

FINAL REPORT

Review of VMT Tank Inspection Timelines



Report Prepared for:



PREPARED BY:

William Mott P.E.

$\left(\frac{\lambda}{\delta\tau}\right)$ taku
engineering

907.562.1247
May 2026



The opinions expressed in this PWSRCAC commissioned report.
are not necessarily those of PWSRCAC.

Table of Contents

ACRONYMS & ABBREVIATIONS.....	ii
1.0 EXECUTIVE SUMMARY.....	1
1.1 GENERAL.....	1
1.2 FINDINGS	1
1.3 RECOMMENDATIONS	1
2.0 RESULTS AND DISCUSSION	2
2.1 CRUDE STORAGE TANK 1.....	2
2.2 CRUDE STORAGE TANK 2.....	3
2.3 CRUDE STORAGE TANK 3.....	3
2.4 CRUDE STORAGE TANK 4.....	4
2.5 CRUDE STORAGE TANK 5.....	5
2.6 CRUDE STORAGE TANK 6.....	7
2.7 CRUDE STORAGE TANK 7.....	8
2.8 CRUDE STORAGE TANK 8.....	9
2.9 CRUDE STORAGE TANK 9.....	10
2.10 CRUDE STORAGE TANK 10.....	10
2.11 CRUDE STORAGE TANK 11.....	11
2.12 CRUDE STORAGE TANK 12.....	12
2.13 CRUDE STORAGE TANK 13.....	12
2.14 CRUDE STORAGE TANK 14.....	13
2.15 BALLAST WATER STORAGE TANK 93	13
2.16 BALLAST WATER STORAGE TANK 94	15
2.17 RECOVERED CRUDE STORAGE TANK 80	16
2.18 SUMMARY OF FINDINGS	19

ACRONYMS & ABBREVIATIONS

API – American Petroleum Institute

APSC – Alyeska Pipeline Service Company

BWT – Ballast Water Treatment

CP – Cathodic Protection

ETF – East Tank Farm

K – Thousand

MPY or mpy – Mils-per-year

MRT – Minimum Remaining Thickness

ODPCP – Oil Discharge Prevention and Contingency Plan

PWSRCAC - Prince William Sound Regional Citizens' Advisory Council

RWT – Remaining Wall Thickness

TK – Tank

VMT – Valdez Marine Terminal

1.0 EXECUTIVE SUMMARY

1.1 GENERAL

In February of 2025, the Prince William Sound Regional Citizen's Advisory Council (PWSRCAC) tasked Taku Engineering (Taku) with reviewing documents associated with American Petroleum Institute (API) 653 Out-of-Service inspections of the crude oil, ballast water, and recovered crude tanks at the Alyeska Pipeline Service Company (APSC) Valdez Marine Terminal (VMT). The intent was to identify opportunities for reducing the risks of a future leak associated with the VMT tanks.

Background

In August of 2025, PWSRCAC provided Taku with a cache of documents including the inspection records for the crude oil, ballast water, fuel oil and recovered crude tanks at the VMT. Taku completed an inventory of the documents and in October of 2025 provided PWSRCAC with a list of missing critical documents for this assessment. Much of the missing documentation was associated with the VMT fuel storage tanks. PWSRCAC opted to remove the fuel tanks from the scope (Tanks 51, 52, 53, 54, 55, 56 & 68) and focus the study on the crude oil, ballast water and recovered crude tanks.

Crude Storage Tanks 8, 15, 16, 17, & 18 were not included in the scope of this study because they are not in active service.

Additional documents for this assessment were provided to Taku in January of 2026. Tank service intervals were calculated for each tank and compared to Alyeska's reports and the dates included in the Oil Discharge Prevention and Contingency Plan (ODPCP).

1.2 FINDINGS

- The use of long-term corrosion rate calculations in the 2025 Engineering Summary Report for Crude Storage Tank 5 resulted in artificially reduced predictive corrosion rates for 2025-2045.
- The use of long-term corrosion rate calculations in the 2021 Engineering Summary Report for Crude Storage Tank 7 resulted in artificially reduced predictive corrosion rates for 2021-2034.
- The use of long-term corrosion rate calculations in the 2013 Engineering Corrosion Report for Recovered Crude Storage Tank 80 also resulted in artificially depressed predictive corrosion rates for the period of 2013-2033.
- The data made available to PWSRCAC suggests that the upper areas of the columns for Tanks 93 & 94 were not inspected. These areas would be expected to be subjected to a higher rate of corrosion than the rest of the column surfaces due to wet/dry cycling and exposure to corrosive gases.
- The use of long-term corrosion rates in the 2021 Tank 94 Engineering Summary Report artificially reduced the predictive floor plate corrosion rates for the tank for the period of 2021-2035.

1.3 RECOMMENDATIONS

- Crude Storage Tank 5 should be removed from service for the next internal inspection in 2038, not 2045 as currently scheduled. The VMT ODPCP should be updated to reflect the 2038 internal inspection date.

- Crude Oil Storage Tank 7 should be internally inspected in 2031 rather than 2033 as noted in the VMT ODPCP.
- Recovered Crude Storage Tank 80 should be removed from service for the next internal inspection in 2026, not 2033 as currently scheduled. The VMT ODPCP should be updated to reflect the 2026 internal inspection date.
- Review the column inspection data from Tank 93. If there is insufficient data to confirm the condition of the upper columns, consider removing the tank from service for internal inspection earlier than the current planned dates.
- If the column corrosion data for Tank 94 is insufficient to ensure the condition of the upper columns, APSC should consider removing the tank from service earlier to inspect the upper roof support columns. If APSC has sufficient data to determine that the upper column remaining thicknesses are adequate, the tank should be removed from service for the next internal inspection in 2030 based on short-term floorplate corrosion rate calculations.

2.0 RESULTS AND DISCUSSION

2.1 CRUDE STORAGE TANK 1

Crude Oil Storage Tank 1 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the East Tank Farm (ETF). A new tank floor and cathodic protection system were installed in the tank in 1994. The tank was removed from service again for internal inspection in 2014. The tank is scheduled for the next out-of-service inspection in 2031.

The following documents were reviewed for this study:

- The *Engineering Corrosion Report* for the 2014 Tank 1 Out-of-Service Inspection. 12/3/2014
- The 2014 Tank 1, *API 653 Out-of-Service Inspection Report*
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 1 of 2031 based on the annular plate corrosion rate.
- The VMT ODPCP reflects an inspection date of 2031 which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 1 as scheduled in 2031.

2.2 CRUDE STORAGE TANK 2

Crude Oil Storage Tank 2 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1994. The tank was removed from service again for internal inspections in 2003 and 2022. The tank is scheduled for the next out-of-service inspection in 2042.

The following documents were reviewed for this study:

- The *Engineering Summary Report* for the 2022 Tank 2 Out-of-Service Inspection. 11/15/2023
- The 2003 TK 2 Summary Review 10/17/2003
- The 2022 Tank 2, *API 653 Out-of-Service Inspection Report* 6/28/23
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 2 of 2042 based on the floor plate corrosion rate.
- The VMT ODP-CP reflects a Tank 2 inspection date of 2042, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 2 as scheduled in 2042.

2.3 CRUDE STORAGE TANK 3

Crude Oil Storage Tank 3 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1995. The tank was removed from service for internal inspection in 2015. The tank is scheduled for the next out-of-service inspection in 2034.

The following documents were reviewed for this study:

- The *Engineering Corrosion Summary* for the 2015 Tank 3 Out-of-Service Inspection. 9/30/2015
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Discussion

The APSC Engineering Corrosion Report calls for a service interval of 19.6 years and suggests that the tank be removed from service for an internal inspection in 2035. Taku Engineering's calculations result

in a recommended service interval of 19-years and a 2034 internal (out-of-service) inspection for Tank 3 Based on the floor plate corrosion rate. The ODPCP aligns with Taku's calculated inspection date of 2034.

Taku did not receive the 2015 API 653 report, so we were unable to check that the data used was consistent between the API 653 report and the Engineering Corrosion Summary.

Findings

- The APSC Engineering Corrosion Report suggests an inspection date of 2035, which conflicts with Taku's recommendation to inspect the Tank in 2034. However, the ODPCP aligns with Taku's recommendation.

Recommendations

- Inspect Tank 3 as scheduled in 2034.

2.4 CRUDE STORAGE TANK 4

Crude Oil Storage Tank 4 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1997. The tank was removed from service again for internal inspection in 2009. The tank is scheduled for the next out-of-service inspection in 2029.

The following documents were reviewed for this study:

- The *2009 Corrosion Report: 54-TK-4* for the Tank 4 Out-of-Service Inspection (Nov 2009)
- The 2009 Tank 4, *API 653 Supplemental Tank Inspection Report*
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 4 of 2029 based on the annular plate corrosion rate.
- The VMT ODPCP reflects an inspection date of 2029, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 4 as scheduled in 2029.

2.5 CRUDE STORAGE TANK 5

Crude Oil Storage Tank 5 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. New tank floors and cathodic protection systems were installed in the tank in 1992 and 2002. The tank was removed from service again for internal inspections in 2014 and 2025. The tank is scheduled for the next out-of-service inspection in 2045.

The following documents were reviewed for this study:

- The *Engineering Corrosion Report* for the 2014 Tank 5 Out-of-Service Inspection. 12/3/2014
- 2025 Tank 5, *API 653 Inspection Report 54-TK-5, Out-of-Service 11/1/25*
- The *2025 Engineering Summary Report: 54-TK-5*, 12/12/25
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Discussion

During the 2014 inspection of Tank 5. APSC found a minimum remaining floor plate thickness (MRT) of 0.127-inches due to soil-side corrosion. They used this to calculate a corrosion rate of 10.25 mils-per-year (mpy) between 2002 and 2014. Prior to returning the tank to service, APSC used a repair threshold of 0.215-inches.

The 2025 inspection identified an MRT of 0.123-inches due to soil side corrosion. The APSC 2025 Engineering Summary Report for Tank 5 used this MRT, the original floorplate thickness and the floorplate installation date of 2002, to calculate a long-term corrosion rate (2002-2025) of 5.5 mpy. These calculations suggest that the corrosion rate slowed 46% from 10.25 mpy between 2002 and 2014 to 5.5 mpy between 2014 and 2025.

Figure 1 graphically depicts the long-term corrosion rate calculated in the Tank 5 2025 Engineering Summary Report. The issue is that based on the assumptions and logic behind the long-term calculations, the deepest pit discovered in 2025 (0.123-inches MRT) would have had a wall thickness of 184 mils in 2014 if it had been subjected to a corrosion rate of 5.5 mpy. That MRT is well below (31-mils below) the 2014 repair threshold. **This indicates that either the corrosion rates accelerated between 2014 and 2025 or the 2014 inspection missed a 184 mil RWT pit.**

My professional opinion is that the long-term corrosion rate calculations are invalid. They result in artificially reduced predictive corrosion rates.

In the 2025 Engineering Summary Report for Tank 5, Alyeska included a table comparing "Observed Corrosion Rates" to "API" Rates. The table does not include the short-term corrosion rates observed. Additionally, empirical data from APSC's tanks has shown that the "API" rates that APSC has presented grossly underpredict the corrosion in the ensuing service interval. Reliance on these "API" rates for any reason would violate engineering ethical standards.

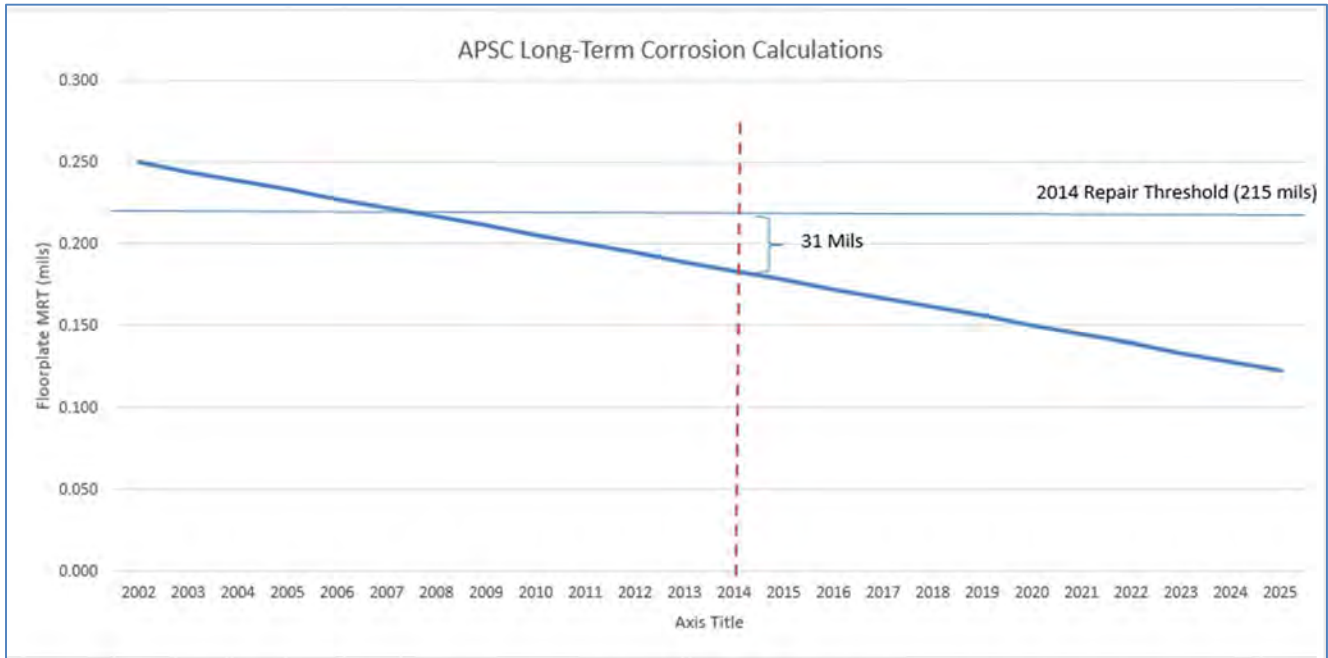


Figure 1 – 2025 APSC Tank 5 Corrosion Rate Calculation

The 2025 Engineering Summary Report used the 5.5 mpy long-term corrosion rate that they calculated, coupled with a repair threshold of 0.210-, to calculate a service interval of 20-years, suggesting that the next out-of-service inspection should take place in 2045.

Taku Engineering used the 2014 repair threshold of 0.215 mils, the 2025 MRT of 0.123-inches, and a service interval of 11-years (2014-2025) to calculate a short-term corrosion rate of 8.36 between 2014 and 2025. Taku's short-term corrosion rate calculations are shown graphically in Figure 2.

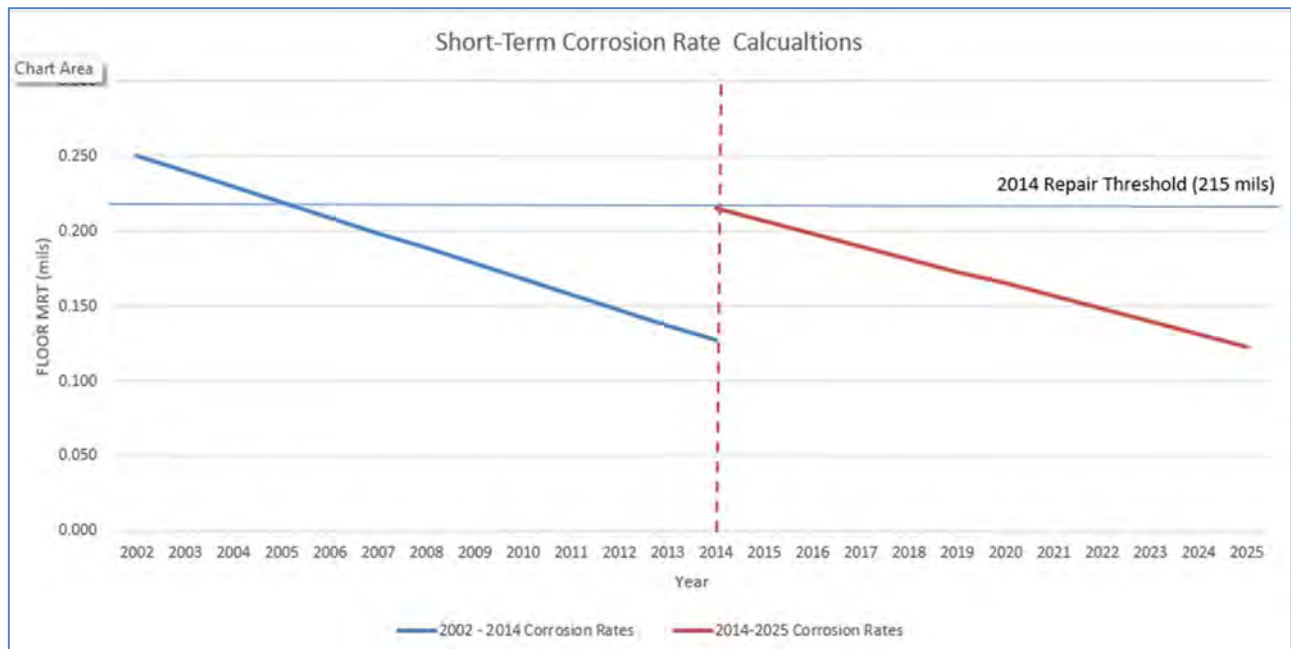


Figure 2 – Taku Short-Term Corrosion Rate Calculations for Tank 5

Taku's calculations assume that the deepest pit discovered in 2025 was at the repair threshold in 2014; it may have been thicker. That means that the corrosion rate between 2014 and 2025 was 8.36 mpy or greater.

Using the 2014-2025 corrosion rate of 8.36 mpy, and the 2025 repair threshold of 0.210-inches, Taku calculated a service interval of 13-years before the next out-of-service inspection. Tank 5 should be removed from service for an internal inspection in 2038.

Findings

- Calculations in the 2025 APSC Engineering Summary Report for Tank 5 artificially reduce the predictive corrosion rate for the next service interval.

Recommendations

- Remove Tank 5 for the next out-of-service inspection in 2038 not 2045 as recommended in the 2025 Tank 5 Engineering Summary Report.
- Update the ODPCT to reflect a 2038 inspection for Tank 5.

2.6 CRUDE STORAGE TANK 6

Crude Oil Storage Tank 6 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the East Tank Farm (ETF). A new tank floor and cathodic protection system were installed in the tank in

1997. The tank was removed from service again for internal inspection in 2009. The tank is scheduled for the next out-of-service inspection in 2029.

The following documents were reviewed for this study:

- The *2009 Corrosion Report: 54-TK-6* for the Tank 6 Out-of-Service Inspection (Nov 2009)
- The 2009 Tank 6, *API 653 Supplemental Tank Inspection Report (9/26/09)*
Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 6 of 2029 based on the annular plate corrosion rate.
- The VMT ODPCP reflects an inspection date of 2029, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 6 as scheduled in 2029.

2.7 CRUDE STORAGE TANK 7

Crude Oil Storage Tank 7 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1996. The tank was removed from service again for internal inspections in 2008 and 2021. The tank is scheduled for the next out-of-service inspection in 2033.

The following documents were reviewed for this study:

- The *Engineering Summary Report* for the 2021 Tank 7 Out-of-Service Inspection. 2/24/2022
- 2021 Tank 7, *API 653 Internal/External Inspection*, 3/18/22
- The 2008 Tank 7, *API 653 Supplemental Tank Inspection Report* (Sept. 2008)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Discussion

APSC's Engineering Summary Report calculated a long-term corrosion rate for the years 1996-2021 of 4.48 mils per year. They added a top-side corrosion rate of 4.42 mpy to accommodate any internal corrosion that may occur because the internal coatings were not replaced. This resulted in a recommended service interval of 12 years. That should have resulted in a recommendation for the next internal inspection of

2033 (2021 + 12 years). The report erroneously calls out an inspection date of 2034. However, the ODPCP calls out an inspection date of 2033.

Taku calculated the short-term corrosion rate between 2008 and 2021 using the 2008 repair threshold (0.215-inches) and the MRT found in the 2021 inspection (0.138-inches). This resulted in a soil-side corrosion rate of 5.92 mpy.

Taku calculated the total floorplate corrosion rate CR_{FP} by:

$$CR_{FP} = CR_{FS} + CR_{FT}$$

where CR_{FS} = the floorplate soil-side corrosion rate = (215 mils – 138 mils)/13-years = 5.92 mpy

and CR_{FT} = the assumed topside corrosion rate = 4.42 mpy

Therefore, the total floorplate corrosion rate CR_{FP} = 5.92 mpy + 4.42 mpy = 10.34 mpy

The maximum service interval, I was calculated by:

$$I = (T_{MIN} - T_{REQ}) / CR_{FP}$$

Where:

T_{MIN} = the 2021 repair threshold = 210 mils

T_{REQ} = the minimum allowable thickness at the end of the service interval = 100 mils

Therefore:

$$I = (210 \text{ mils} - 100 \text{ mils}) / 10.34 \text{ mpy} = 10.63 \text{ years (round down to 10 years)}$$

Based on these calculations, the next internal inspection of Tank 7 should take place in 2031.

Findings

- Based on long-term corrosion rate calculations, the APSC Engineering Corrosion Report recommends that Tank 7 be internally inspected in 2034. It is scheduled for inspection in 2033 based on the ODPCP. Based on short-term corrosion rate calculations, Taku recommends that it be internally inspected in 2031.
- The VMT ODPCP reflects an inspection date of 2033, which is a year earlier than recommended in the APSC Engineering Corrosion Report and two years later than Taku Engineering's calculations call for.

Recommendations

- Inspect Tank 7 in 2031.

2.8 CRUDE STORAGE TANK 8

Crude Oil Storage Tank 8 remains out-of-service. No assessment was done for Tank 8.

2.9 CRUDE STORAGE TANK 9

Crude Oil Storage Tank 9 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1999. The tank was removed from service for internal inspection in 2011. Based on the ODPCP, the tank is scheduled for the next out-of-service inspection in 2027.

The following documents were reviewed for this study:

- The *Corrosion Report: 54-TK-9* for the 2011 Tank 9 Out-of-Service Inspection (March 2012)
- *API 653 Tank Inspection Report, Crude Oil Storage Tank 54-Tk-9* (8/19/11)
- *Government Letter No. 58620, VMT Crude Storage Tank 54-TK-9 Inspection Schedule*
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Discussion

The 2011 Corrosion Report: 54-TK-4, included a math error that caused the author to recommend a service interval of 20-years (for an internal inspection date of 2031). However, correctly calculated, the recommendation should have been for a service interval of 15-years (for an internal inspection date of 2026).

PWSRCAC notified APSC of the error. In December of 2025, PWSRCAC received a letter from APSC (*Government Letter No. 58620*) confirming the math error and concurring with Taku's calculations. The letter also noted that APSC had completed an RBI analysis of the Tank 9 data and increased the service interval by one year (to 2027) based on that analysis.

Findings

- APSC's current standing is to complete the next internal inspection of Tank 9 based on corrected calculations and a 2025 RBI analysis.

2.10 CRUDE STORAGE TANK 10

Crude Oil Storage Tank 10 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 2000. The tank was removed from service again for internal inspections in 2014. The tank is scheduled for the next out-of-service inspection in 2032.

The following documents were reviewed for this study:

- *Engineering Corrosion Report: 54-TK-10* for the 2014 Tank 10 Out-of-Service Inspection (12/3/2014)
- *API 653 Tank Inspection Report, Crude Oil Storage Tank 54-TK-10* (10/2/14)

- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 10 of 2032 based on the floor plate corrosion rate.
- The VMT ODPCP reflects a Tank 10 inspection date of 2032, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 10 as scheduled in 2032.

2.11 CRUDE STORAGE TANK 11

Crude Oil Storage Tank 11 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1999. The tank was removed from service again for internal inspections in 2011. The tank is scheduled for the next out-of-service inspection in 2031.

The following documents were reviewed for this study:

- *Corrosion Report: 54-TK-11* for the 2011 Tank 11 Out-of-Service Inspection (March 2012)
- *API 653 Tank Inspection Report, Crude Oil Storage Tank 54-Tk-11* (12/9/11)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 11 of 2031 based on the floor plate corrosion rate.
- The VMT ODPCP reflects a Tank 11 inspection date of 2031, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 11 as scheduled in 2031.

2.12 CRUDE STORAGE TANK 12

Crude Oil Storage Tank 12 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 2000. The tank was removed from service again for internal inspections in 2010. The tank is scheduled for the next out-of-service inspection in 2030.

The following documents were reviewed for this study:

- *Corrosion Report: 54-TK-12* for the 2010 Tank 12 Out-of-Service Inspection (July 2010)
- *API 653 Tank Inspection Report, Crude Oil Storage Tank 54-Tk-12* (11/01/10)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 12 of 2030 based on the floor plate corrosion rate.
- The VMT ODPCP reflects a Tank 12 inspection date of 2030, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 12 as scheduled in 2030.

2.13 CRUDE STORAGE TANK 13

Crude Oil Storage Tank 13 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1998. The tank was removed from service again for internal inspections in 2012. The tank is scheduled for the next out-of-service inspection in 2032.

The following documents were reviewed for this study:

- *Engineering Corrosion Report: 54-TK-13* for the 2010 Tank 13 Out-of-Service Inspection (February 2013)
- *API 653 Tank Inspection Report, Crude Oil Storage Tank 54-Tk-13* (12/15/12)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 13 of 2032 based on the floor plate corrosion rate.
- The VMT ODPCP reflects a Tank 13 inspection date of 2032, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 13 as scheduled in 2032.

2.14 CRUDE STORAGE TANK 14

Crude Oil Storage Tank 14 is a 250-foot diameter, 62' 3" high, 546K-barrel crude oil storage tank located in the ETF. A new tank floor and cathodic protection system were installed in the tank in 1998. The tank was removed from service again for internal inspections in 2012. The tank is scheduled for the next out-of-service inspection in 2032.

The following documents were reviewed for this study:

- *Engineering Corrosion Report: 54-TK-14* for the 2010 Tank 14 Out-of-Service Inspection (February 2013)
- *API 653 Tank Inspection Report, Crude Oil Storage Tank 54-Tk-14* (12/15/12)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report and Taku Engineering's calculations align with a recommended internal (out-of-service) date for Tank 14 of 2032 based on the floor plate corrosion rate.
- The VMT ODPCP reflects a Tank 14 inspection date of 2032, which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.

Recommendations

- Inspect Tank 14 as scheduled in 2032.

2.15 BALLAST WATER STORAGE TANK 93

Ballast Water Storage Tank 93 is a 250-foot diameter, 53' 6" high, 465.2K-barrel ballast water storage/separation tank located in the Ballast Water Treatment (BWT) plant. A new tank floor and

cathodic protection system were installed in the tank in 2002. The tank was removed from service for internal inspections in 2012 and again for internal inspections and replacement of the annular plate in 2022. The tank was returned to service in 2023 and is scheduled for the next out-of-service inspection in 2033.

The following documents were reviewed for this study:

- *Engineering Corrosion Report: 51-TK-93* for the 2012 Tank 93 Out-of-Service Inspection (February 2013)
- *2023 Engineering Summary Report: 51-TK-93* for the 2023 Tank 93 Out-of-Service Inspection (7/31/2023)
- *API 653 Inspection Report, 51-TK-93 Out of Service Inspection* (11/20/23)
- *Review of Ballast Water Tank 93 Out-of-Service Inspection Report and Tank Repairs*, Taku Engineering (July 2025)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report calculated a long-term floorplate corrosion rate (2002-2023) of 5.3 mpy. Taku Engineering's floorplate calculated a short-term corrosion rate (2012-2022) of 6.9 mpy. However, APSC defaulted to a 10-year service interval based on replacement of the annular plate (a 2033 out-of-service inspection).
- The VMT ODPCP reflects a Tank 93 inspection date of 2033 which aligns with the APSC Engineering Corrosion Report and Taku Engineering's calculations.
- Taku's 2025 report on the Tank 93 inspection found that the Tank 93 tank inspection report did not provide data for condition of the column at heights above 20-feet. This area would be expected to have the highest column internal corrosion rates due to wet/dry cycling and exposure to corrosive vapors.

Recommendations

- Assess the 2023 column thickness data to determine if they have sufficient documentation of the upper column condition. If not, they should consider removing the Tank from service earlier than 2033 to complete a more through column inspection.
- If it is determined that they have sufficient data on the upper column condition, Tank 93 should be removed from service for an internal inspection in 2033.

2.16 BALLAST WATER STORAGE TANK 94

Ballast Water Storage Tank 94 is a 250-foot diameter, 53' 6" high, 465.2K-barrel ballast water storage/separation tank located in the Ballast Water Treatment (BWT) plant. A new tank floor and cathodic protection system were installed in the tank in 2001. The tank was removed from service for internal inspections in 2011 and again for internal inspections and replacement of the annular plate in 2021. The tank was returned to service in 2021 and is scheduled for the next out-of-service inspection in 2031.

The following documents were reviewed for this study:

- *Corrosion Report: 51-TK-94* for the 2011 Tank 94 Out-of-Service Inspection (March 2012)
- *2021 Engineering Summary Report: 51-TK-94* for the 2021-2023 Tank 93 Out-of-Service Inspection and repair (8/1/2023)
- *API 653 Inspection Report, Part 1 of 2 Out of Service Inspection: 51-TK-94* (7/11/23)
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Findings

- The APSC Engineering Corrosion Report calculated a long-term floorplate corrosion rate (2001-2021) of 7.25 mpy. APSC calculated a service interval of 13.9 years based on the long-term corrosion rate.
- Taku Engineering calculated a short-term floorplate corrosion rate (2011-2021) of 11.0 mpy. Based on the repair threshold, Taku calculated a service life of 9-years.
- APSC defaulted to a 10-year service interval based on replacement of the annular plate (a 2033 out-of-service inspection).
- The VMT ODPCP reflects a Tank 94 inspection date of 2031, which aligns with the APSC Engineering Corrosion Report but conflicts with Taku Engineering's calculations that suggest the tank should be inspected in 2030 based on the short-term floor-plate corrosion rate.
- The Tank 94 tank inspection report did not provide data for condition of the column at heights above 10 feet. The upper areas of the columns would be expected to have the highest internal corrosion rates due to wet/dry cycling and exposure to corrosive vapors.

Recommendations

- Assess the 2021 Tank 94 column thickness data to determine if they have sufficient documentation of the upper column condition. If not, they should consider removing the Tank from service earlier than 2030 to complete a more thorough column inspection.
- If it is determined that they have sufficient data on the upper column condition, Tank 94 should be removed from service for an internal inspection in 2030 based on the floorplate corrosion rate from 2011 to 2021.

2.17 RECOVERED CRUDE STORAGE TANK 80

Crude Oil Storage Tank 80 is a 100-foot diameter, 28' 9" high, 40K-barrel recovered crude oil storage tank located in the Ballast Water Treatment (BWT) plant. The tank floor is from original tank construction in 1976. The tank was removed from service for internal inspections in 2001 and 2013. The tank is scheduled for the next out-of-service inspection in 2033.

The following documents were reviewed for this study:

- The 2001 TK 80 Summary Review 9/30/2003
- The 2013 *API 653 Tank Inspection Report Ballast Water/Crude Oil Recovery Tank 51-TK-80*, 8/8/13
- The *Engineering Corrosion Report: 51-TK-80*, February 2014
- Valdez Marine Terminal, *Oil Discharge Prevention and Contingency Plan Regulatory Manual*, CP-35-2 Volume 1

Discussion

During the 2001 inspection of Tank 80, APSC found a minimum remaining floor plate thickness (MRT) of 0.120-inches due to soil-side corrosion. They used this to calculate a corrosion rate of 5.20 mpy between 1976 and 2001. Prior to returning the tank to service, APSC used a repair threshold of 0.175-inches.

During the next out-of-service inspection, which occurred in 2013, APSC identified a floor plate MRT of 0.108-inches due to soil side corrosion. The APSC 201 Engineering Corrosion Report for Tank 80 used this MRT, the original floorplate thickness and the tank construction date of 1976, to calculate a long-term corrosion rate (1976-2013) of 3.84 mpy. These calculations suggest that the corrosion rate slowed 26% from 5.20 mpy between 1976 and 2001 to 3.84 mpy between 2001 and 2013.

Figure 3 graphically depicts corrosion rate calculated in the Tank 80 2013 Engineering Corrosion Report. The issue is that based on the assumptions and logic behind the long-term calculations, the deepest pit discovered in 2013 (0.120-inches MRT) would have had a wall thickness of 162 mils in 2001. That MRT is below (13-mils below) the 2001 repair threshold of 175 mils. **This means that either the corrosion rates accelerated between 2001 and 2013, the 2001 inspection missed a 162 mil RWT pit, or the use of a long-term corrosion rate is invalid in this situation.**

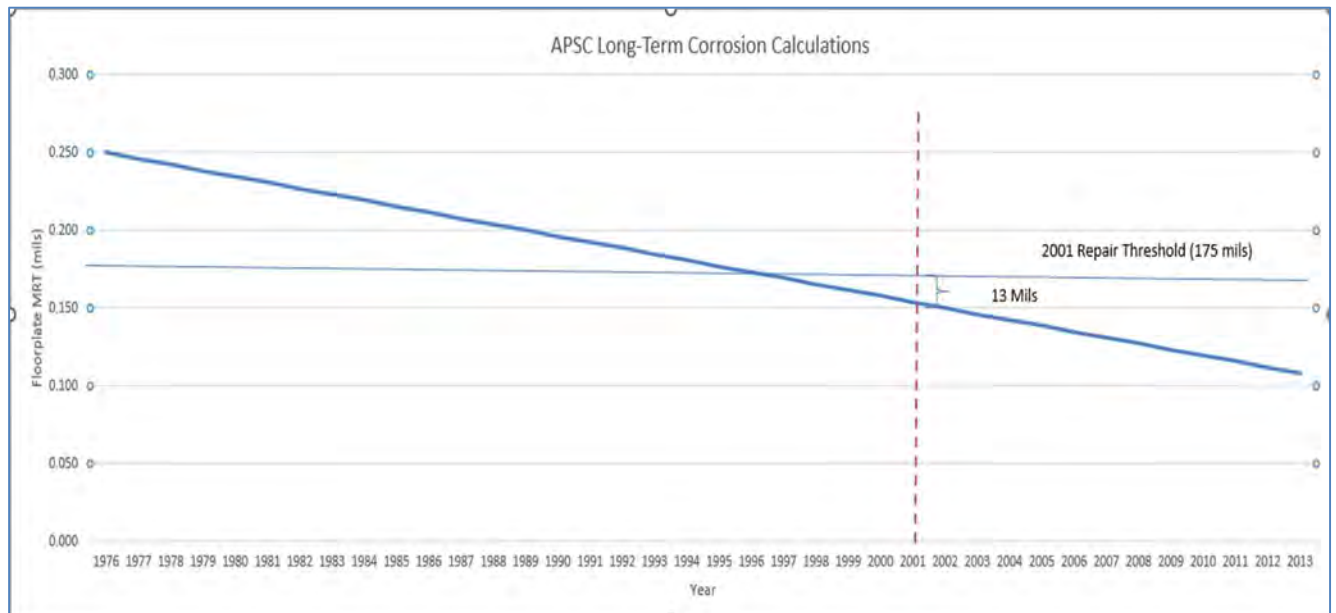


Figure 3 – 2013 APSC Tank 80 Corrosion Rate Calculations

Alyeska used the 3.84 mpy long-term corrosion rate that they calculated, coupled with a 2013 repair threshold of 0.178-inches, to calculate a service interval of 20-years, suggesting that the next out-of-service inspection should take place in 2033.

Taku Engineering used the deepest pit found in 2013 (0.108-inches remaining), the repair threshold in 2001 (0.175-inches), and the service interval between inspections (12-years) to calculate a short-term (2001-2013) corrosion rate of 5.58 mpy. Taku's calculations assume that the deepest pit discovered in 2013 was at the repair threshold in 2001; it may have been thicker. That means that the corrosion rate

between 2001 and 2013 was 5.58 mpy *or greater*, not 3.84 mpy as the long-term calculations suggest. Taku's short-term corrosion rate calculations are shown graphically in Figure 4.

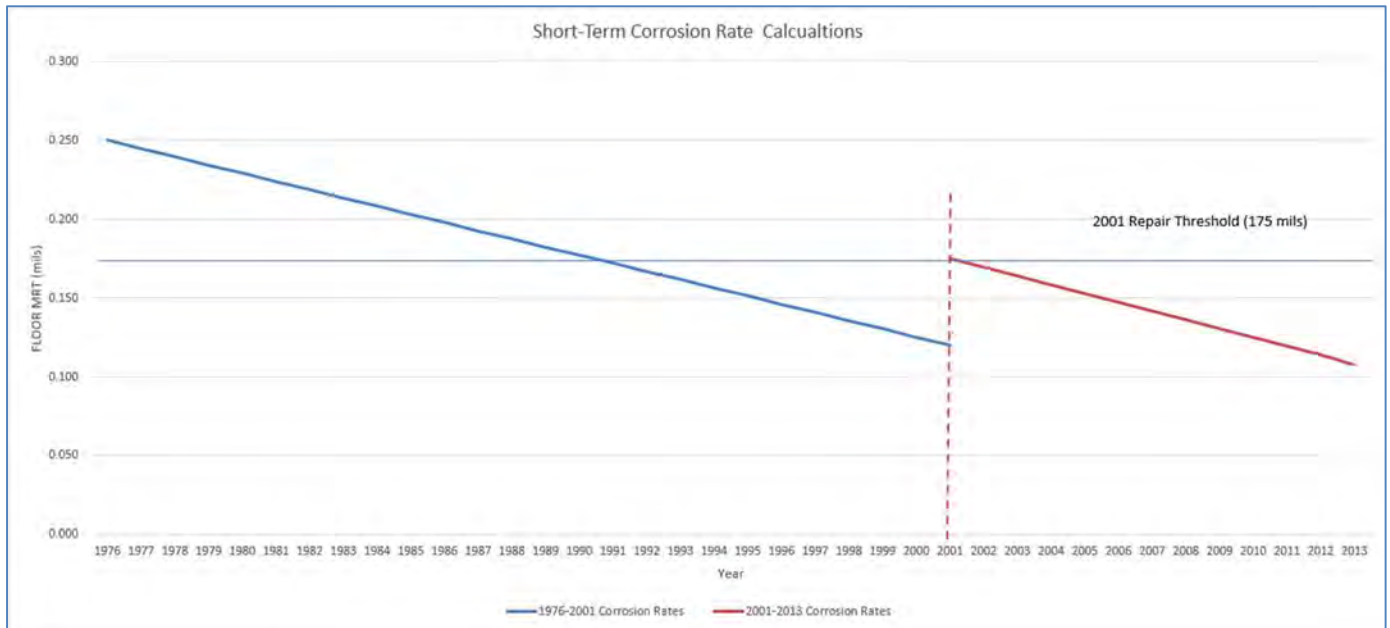


Figure 4 – Taku Short-Term Corrosion Rate Calculations for Tank 80

Using the 2001-2013 corrosion rate of 5.58 mpy, and the 2013 repair threshold of 0.178-inches, Taku calculated a service interval of 14-years before the next out-of-service inspection. Tank 80 should be removed from service for an internal inspection in 2027.

Findings

- Calculations in the 2013 APSC Engineering Corrosion Report for Tank 80 artificially reduced the predictive soil side corrosion rate for the tank floor.

Recommendations

- Remove Tank 80 for the next out-of-service inspection in 2026, not 2033 as recommended in the 2013 Tank 80 Engineering Corrosion Report.
- Update the ODPCP to reflect a 2027 inspection for Tank 80.

2.18 SUMMARY OF FINDINGS

The following table provides a summary of the discrepancies between the tank inspection dates recommended in the APSC VMT ODPCP, the APSC Engineering Summary Report and Taku's findings.

<u>Tank #</u>	<u>Next Recommended Out-of-Service Tank Inspection</u>			<u>Taku</u>
	<u>APSC ESR</u>	<u>ODPCP</u>		
5	2045	2025 ¹		2038
7	2034	2033		2031
94	2031	2031		2030
80	2033	2033		2026

¹ The ODPCP Tank 5 inspection date was not yet updated as of the writing of this report.