Design of Concrete Pipe Anchors

The main design purpose of the (b) (3) (A)

. Figures 4 and 5 show typical concrete pipe anchor details, excerpted from the original design documents, Drawing No. 294161, "Harbor and Lower Access Tunnel – Typical Sections, Pipe Supports, and Anchors."

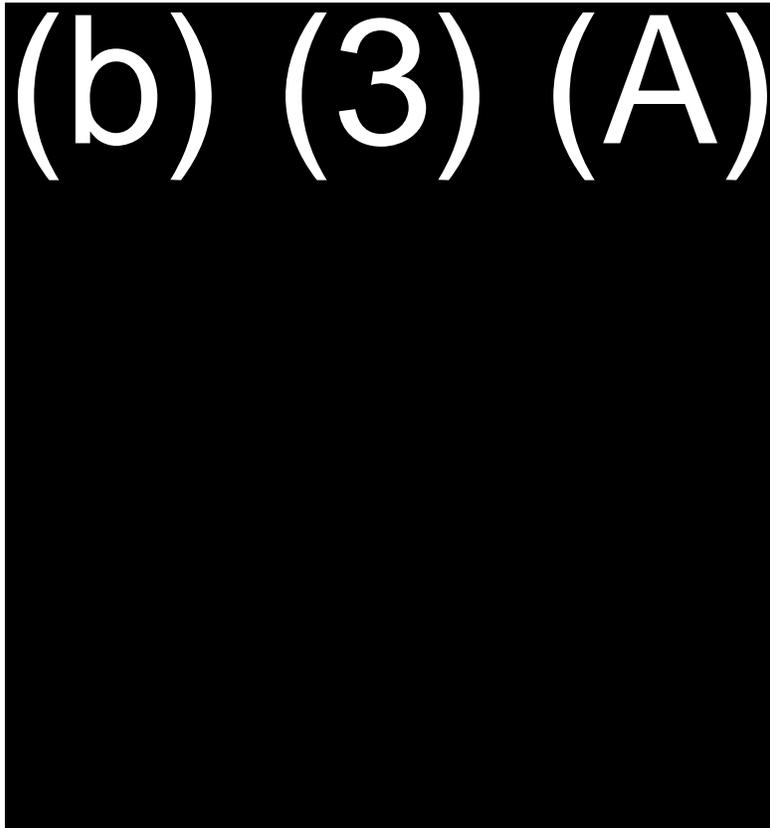


Figure 4 – Typical Section through Pipe Anchor and Horizontal Design Forces on Anchor  
(excerpted from Drawing No. 294161)

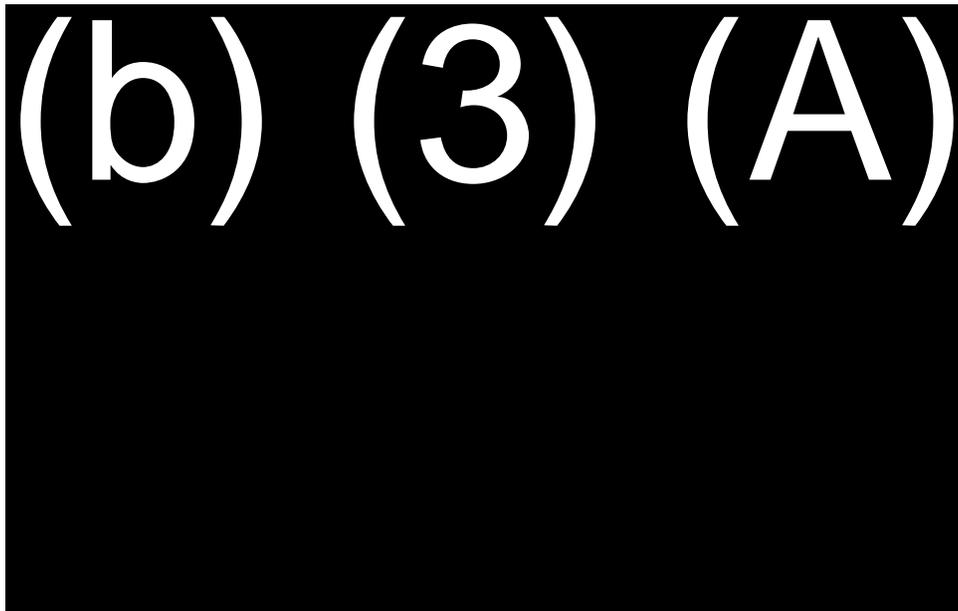
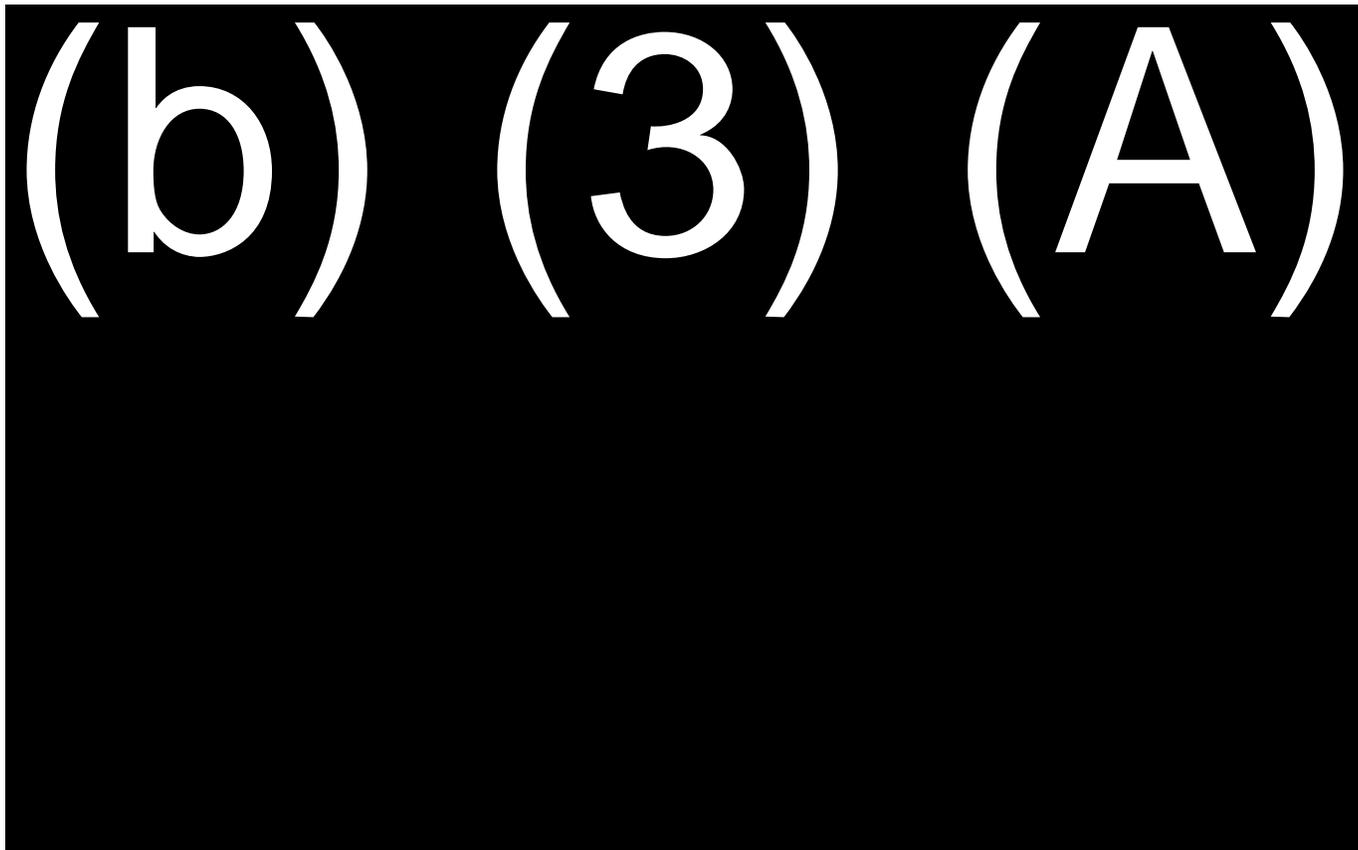


Figure 5 – Typical Plan View Section Cut of Concrete Pipe Anchor  
(excerpted from Drawing No. 294161)



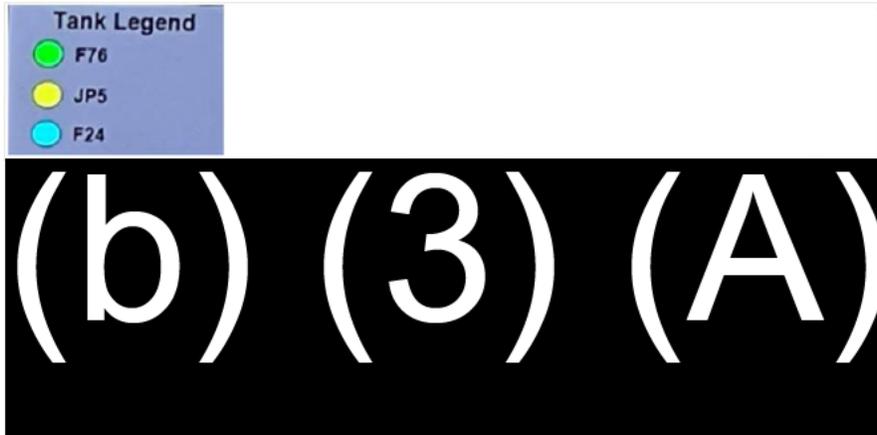
The original design temperature differentials (that result in the horizontal design axial forces above) for the pipelines were not available. However, based on the horizontal design anchor forces shown above, we estimated that the minimum temperature differential considered in the original design was 20°F.

Note that the lack of axial connection between the pipelines and the concrete block due to the likely presence of sleeves at PSC.44A converts these anchor supports to sliding supports (guides) which provide vertical and lateral (transverse) support but allow movement of the pipelines in the longitudinal (axial) direction.

### 3.2 Temperature Gradient

#### 3.2.1 Fuel Temperature in the Underground Storage Tanks

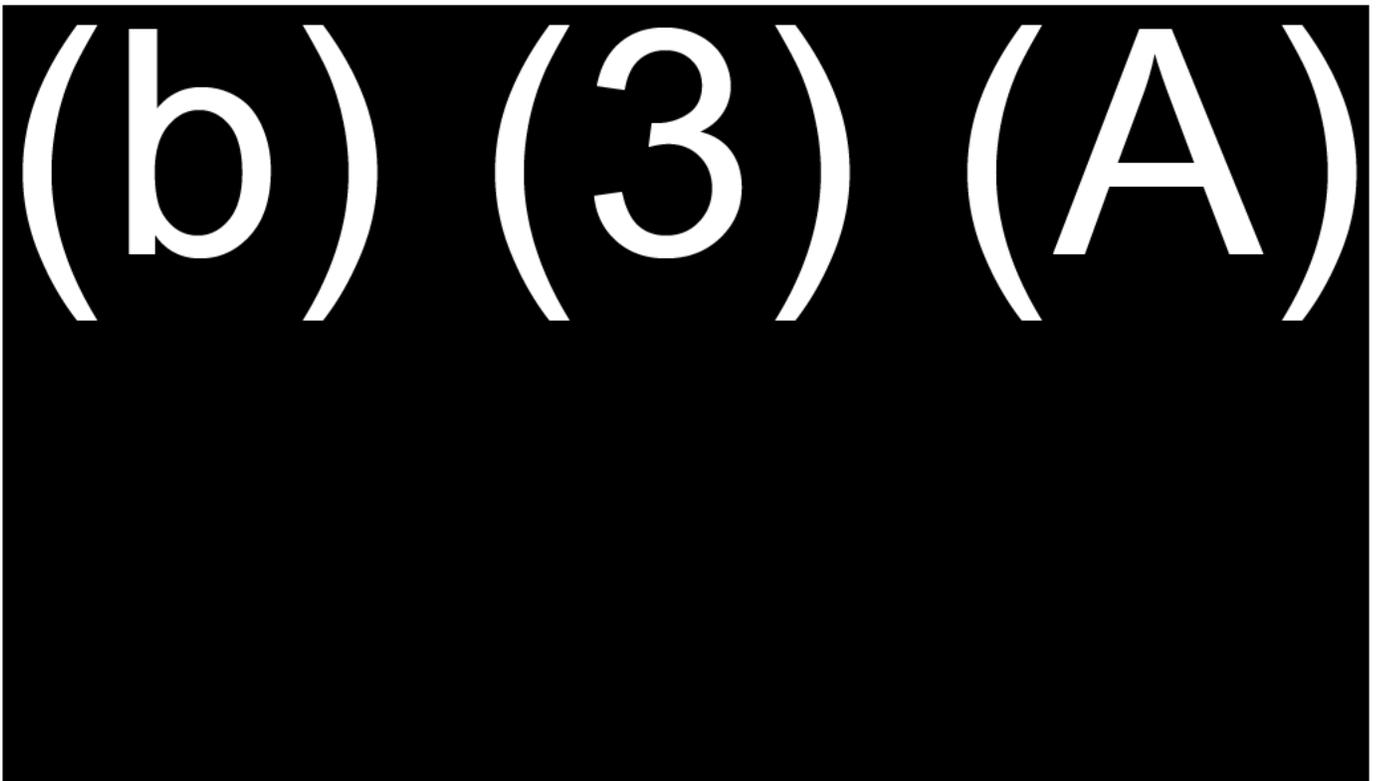
Figure 6 shows the underground storage tanks and fuel types stored in the tanks. Six tanks (b) (3) (A). The present fuel temperature in the tanks filled with fuel ranges from 76°F to 82°F. See Appendix A for the fuel temperature details in each tank storing fuel. Note that the photos in Appendix A were taken on 17 November 2022.



### 3.2.2 Maximum Temperature Difference in the Pipelines during Defueling Process

We assume that the current ambient temperature in both the lower access tunnel and the harbor tunnel (where the fuel pipelines are located) is 72°F at a minimum, and it will remain so during the defueling process. Given the maximum fuel temperature in any of the Red Hill tanks is 82°F per the data in Appendix A, the maximum temperature differential during the defueling process in both the (b) (3) (A) will be approximately 10°F at most.

### 3.3 Pipeline Response with Sliding Support at PSC.44A



Without any longitudinal restraint at PSC.44A, the (b) (3) (A) [redacted] will need to accommodate any thermal expansion. The existing embedded angle rings at PSC.71A are adequate to resist the temperature differential of 10°F even if there is some damaged concrete since the minimum temperature differential considered in the original design was 20°F.

With an approximate pipe length of (b) (3) (A) [redacted] and with a maximum temperature differential of 10°F during the defueling process, the maximum thermal expansion can be estimated (b) (3) (A) [redacted]

(b) (3) (A) [redacted]

(b) (3) (A)

(b) (3) (A)

#### 4. CONCLUSIONS

The sections of the (b) (3) (A) are reduced at PSC.44A, likely due to previous repairs. The reduced pipe sections are likely sleeved through th (b) (3) (A)

. Replacing the chipped concrete at this location will likely not be sufficient to reinstate the original design anchorage forces for the (b) (3) (A) unless the reduced sections are also anchored into the concrete.

It appears that the anchorage at the location of PSC.71A remains intact (b) (3) (A). The existing embedded angle rings at PSC.71A are adequate to resist the temperature differential of 10°F even if there is some damaged concrete since the minimum temperature differential considered in the original design was 20°F.

The present fuel temperature in the tanks filled with fuel ranges from 76°F to 82°F. We assume that the ambient temperature in the lower access tunnel and the harbor tunnel (where the fuel pipelines are located) will not be less than 72°F during the defueling process. Given the maximum fuel temperature of 82°F, the maximum temperature differential in (b) (3) (A) will be no more than 10°F during the defueling process.

(b) (3) (A)

(b) (5)

(b) (5), (b) (3) (A)

# APPENDIX A

(b) (3) (A)

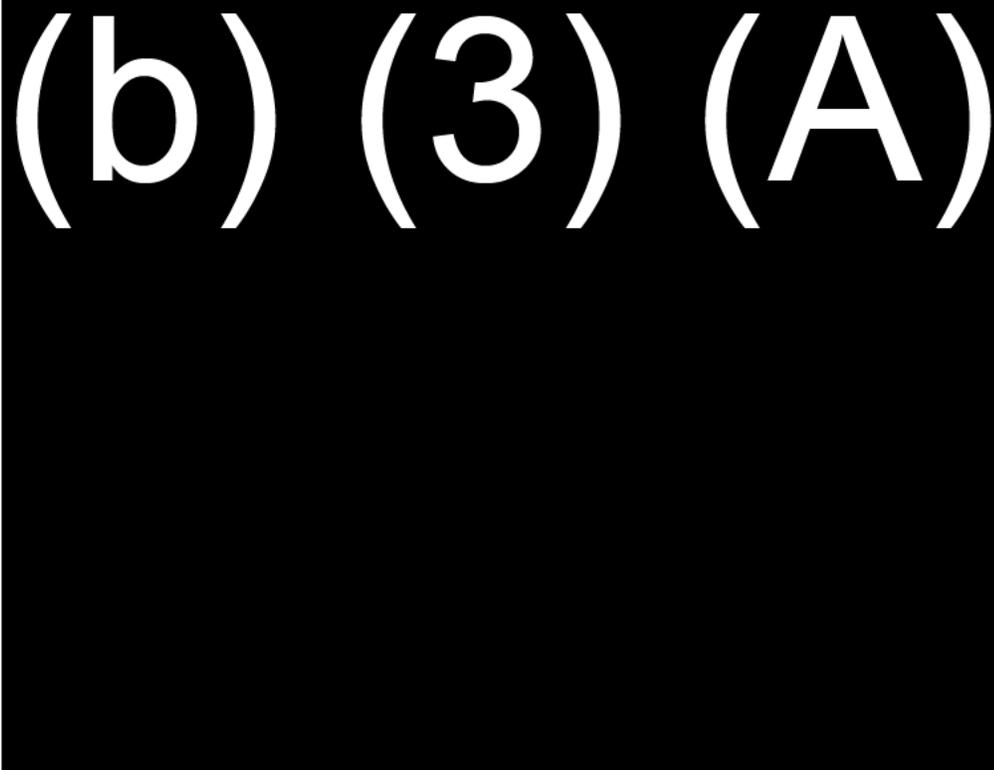
**Photo 1**

Tank (b) (3) (A) (fuel temperature ranges from 79.15°F to 81.44°F).

(b) (3) (A)

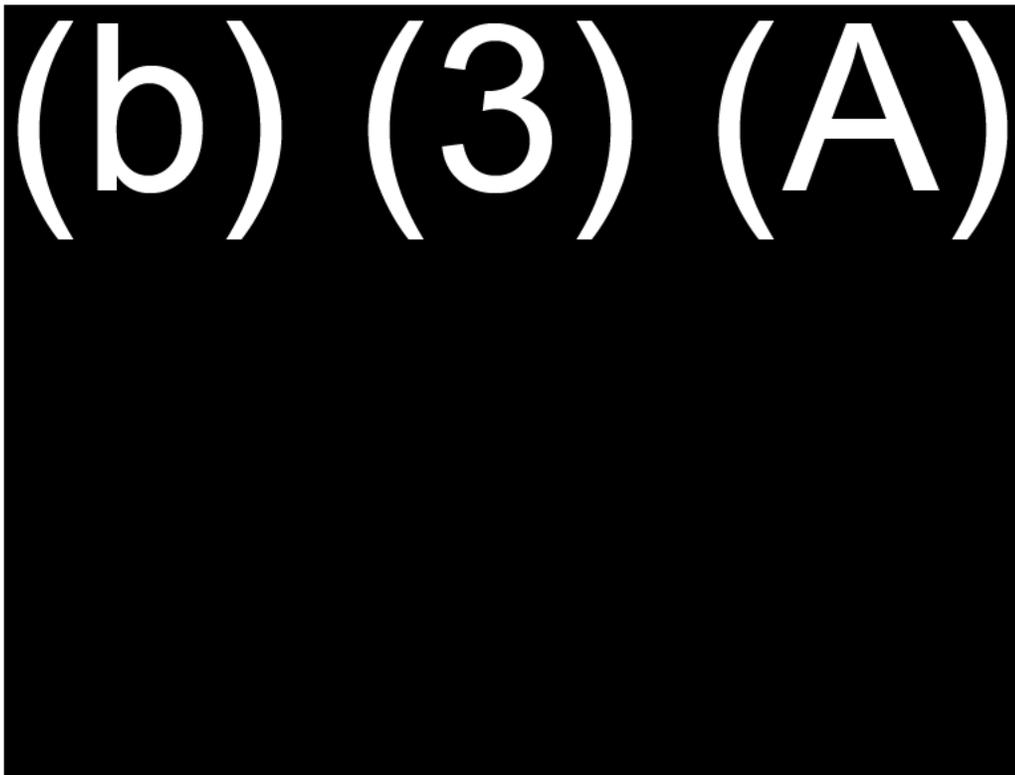
**Photo 2**

Tank (b) (3) (A) (fuel temperature ranges from 80.49°F to 81.44°F).



**Photo 3**

Tank (b) (3) (A) (fuel temperature ranges from 79.55°F to 80.46°F).



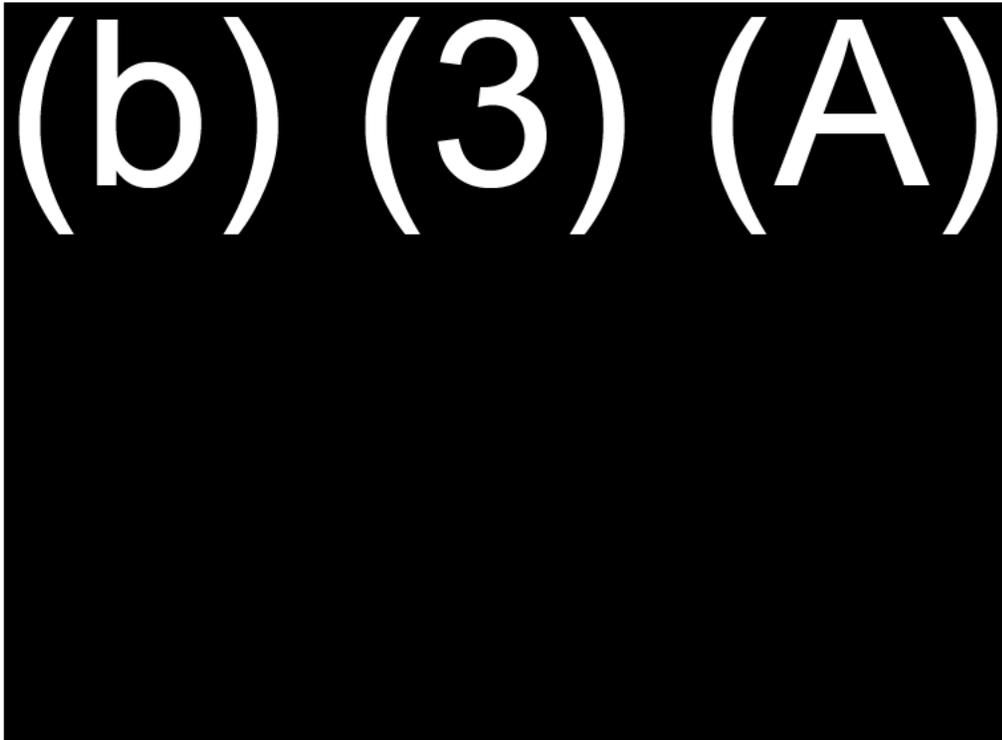
**Photo 4**

Tank (b) (3) (A) (fuel temperature ranges from 81.66°F to 82.13°F).



**Photo 5**

Tank (b) (3) (A) (fuel temperature ranges from 80.72°F to 81.37°F).



**Photo 6**

Tank (b) (3) (A) (fuel temperature ranges from 78.56°F to 79.07°F).

(b) (3) (A)

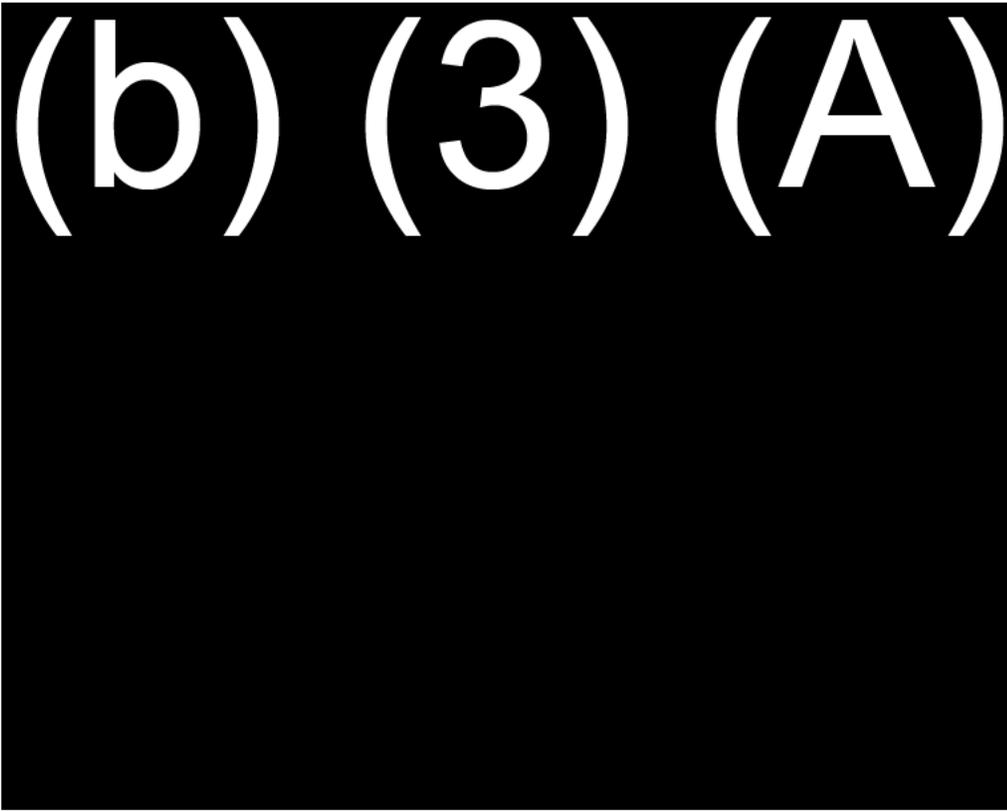
**Photo 7**

Tank (b) (3) (A) (fuel temperature ranges from 76.63°F to 78.07°F).

(b) (3) (A)

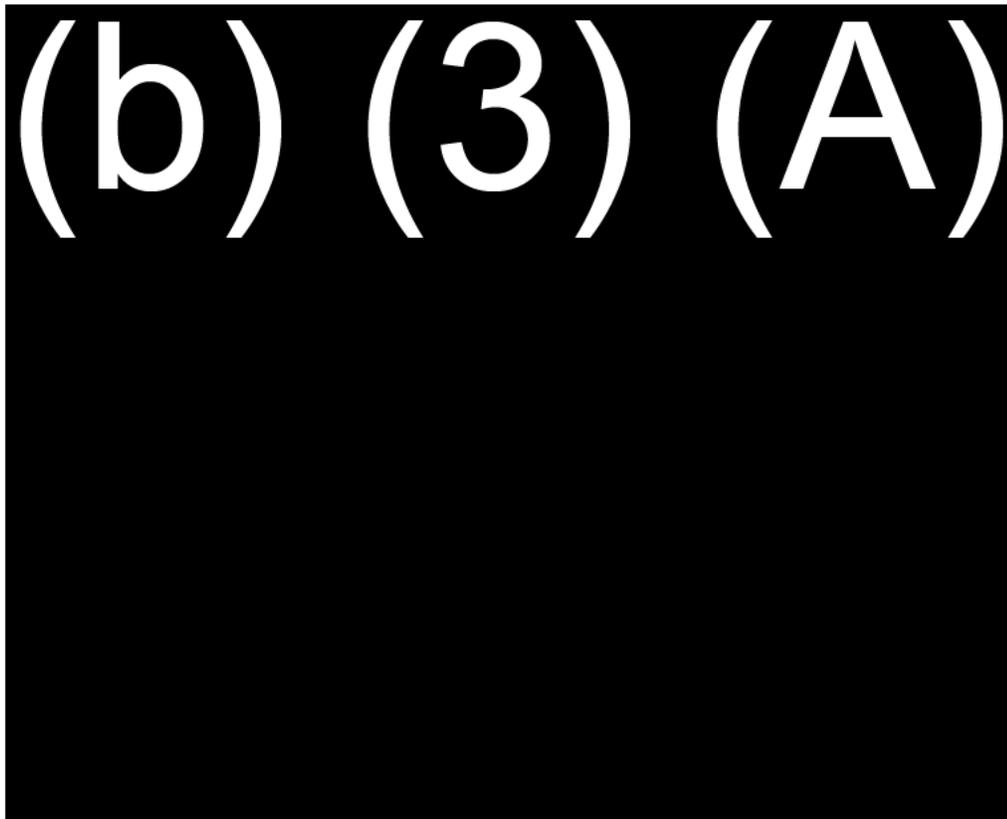
**Photo 8**

Tank (b) (3) (A) (fuel temperature ranges from 77.89°F to 78.70°F).



**Photo 9**

Tank (b) (3) (A) (fuel temperature ranges from 77.44°F to 78.96°F).



**Photo 10**

Tank (b) (3) (A) (fuel temperature ranges from 78.54°F to 79.27°F).

(b) (3) (A)

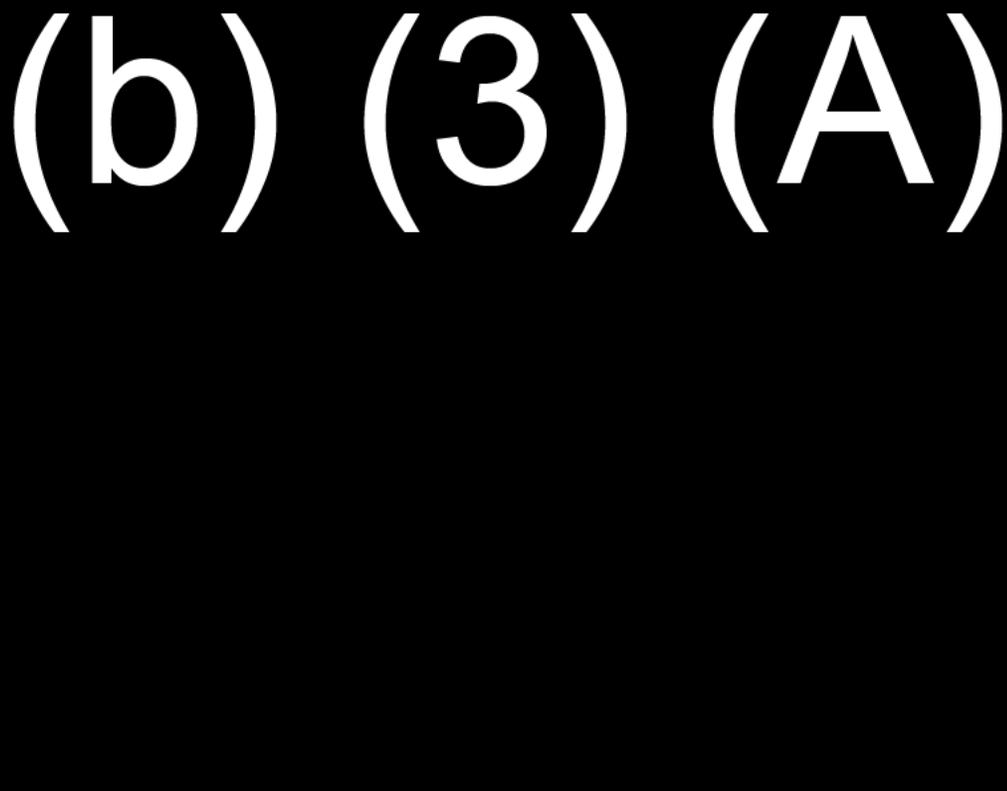
**Photo 11**

Tank (b) (3) (A) (fuel temperature ranges from 79.41°F to 80.49°F).

(b) (3) (A)

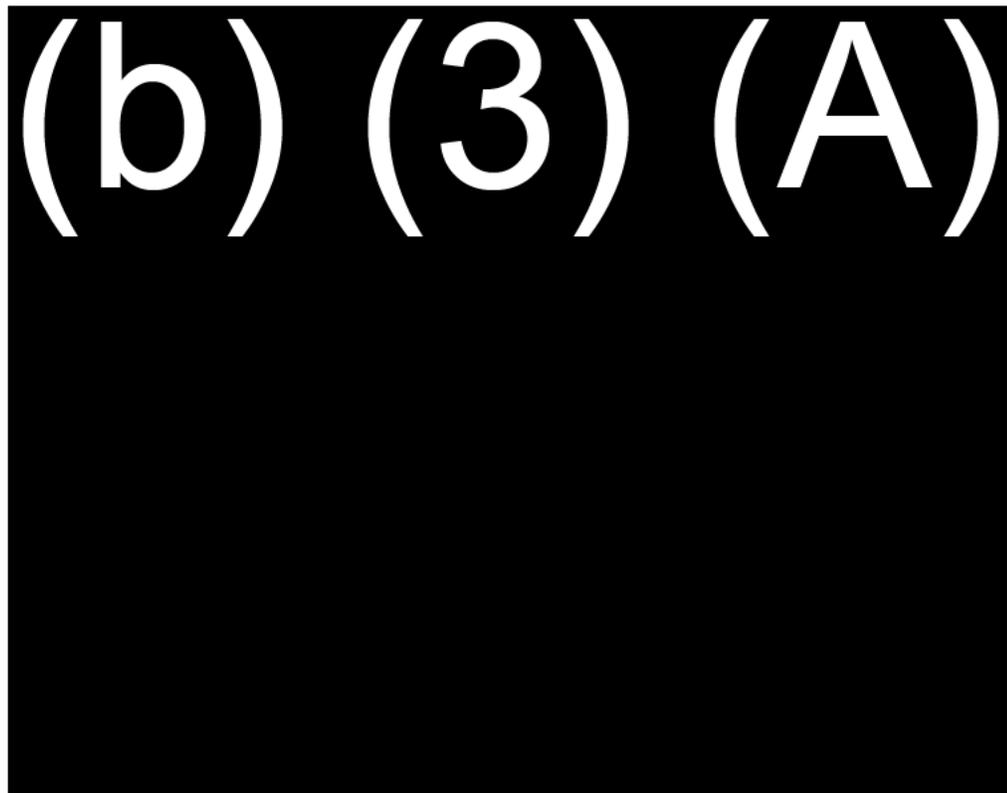
**Photo 12**

Tank (b) (3) (A) (fuel temperature ranges from 77.58°F to 78.67°F).



**Photo 13**

Tank (b) (3) (A) (fuel temperature ranges from 78.93°F to 79.98°F).



**Photo 14**

Tank (b) (3) (A) (fuel temperature ranges from 76.65°F to 77.97°F).