PWSRCAC Board Meeting, May 2025

Alyeska Valdez Marine Terminal
Volatile Organic Compound (VOC) Emissions
from the 2022 Snow Removal Incident

Dr. Ranajit (Ron) Sahu, RCAC Consultant

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Problem Statement

- During snow removal in 2022, numerous tank vents were damaged in the East Tank Farm
- While Alyeska instituted tank pressure management to minimize VOC emissions from the damaged tanks/vents, nonetheless substantial VOC emissions did occur and tank pressure management was not effective

- **Can we estimate the quantity of VOCs that were emitted?**
- **If so, what are the estimated VOC quantities?**

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What are VOCs?

- Volatile organic compounds (VOCs) are gases emitted from certain solids or liquids, including crude oil
  - Encompasses a wide variety of chemicals, which according to the EPA, "some of which may have short- and long-term adverse health effects."
  - Includes:
    - Benzene (known human carcinogen)
    - Toulene (possible carcinogen)
    - Ethylbenzene
    - Xylene

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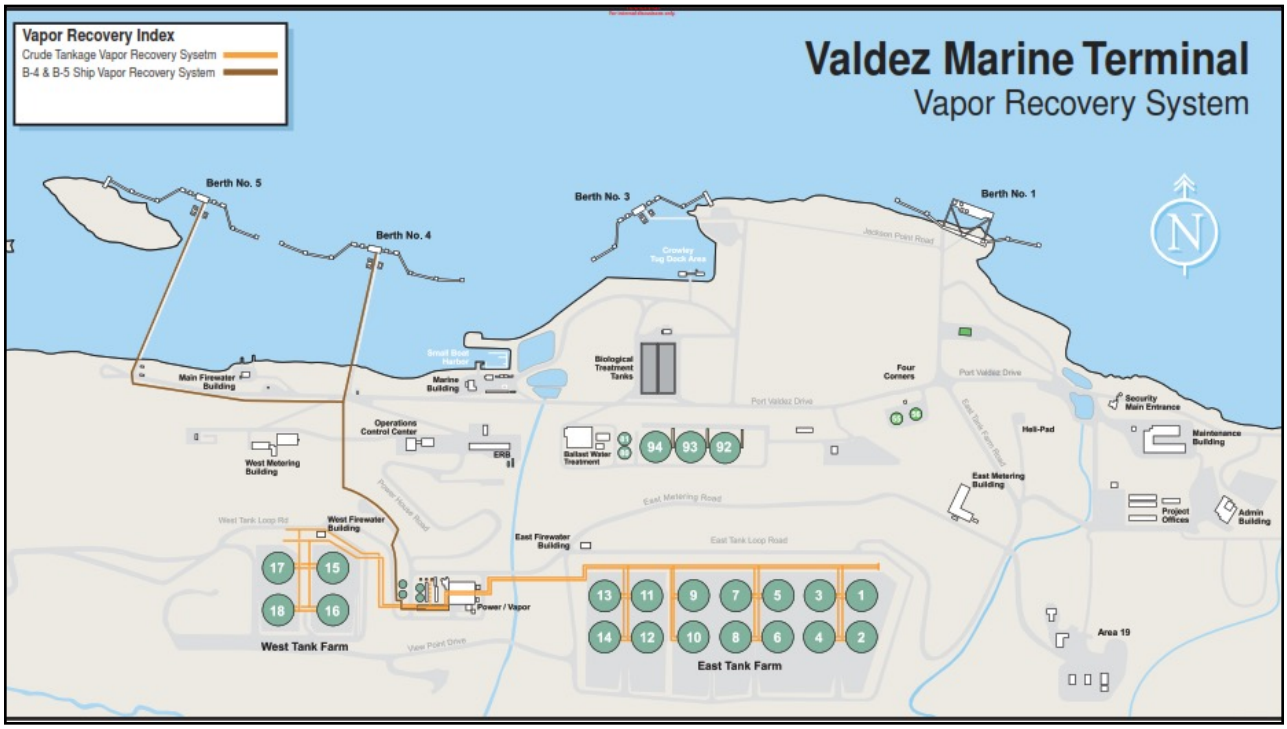

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8.3.3.1 Pipeline Relief and Crude Storage Tanks

The VMT has a total of 18 aboveground crude oil storage tanks, 14 of which are in-service. Two of these 14 tanks are dedicated for pipeline relief.

Each welded-steel tank has a cone-roof, is 250 feet in diameter, 63 feet high, and has a nominal capacity of 510,000 barrels. Original design was in accordance with specification *REF-SP-4459-41-1, Welded Steel Tankage in Excess of 5,000 bbl Nominal Capacity.*

Figure 8-24. Crude Storage Tanks at VMT

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Documents and Data Used in the Analysis

- Alyeska source documents
  - Received through Public Records Requests from the Alaska Department of Environmental Conservation (ADEC) and the Alaska Occupational Safety and Health (AKOSH)
- Observational data
  - Hand-held LEL-type measurements
  - Tank operational data from January 1 – July 31, 2022 (pressure and level)
- Standard engineering methods commonly used in the field

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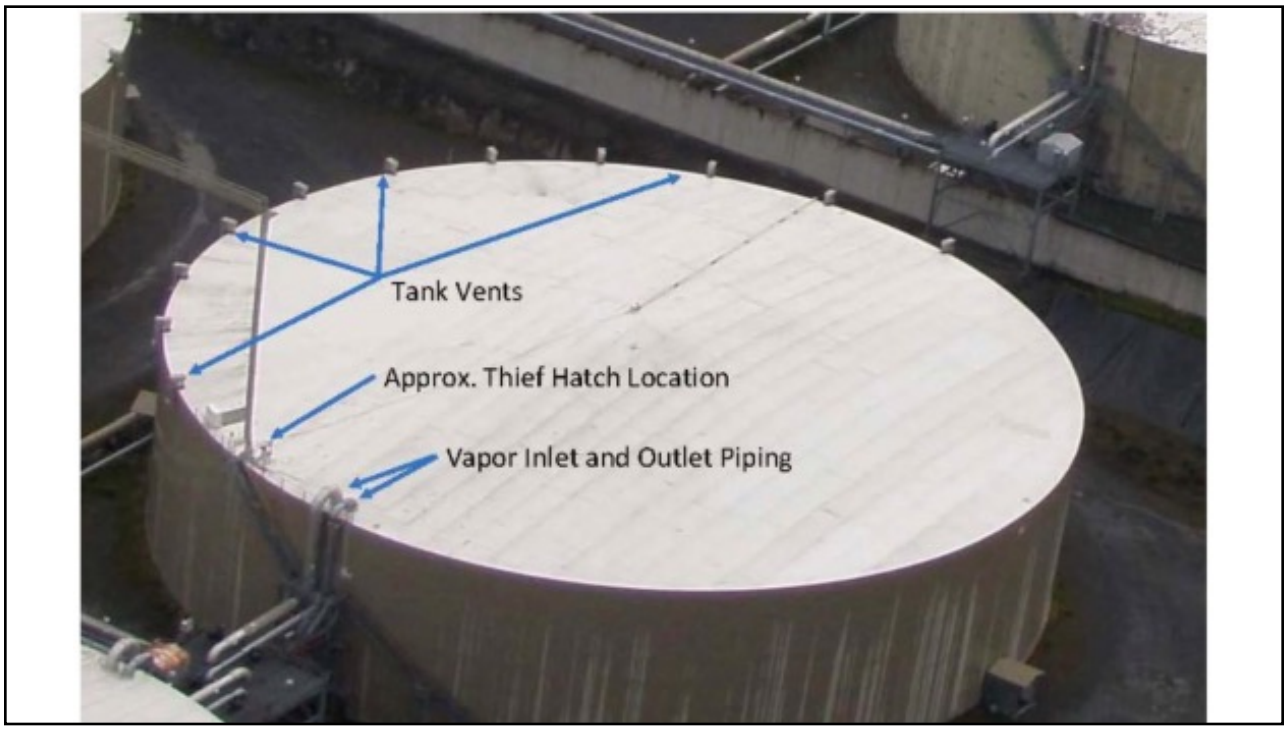

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8.3.2.5 Vents

All tanks are equipped with the necessary equipment to relieve excess pressure or eliminate vacuum conditions. This is to prevent exceeding design pressures within a tank, which could compromise the tank's integrity. Most tanks have a primary way of venting as well as a secondary, for redundant protection. Even the VMT crude tanks that are tied into the VMT Vapor Recovery System have a secondary means of venting in the event of a vapor system malfunction or failure. Three types of vents used on tanks are discussed below.

8.3.3.1.2 Vents

Due to the characteristics of crude oil, the VMT crude oil storage tanks were designed to be closed to the atmosphere and use a vapor recovery system. The VMT Vapor Recovery System is used to control tank pressures. Each tank is equipped with a 30-inch vapor recovery line that collects volatile hydrocarbon vapor for use at the Powerhouse; and a low pressure 16-inch high pressure line used to discharge inert blanket gas inside the tank. Pressures within the tank are controlled via this system.

Should the Vapor Recovery System fail or become overwhelmed, each tank is equipped with either 10 or 11 Shand & Jurs Model LD-220-54 12-inch pressure/vacuum vents. These vents and their numbering are shown in Figure 92, East Tank Farm Vacuum Vent Valve Tag Numbering. The pressure/vacuum vents only operate during an abnormal or upset condition. The number of pressure/vacuum vents is based on the requirements of API 2000 and NFPA 30.

These pressure/vacuum vents are considered pressure safety valves and are tagged accordingly. For example, tag numbers for Tank 1 (58-TK-1) are 54-PSV-1020A through 54-PSV-1020J, as this tank has 10 vent valves. Tag numbers are important during the inspection process for communicating the appropriate issues for a vent if there is a non-conformance.

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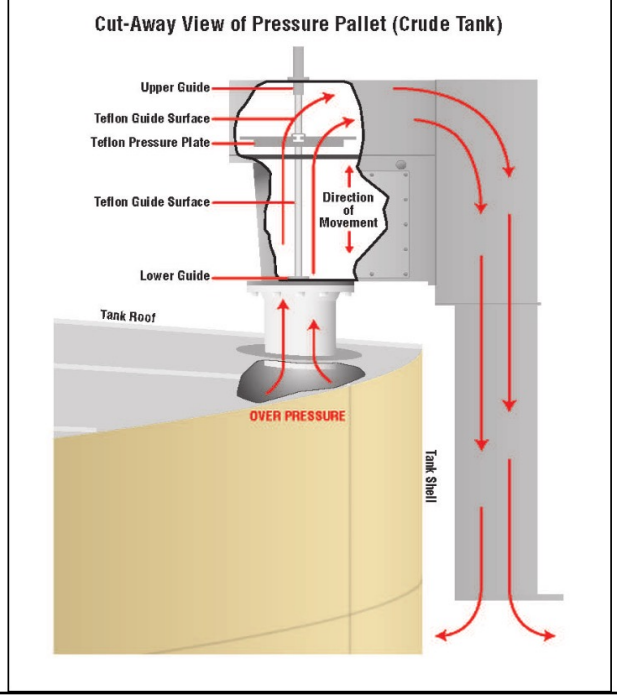
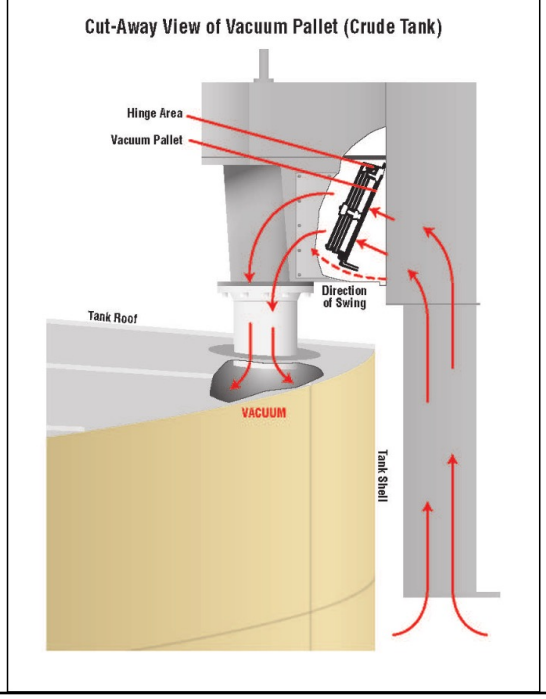
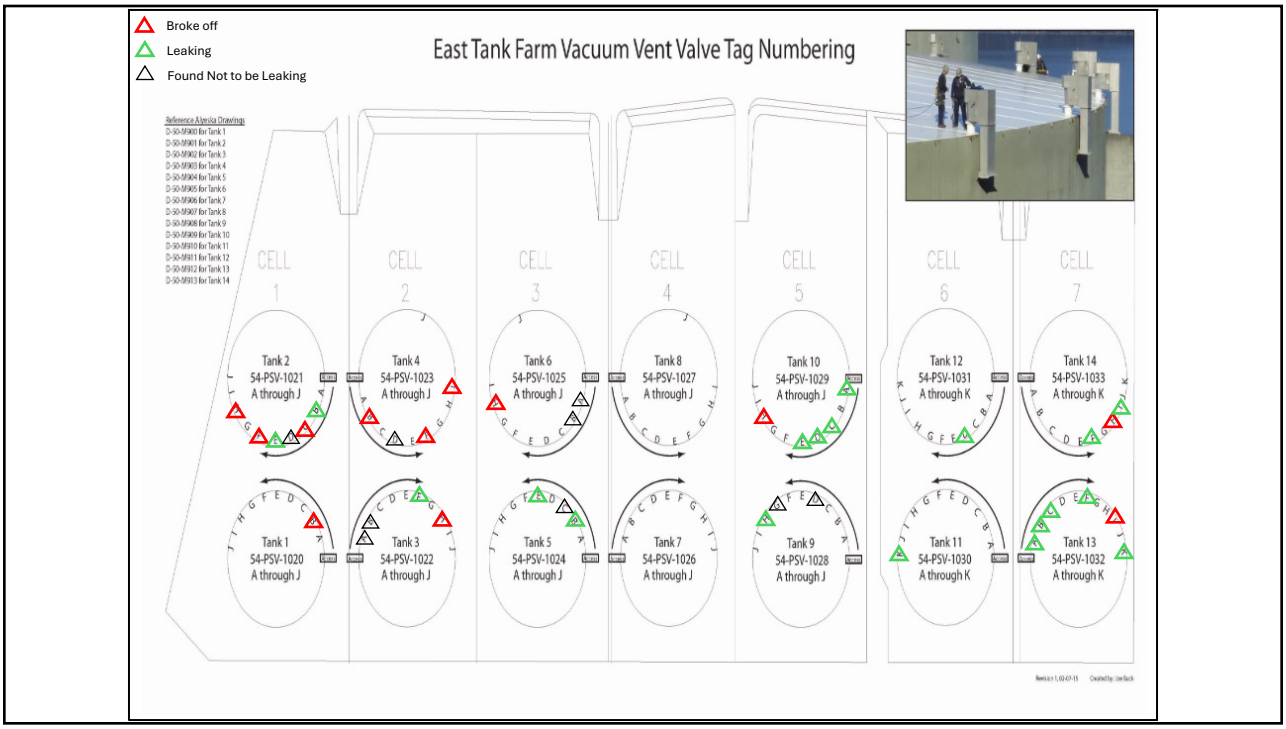

Cut-Away View of Pressure Pallet (Crude Tank)
Upper Guide
Teflon Guide Surface
Teflon Pressure Plate
Teflon Guide Surface
Direction of Movement
Lower Guide
Tank Roof
OVER PRESSURE
Tank Shell


Cut-Away View of Vacuum Pallet (Crude Tank)
Hinge Area
Vacuum Pallet
Direction of Swing
Tank Roof
VACUUM
Tank Shell

9


Broke off
Leaking
Found Not to be Leaking
East Tank Farm Vacuum Vent Valve Tag Numbering
CELL 1
CELL 2
CELL 3
CELL 4
CELL 5
CELL 6
CELL 7
Tank 2 54-PSV-1021 A through J
Tank 4 54-PSV-1023 A through J
Tank 6 54-PSV-1025 A through J
Tank 8 54-PSV-1027 A through J
Tank 10 54-PSV-1029 A through J
Tank 12 54-PSV-1031 A through K
Tank 14 54-PSV-1033 A through K
Tank 1 54-PSV-1020 A through J
Tank 3 54-PSV-1022 A through J
Tank 5 54-PSV-1024 A through J
Tank 7 54-PSV-1026 A through J
Tank 9 54-PSV-1028 A through J
Tank 11 54-PSV-1030 A through K
Tank 13 54-PSV-1032 A through K

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Tank	Valve	Discovery Date/Time	Type of Damage	Date/Time Repair	Type of Repair
1	B	3/28/2022 7:07	Broke Off	4/1/2022 15:30	Plugged
2	B	3/11/2022	Leak	3/17/2022	Repaired
2	C	3/13/2022 17:50	Broke Off	3/14/2022 15:24	Blind
2	D	3/22/2022	Leak	N/A	Found not to be leaking
2	E	3/18/2022	Leak	3/30/2022	Repaired
2	F	3/20/2022 7:50	Broke Off	3/26/2022	Plugged
2	H	3/10/2022 16:45	Broke Off	3/13/2022 14:30	Plugged
3	A	2/28/2022 14:30	Leak	N/A	Found not to be leaking
3	B	2/28/2022 14:30	Leak	N/A	Found not to be leaking
3	F	3/29/2022	Leak	3/31/2022	Blind
3	H	Leak Discovered 3/29/2022 Vent Broke off 3/30/2022 11:00	Leak Broke Off	3/30/2022	Plugged
4	B	Leak Discovered 3/10/2022 Vent Broke Off 3/19/2022 8:40	Leak Broke Off	3/19/2022	Plugged
4	D	2/28/2022 14:30	Leak	N/A	Found not to be leaking
4	F	Leak Discovered 3/25/2022 Vent Broke off 3/27/2022 1:15	Broke Off	3/27/2022	Plugged
4	I	3/10/2022 8:00	Broke Off	3/18/2022 16:16	Plugged
5	B	3/11/2022	Leak	3/24/2022 16:07	Repaired
5	C	2/28/2022 14:30	Leak	N/A	Found not to be leaking
5	E	3/15/2022	Leak	3/24/2022 16:07	Repaired
6	A	2/28/2022 14:30	Leak	N/A	Found not to be leaking
6	B	2/28/2022 14:30	Leak	N/A	Found not to be leaking
6	H	3/7/2022 0:38	Broke Off	3/10/2022 16:45	Plugged
9	D	3/28/2022	Leak	N/A	Found not to be leaking
9	G	3/11/2022	Leak	N/A	Found not to be leaking
9	H	3/21/2022	Leak	3/22/2022	Repaired
10	A	3/23/2022	Leak	3/23/2022 17:03	Repaired
10	C	2/28/2022 14:30	Leak	3/23/2022 17:03	Repaired
10	D	2/26/2022 10:23	Leak	3/23/2022 17:03	Repaired
10	E	2/26/2022 10:23	Leak	3/23/2022 17:03	Repaired
10	H	3/10/2022 17:00	Broke Off	3/20/2022	Plugged
11	K	3/10/2022	Leak	4/1/2022 17:23	Repaired
12	D	2/28/2022 14:30	Leak	3/13/2022	Repaired
13	N/A	1/20/2022 1:37	Venting	1/20/2022 1:37	N/A - Reported per permit requirements
13	A	3/26/2022 12:08	Leak	3/27/2022	Repaired
13	B	2/25/2022 04:30	Leak	2/28/22	Repaired
13	C	3/26/2022 12:08	Leak	3/27/2022	Plugged
13	F	3/28/2022	Leak	3/28/2022	Repaired
13	I	Leak Discovered 2/28/2022 14:30 Vent Broke off 3/21/2022 15:00	Leak Broke Off	3/22/2022	Plugged
13	K	3/28/2022	Leak	3/29/2022	Repaired
14	F	3/10/2022	Leak	3/14/2022	Plugged
14	H	3/3/2022 4:00	Broke Off	3/8/2022 17:51	Blind
14	I	2/28/2022 14:00	Leak	3/12/2022	Repaired

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Example of Tank Pressure (inches of water column, IWC) and Liquid Level (feet) Data

	54-tk-01		54-tk-02		54-tk-03	
	pressure:	level:	pressure:	level:	pressure:	level:
Date/time	IWC	feet	IWC	feet	IWC	feet
01-Jan-22 00:00:00	0.303254	6.9586182	0.296648	4.235473633	0.29842	6.82409668
01-Jan-22 00:01:00	0.294933	6.9586182	0.289596	4.235473633	0.293486	6.82409668
01-Jan-22 00:02:00	0.316006	6.9586182	0.300567	4.235473633	0.314317	6.82409668
01-Jan-22 00:03:00	0.290449	6.9586182	0.302823	4.235473633	0.298541	6.82409668
01-Jan-22 00:04:00	0.29541	6.9586182	0.301288	4.235473633	0.299993	6.82409668
01-Jan-22 00:05:00	0.300372	6.9586182	0.299753	4.235473633	0.29019	6.82409668
01-Jan-22 00:06:00	0.301492	6.9586182	0.298217	4.235473633	0.322304	6.82409668
01-Jan-22 00:07:00	0.29947	6.9586182	0.300795	4.235473633	0.297774	6.82409668
01-Jan-22 00:08:00	0.297448	6.9586182	0.304623	4.235473633	0.299001	6.82409668
01-Jan-22 00:09:00	0.304737	6.9586182	0.305559	4.235473633	0.300227	6.82409668
01-Jan-22 00:10:00	0.306015	6.9586182	0.291158	4.235473633	0.297696	6.82409668

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Page 38 of 72, WO Operation 221007906-20, OMS, 54-TK-2, Damaged and leaking vacuum vent valves, no WO actual start date listed.

3/13/2022, H vent valve was completely ripped off. HCC shoveled path to H's port. Put full face respirators on down at truck. Wind was blowing about 30 mph. Walked up gangway and meters were chirping. PV confirmed tank vapor space was a slight negative.

Had to shovel a bit more snow (about 10 mins) to get the plug in. Line attendant gave us an extra 3' in the line which turned it into a fall arrest system. Installed plug tightened by hand. Then tightened with crescent. Couldn't tie off plug to anything, so left rope coiled in cavity. LEL and VOCs instantly dropped to near zero once plug was in place. HCC has to do a bit more shoveling in order for us to access port, so we can blind it. Toxirae Pro PID 732 total VOC readings, peak: 212 ppm; TWA: 3 ppm; STEL: .7 ppm. LDAR peaked at 16% LEL, I believe. Note: meters chirping on tank top while slight negative pressure in tank, VOC peaked at 212 ppm and LEL peaked at 16% LEL.

Documentation that tanks continued to leak while undergoing negative pressure management in 2022

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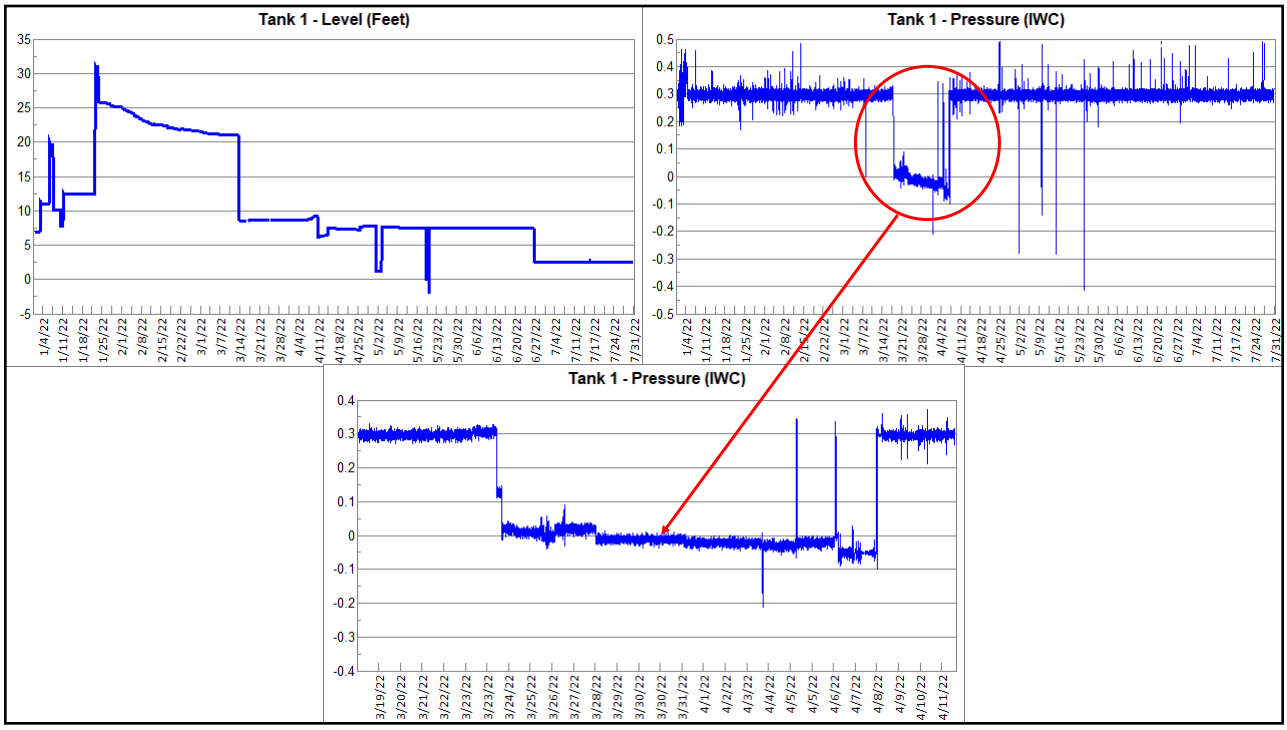

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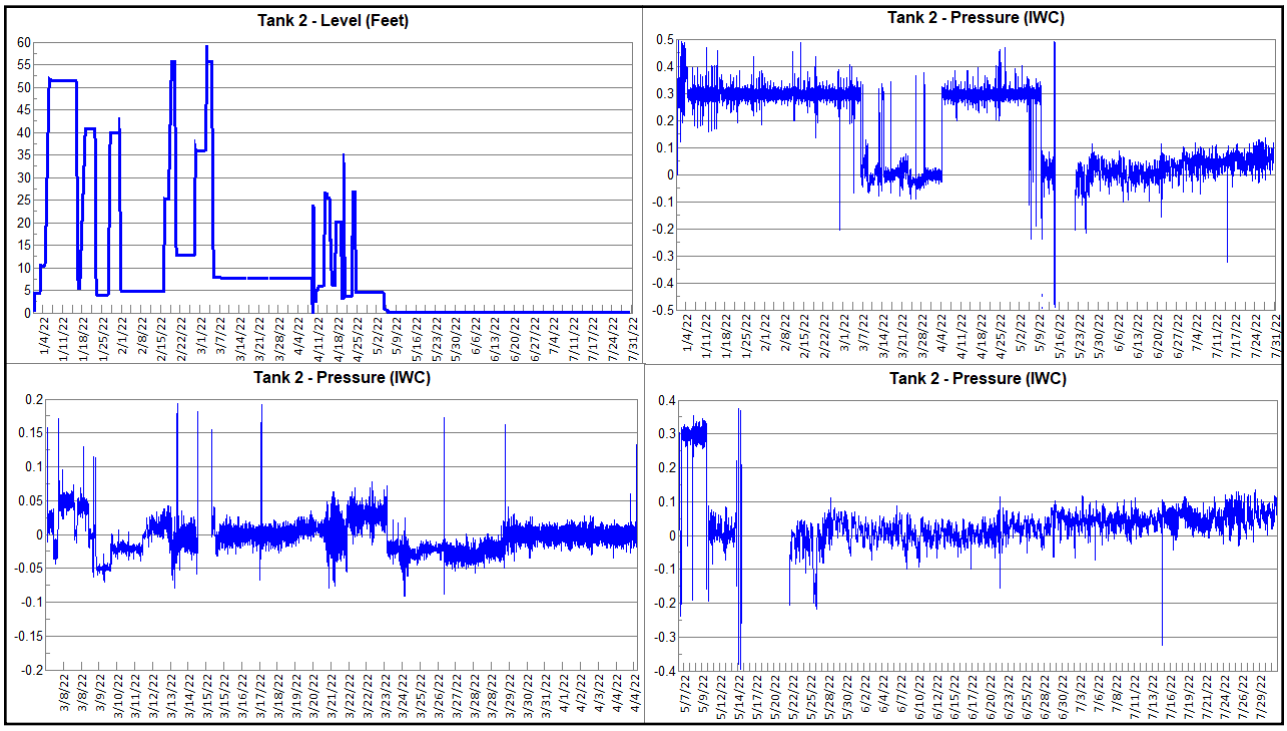
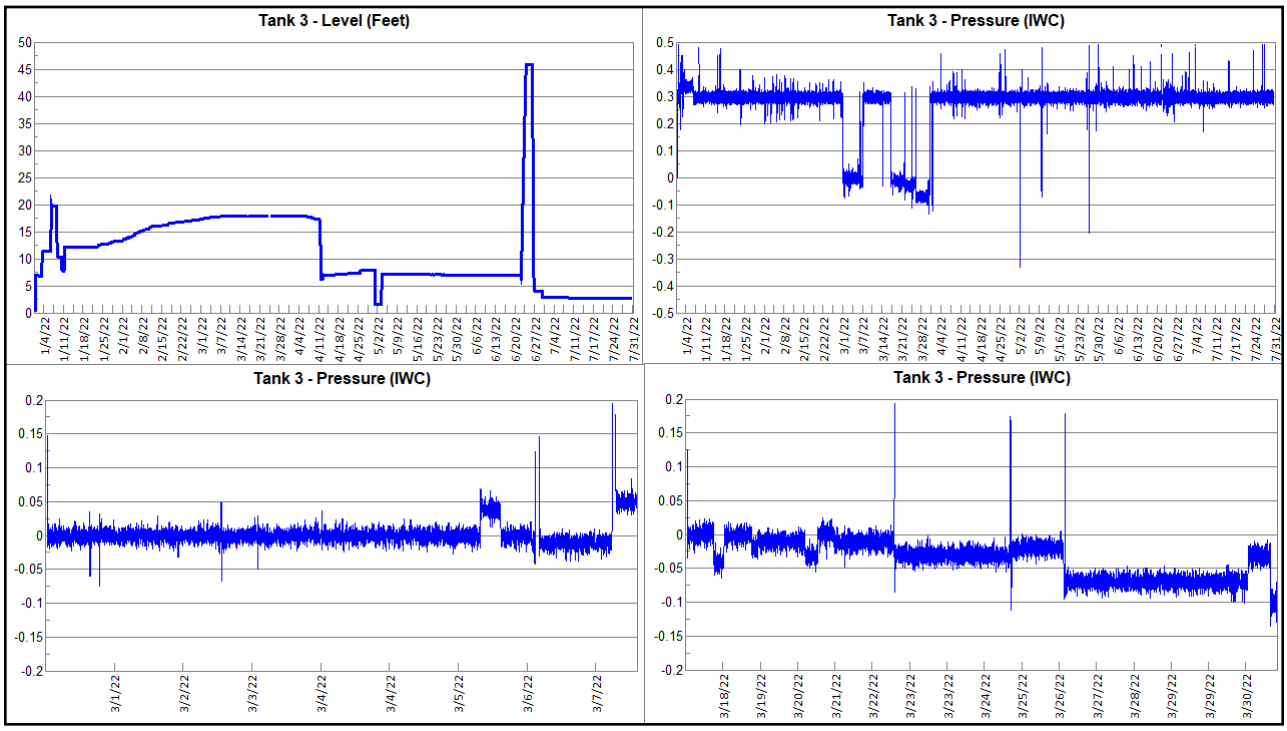
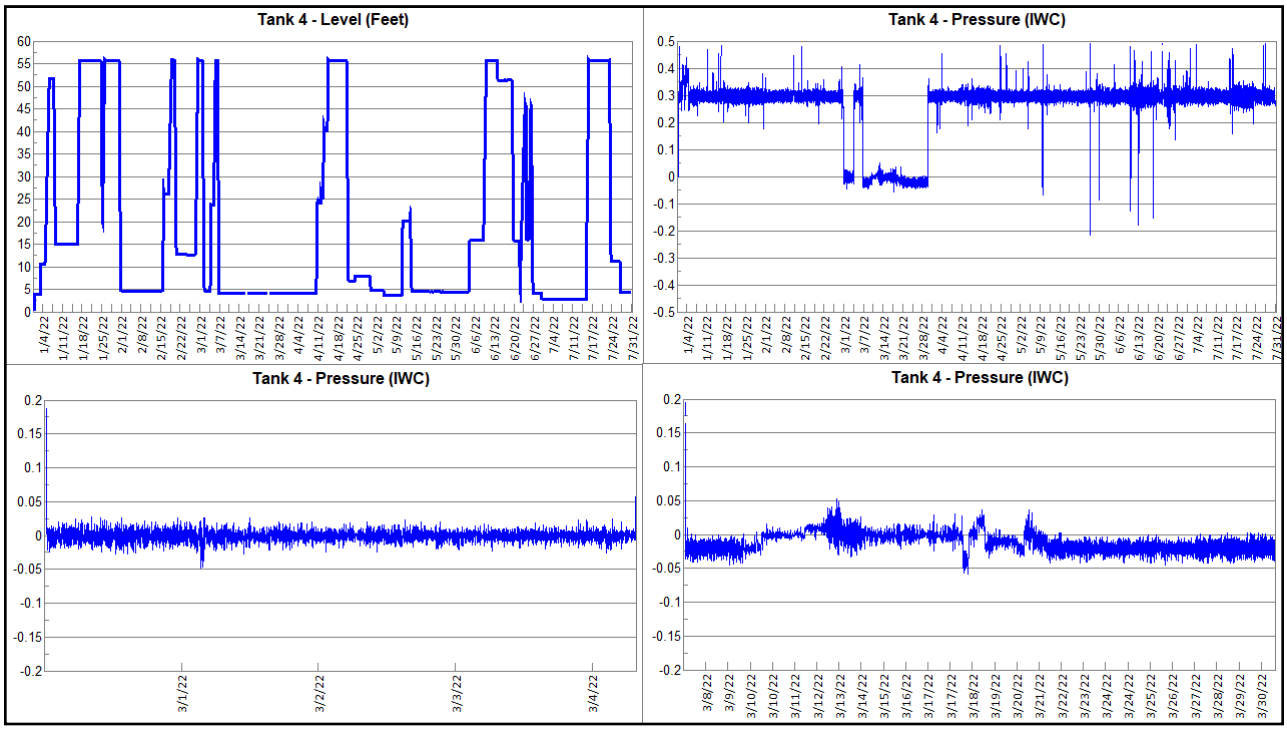

Tank 2 - Level (Feet)
Tank 2 - Pressure (IWC)
Tank 2 - Pressure (IWC)
Tank 2 - Pressure (IWC)

17


Tank 3 - Level (Feet)
Tank 3 - Pressure (IWC)
Tank 3 - Pressure (IWC)
Tank 3 - Pressure (IWC)

18


Tank 4 - Level (Feet)
Tank 4 - Pressure (IWC)
Tank 4 - Pressure (IWC)
Tank 4 - Pressure (IWC)

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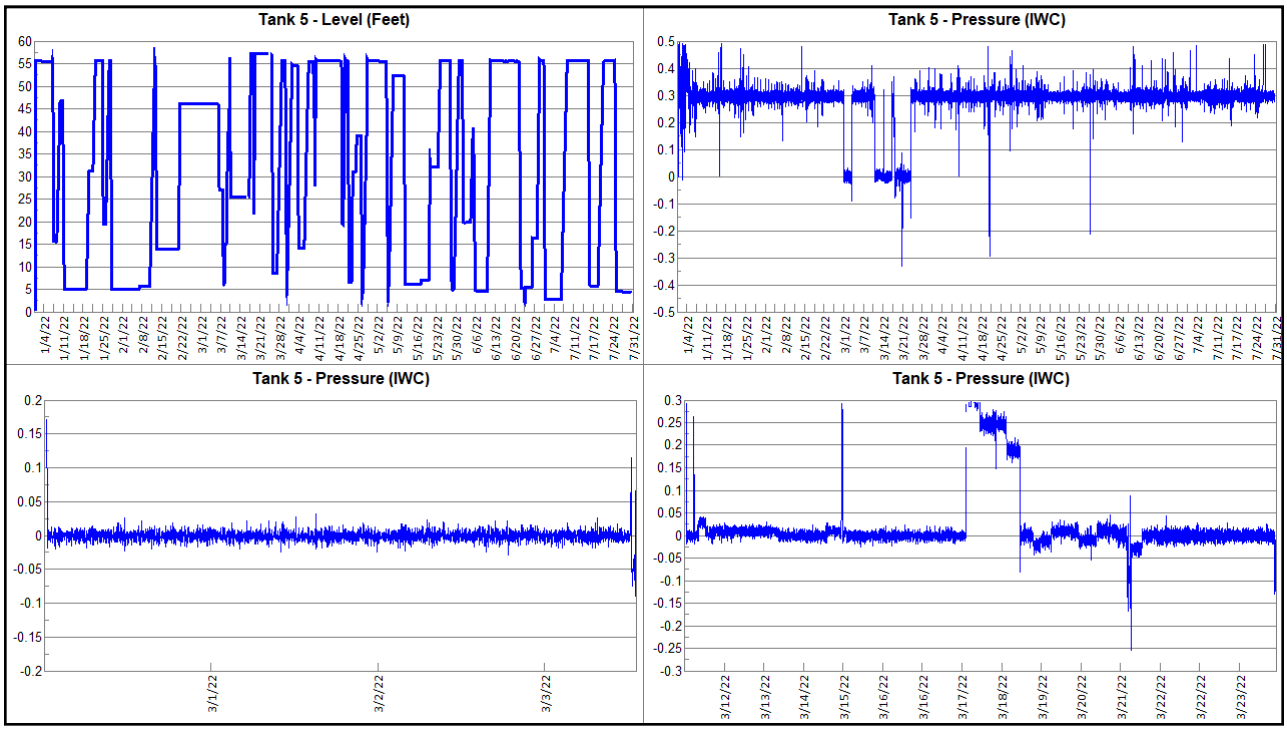
Tank 5 - Level (Feet)
Tank 5 - Pressure (IWC)
Tank 5 - Pressure (IWC)
Tank 5 - Pressure (IWC)

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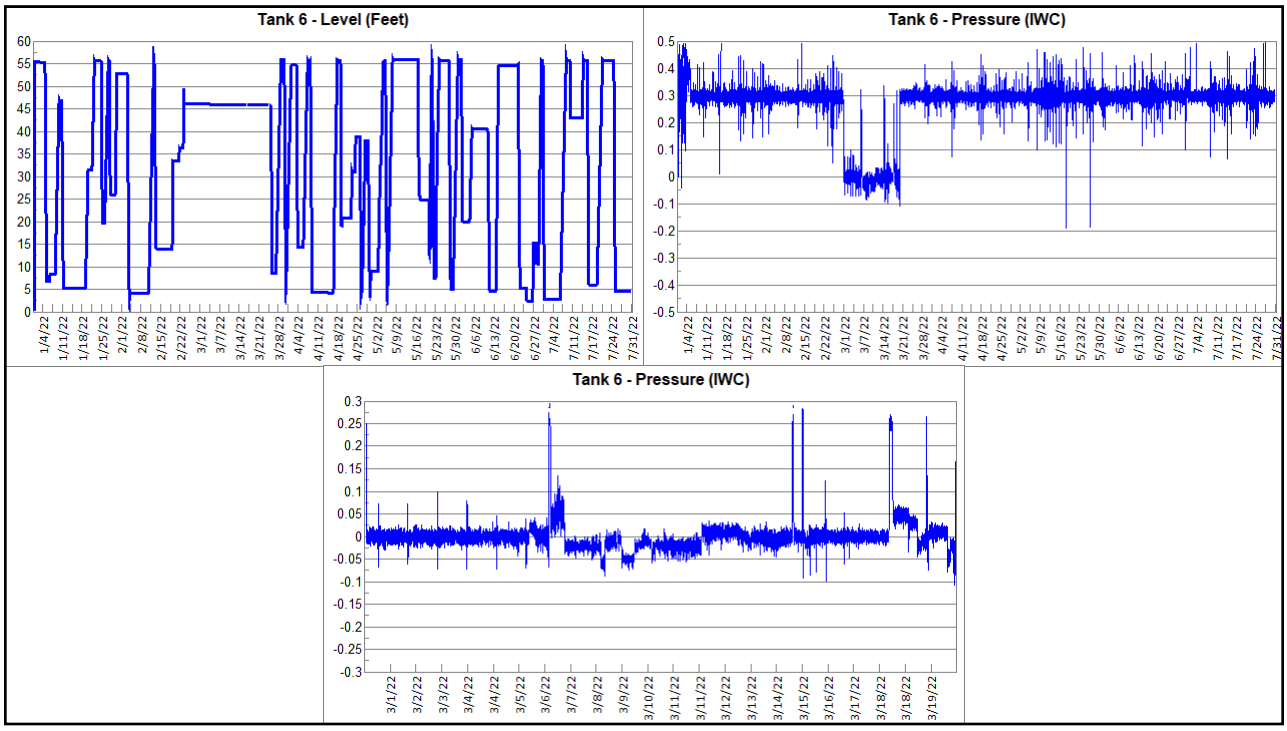
Tank 6 - Level (Feet)
Tank 6 - Pressure (IWC)
Tank 6 - Pressure (IWC)

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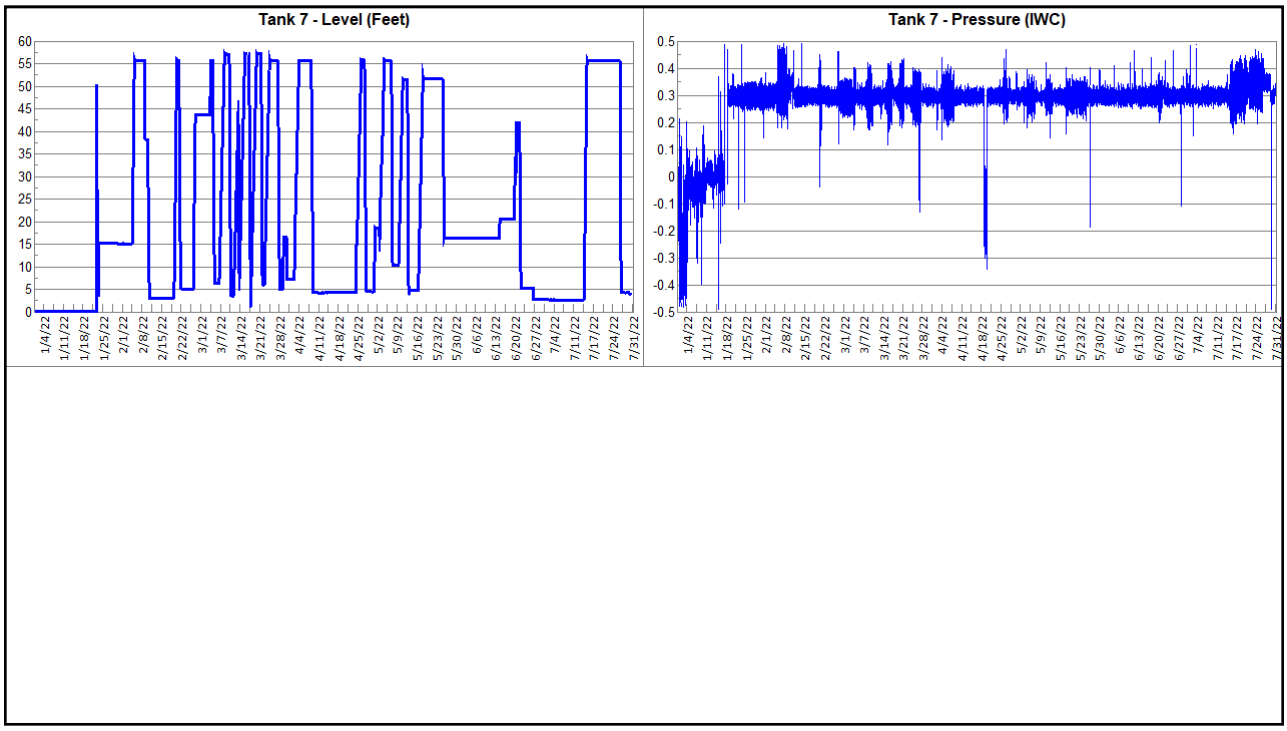
Tank 7 - Level (Feet)
Tank 7 - Pressure (IWC)

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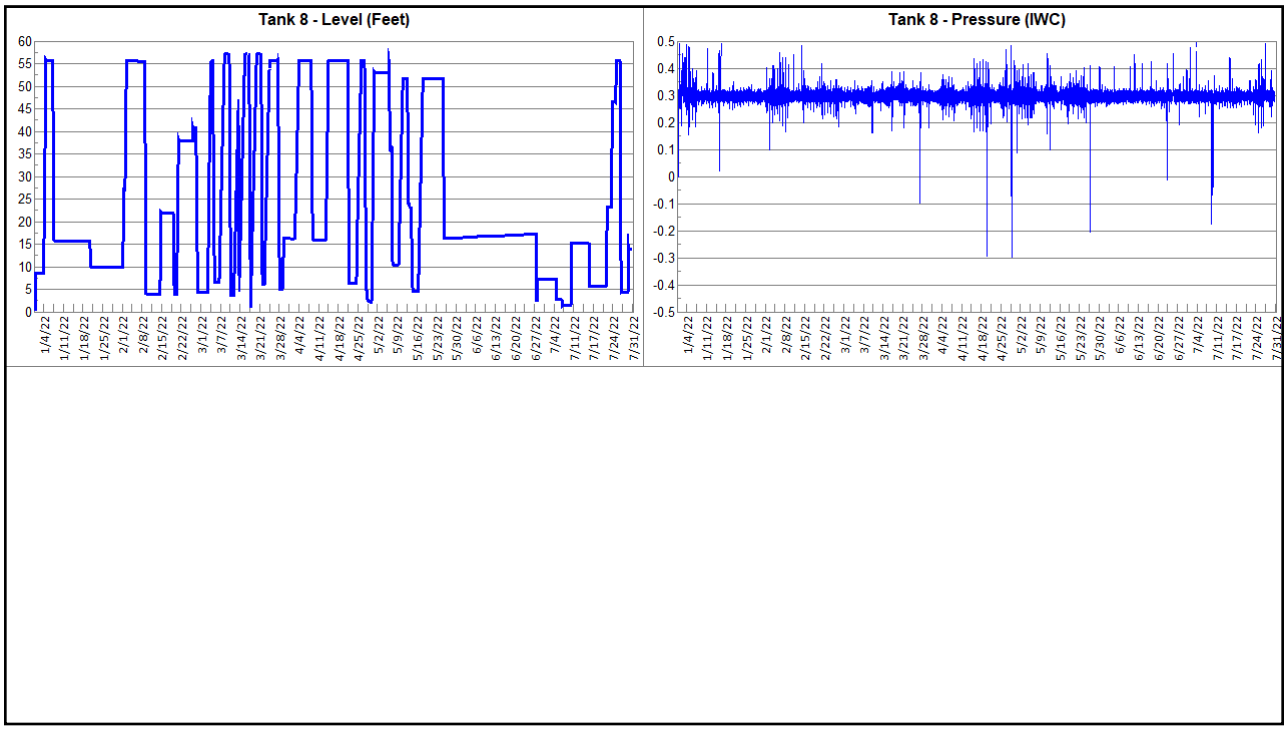
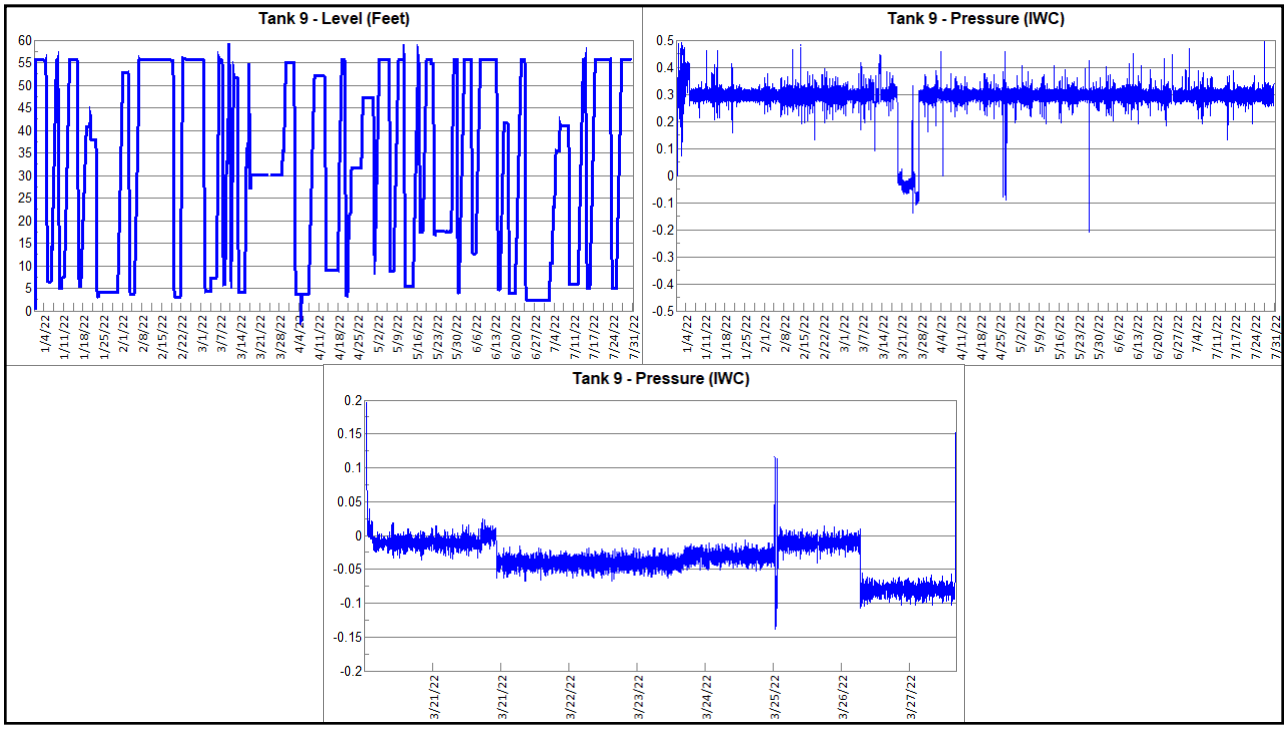
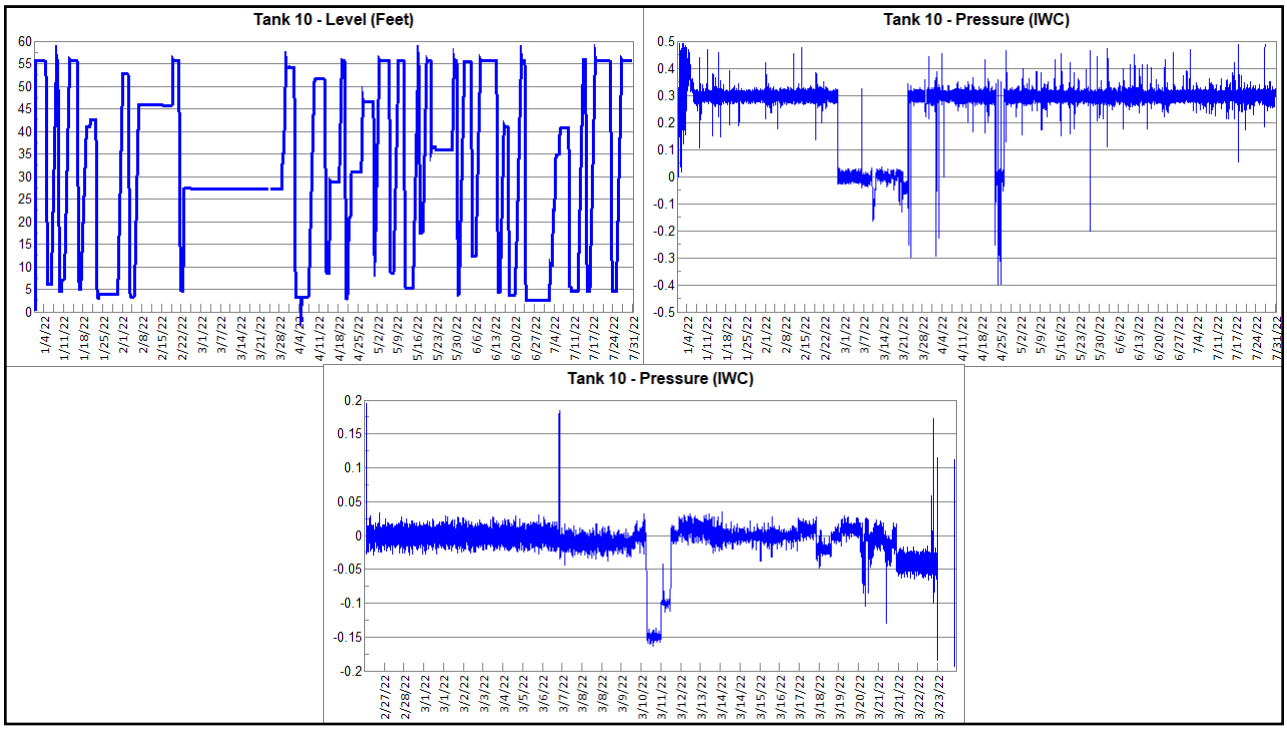

Tank 8 - Level (Feet)
Tank 8 - Pressure (IWC)

23


Tank 9 - Level (Feet)
Tank 9 - Pressure (IWC)
Tank 9 - Pressure (IWC)

24


Tank 10 - Level (Feet)
Tank 10 - Pressure (IWC)
Tank 10 - Pressure (IWC)

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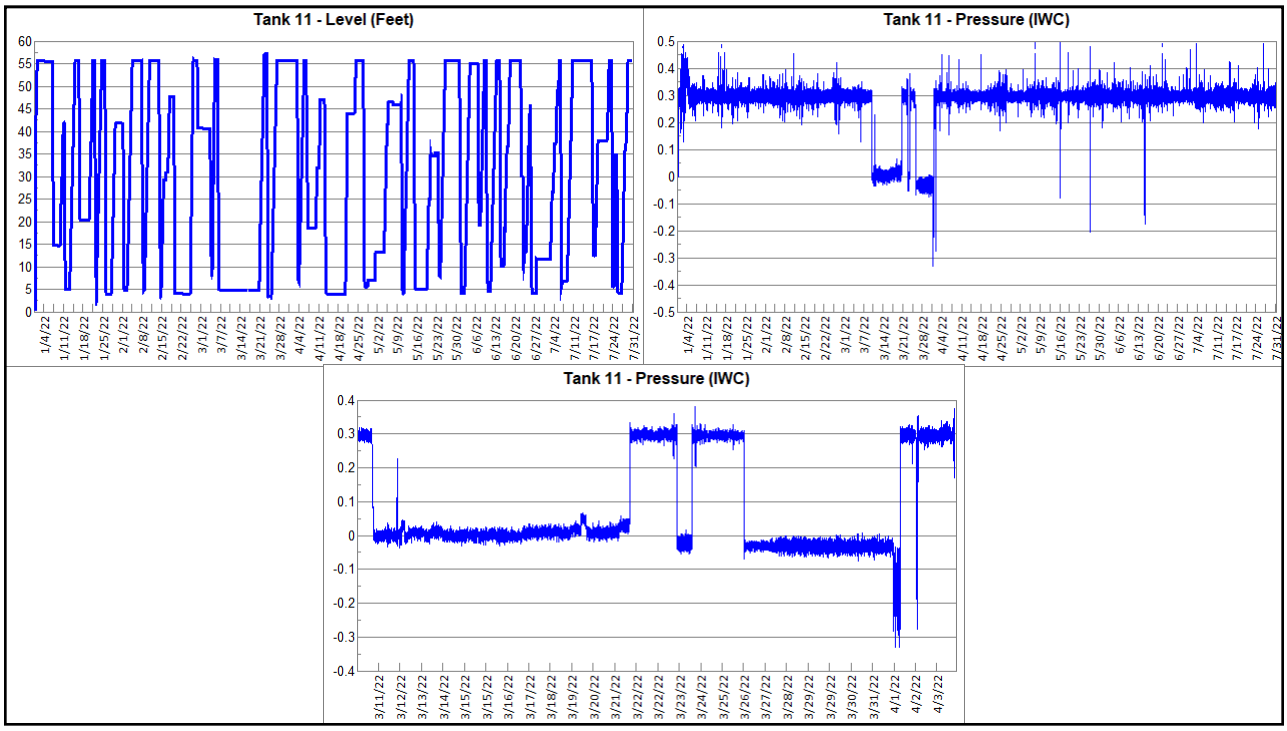
Tank 11 - Level (Feet)
Tank 11 - Pressure (IWC)
Tank 11 - Pressure (IWC)

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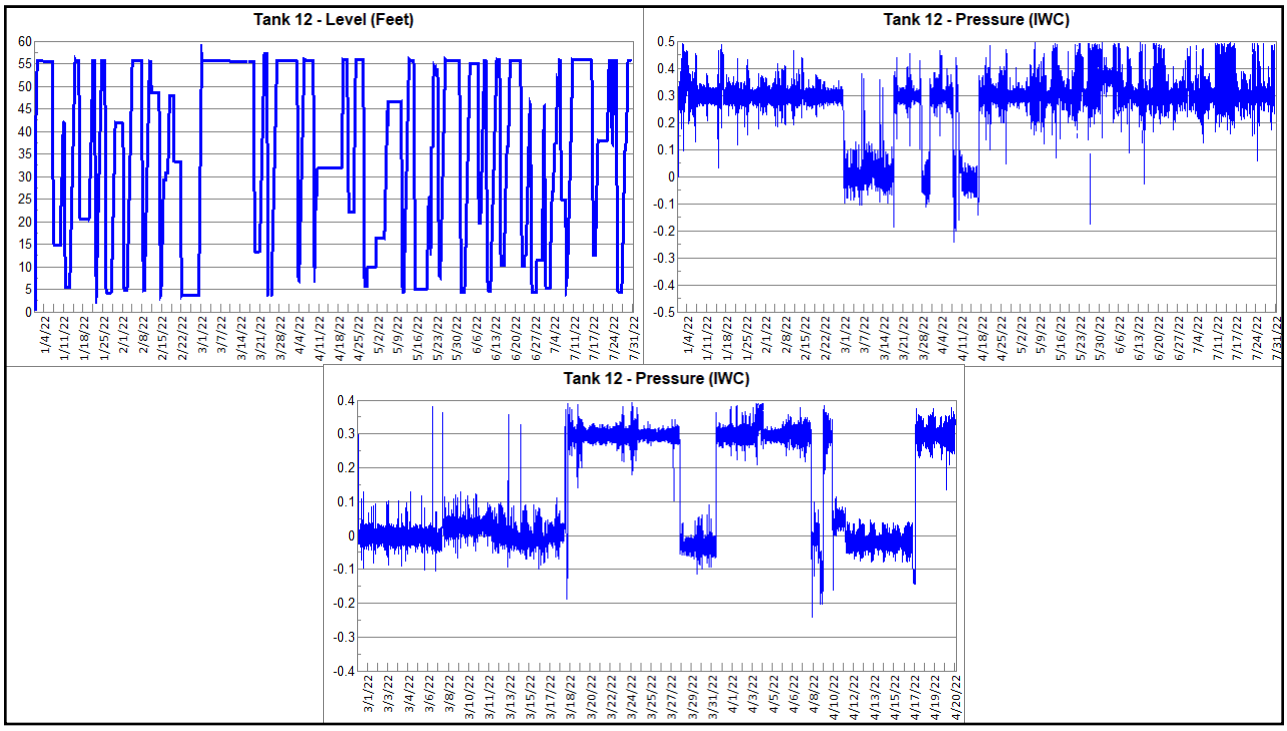
Tank 12 - Level (Feet)
Tank 12 - Pressure (IWC)
Tank 12 - Pressure (IWC)

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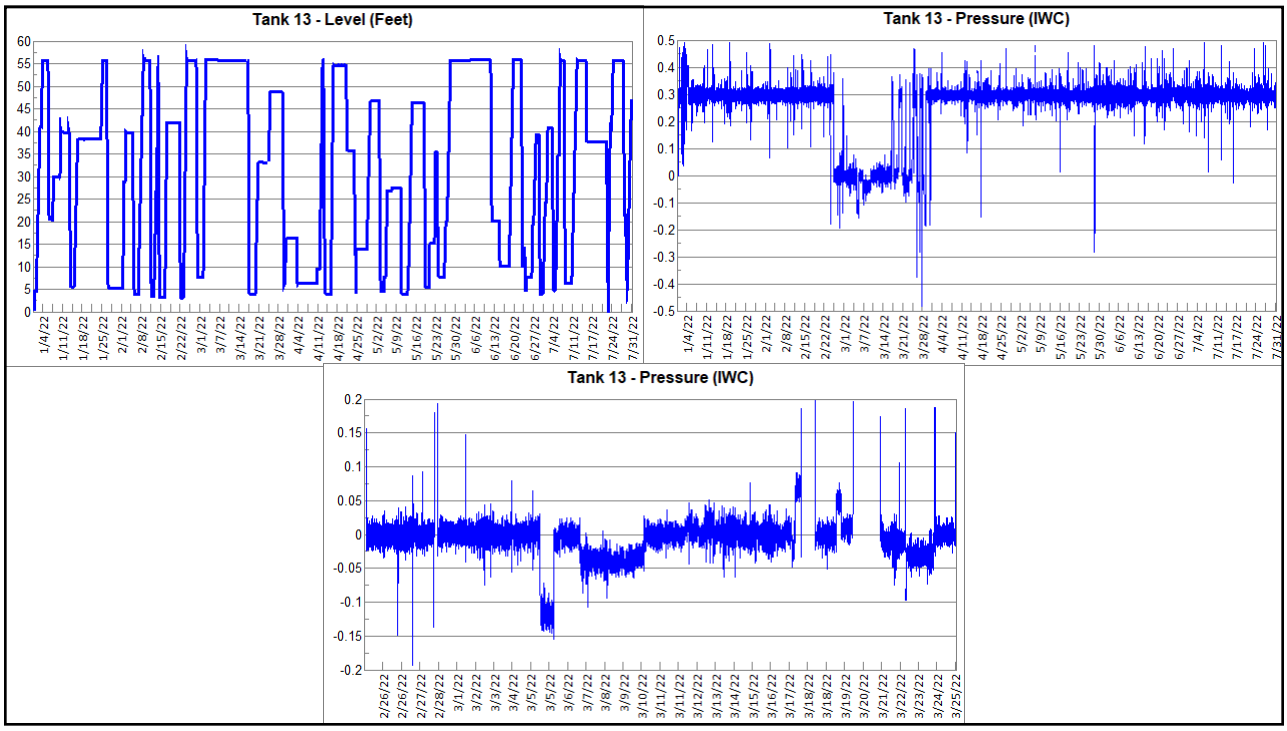
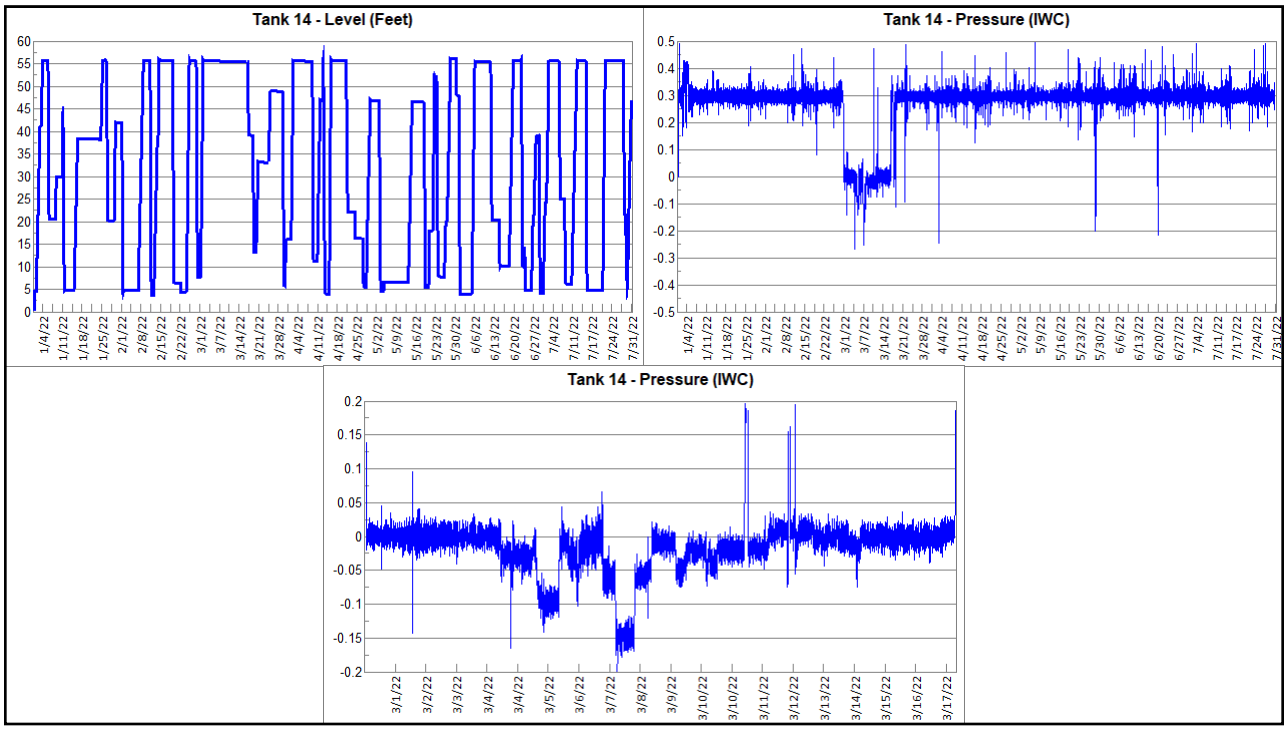

Tank 13 - Level (Feet)
Tank 13 - Pressure (IWC)
Tank 13 - Pressure (IWC)

28



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VOC Emissions – Methods and Inputs

- Used EPA TANKS 5.0
  - https://www.epa.gov/air-emissions-factors-and-quantification/tanks-emissions-estimation-software-version-5
- Emissions estimated tank by tank (since leaks and pressure management varied by tank, over time)
- Inputs – Tank geometry and ambient conditions
  - Used temperature data for Seattle (since TANKS does not have Valdez data). Temperatures were comparable.
- Inputs – Vapor pressure
  - EPA RVP of 5.0
  - Exxon RVP of 10.0
  - Results – VOC Emissions estimated on a monthly basis; which was then converted to average daily basis.
  - Summed over all tanks and all days with pressure management

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Reference: ANS17Y
Crude: Alaska North Slope

ExxonMobil

Crude Summary Report

General Information		Molecules (%wt on crude)		Whole Crude Properties	
Reference:	ANS17Y	methane + ethane	0.02	Density @ 15°C (g/cc)	0.8648
Name:	Alaska North Slope	propane	0.31	**API Gravity**	**32.1**
		isobutane	0.60	Total Sulfur (% wt)	0.96
Origin:	Alaska	n-butane	2.14	Pour Point (°C)	-49
		isopentane	1.06	Viscosity @ 20°C (cSt)	11.1
Assay Date:	8/15/2017	n-pentane	1.49	Viscosity @ 40°C (cSt)	6.4
		cyclopentane	0.19	Nickel (ppm)	11.6
Comments:		C6 paraffins	2.16	Vanadium (ppm)	27.7
		C6 naphthenes	1.34	Total Nitrogen (ppm)	1720
		benzene	0.35	Total Acid Number (mgKOH/g)	0.20
		C7 paraffins	1.88	Mercaptan Sulfur (ppm)	3.9
		C7 naphthenes	2.15	Hydrogen Sulfide (ppm)	0.0
		toluene	0.86	Reid Vapor Pressure (kPa)	73.0

73 kPa = 10.59 psi

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Attachment E

The table below provides estimates for when Alyeska found either leaking or sheared vents, but these estimates are not an indicator that leaks or emissions were occurring during the time periods referenced below. Alyeska managed tank pressures to eliminate or reduce emissions, consistent with managing O_2 levels and tank safety, until the pressure vacuum vents were blinded, plugged, repaired, or found not to be leaking.

Note that times, where available, are approximate.

Tank	Valve	Discovery Date/Time	Type of Damage	Date/Time Repair	Type of Repair
1	B	3/28/2022 7:07	Broke Off	4/1/2022 15:30	Plugged
2	B	3/11/2022	Leak	3/17/2022	Repaired
2	C	3/13/2022 17:50	Broke Off	3/14/2022 15:24	Blind
2	D	3/22/2022	Leak	N/A	Found not to be leaking
2	E	3/18/2022	Leak	3/30/2022	Repaired
2	F	3/20/2022 7:50	Broke Off	3/26/2022	Plugged
2	H	3/10/2022 16:45	Broke Off	3/13/2022 14:30	Plugged
3	A	2/28/2022 14:30	Leak	N/A	Found not to be leaking
3	B	2/28/2022 14:30	Leak	N/A	Found not to be leaking
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5	E	3/15/2022	Leak	3/24/2022 16:07	Repaired
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6	B	2/28/2022 14:30	Leak	N/A	Found not to be leaking
6	H	3/7/2022 0:38	Broke Off	3/10/2022 16:45	Plugged
9	D	3/28/2022	Leak	N/A	Found not to be leaking
9	G	3/11/2022	Leak	N/A	Found not to be leaking
9	H	3/21/2022	Leak	3/22/2022	Repaired
10	A	3/23/2022	Leak	3/23/2022 17:03	Repaired
10	C	2/28/2022 14:30	Leak	3/23/2022 17:03	Repaired
10	D	2/26/2022 10:23	Leak	3/23/2022 17:03	Repaired
10	E	2/26/2022 10:23	Leak	3/23/2022 17:03	Repaired
10	H	3/10/2022 17:00	Broke Off	3/20/2022	Plugged
11	K	3/10/2022	Leak	4/1/2022 17:23	Repaired
12	D	2/28/2022 14:30	Leak	3/13/2022	Repaired
13	N/A	1/20/2022 1:37	Venting	1/20/2022 1:37	N/A - Reported per permit requirements
13	A	3/26/2022 12:08	Leak	3/27/2022	Repaired
13	B	2/25/2022 04:30	Leak	2/28/22	Repaired
13	C	3/26/2022 12:08	Leak	3/27/2022	Plugged
13	F	3/28/2022	Leak	3/28/2022	Repaired
13	I	Leak Discovered 2/28/2022 14:30 Vent Broke off 3/21/2022 15:00	Leak Broke Off	3/22/2022	Plugged
13	K	3/28/2022	Leak	3/29/2022	Repaired
14	F	3/10/2022	Leak	3/14/2022	Plugged
14	H	3/3/2022 4:00	Broke Off	3/8/2022 17:51	Blind
14	I	2/28/2022 14:00	Leak	3/12/2022	Repaired

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RVP=5.0 Calcs

	Number of Leaking Days (All Tanks)	Average Daily Emissions (lb/day)	Emissions Total (lb)	
February - All Tanks	7	353	2471	
March - All Tanks	227.5	486	110672	
April - All Tanks	34	718	24427	
May - All Tanks	21	955	20052	
All			157621	pounds
All			**79**	tons

1. Since this only includes periods of pressure management, how long were the vents damaged/leaking before
Earliest Start Date of 2/25/2022
1a. In the pre-pressure management time period, there would be both breathing and working losses.
2. How long did leaks continue after
Last End Date of 5/21/2022

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RVP=10 Calcs

	Number of Leaking Days (All Tanks)	Average Daily Emissions (lb/day)	Emissions Total (lb)	
February - All Tanks	7	861	6026	
March - All Tanks	227.5	1182	269004	
April - All Tanks	34	1772	60252	
May - All Tanks	21	2454	51538	
All			386819	pounds
All			**193**	tons

1. Since this only includes periods of pressure management, how long were the vents damaged/leaking before
Earliest Start Date of 2/25/2022
1a. In the pre-pressure management time period, there would be both breathing and working losses.
2. How long did leaks continue after
Last End Date of 5/21/2022

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The preliminary VOC emissions range is from an estimated 79 to 193 tons. The lower estimate is likely far too low given the low vapor pressure used as well as the conservative assumptions made and discussed previously. This report concludes that actual emissions are likely to have been substantially more than even the high end of the estimate (i.e., 193 tons).

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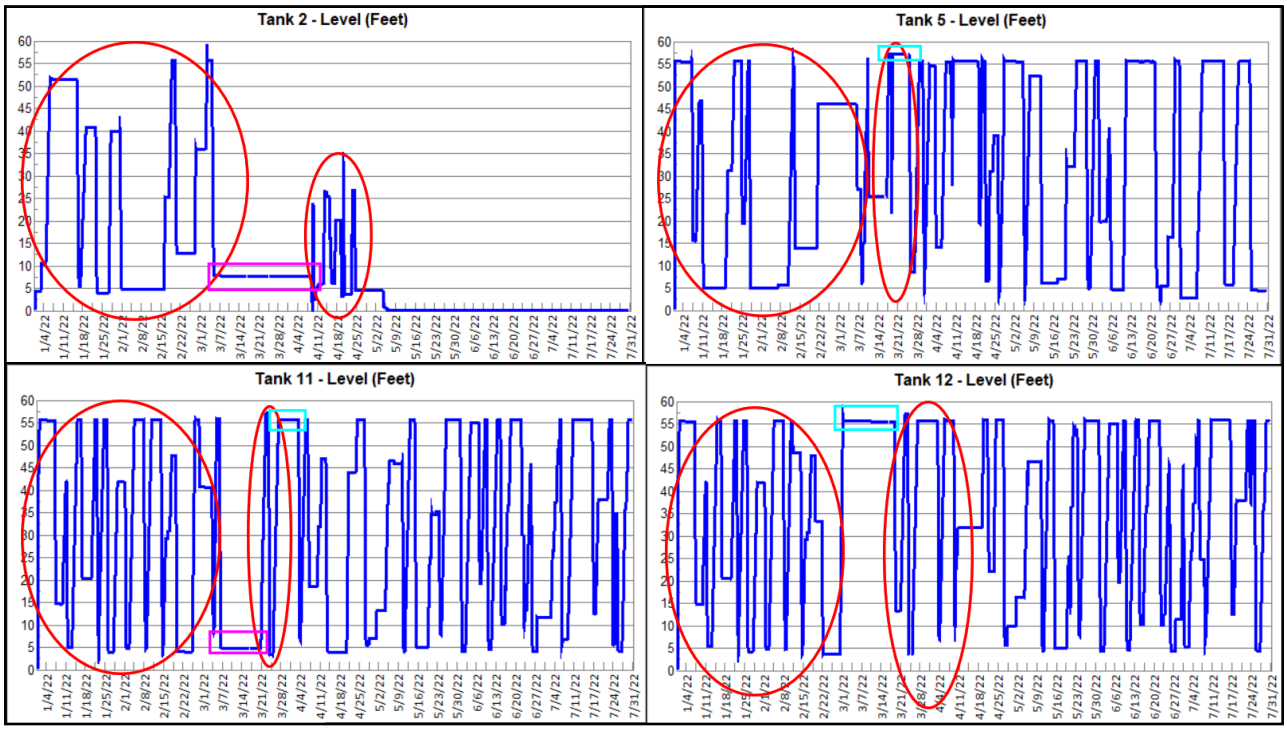
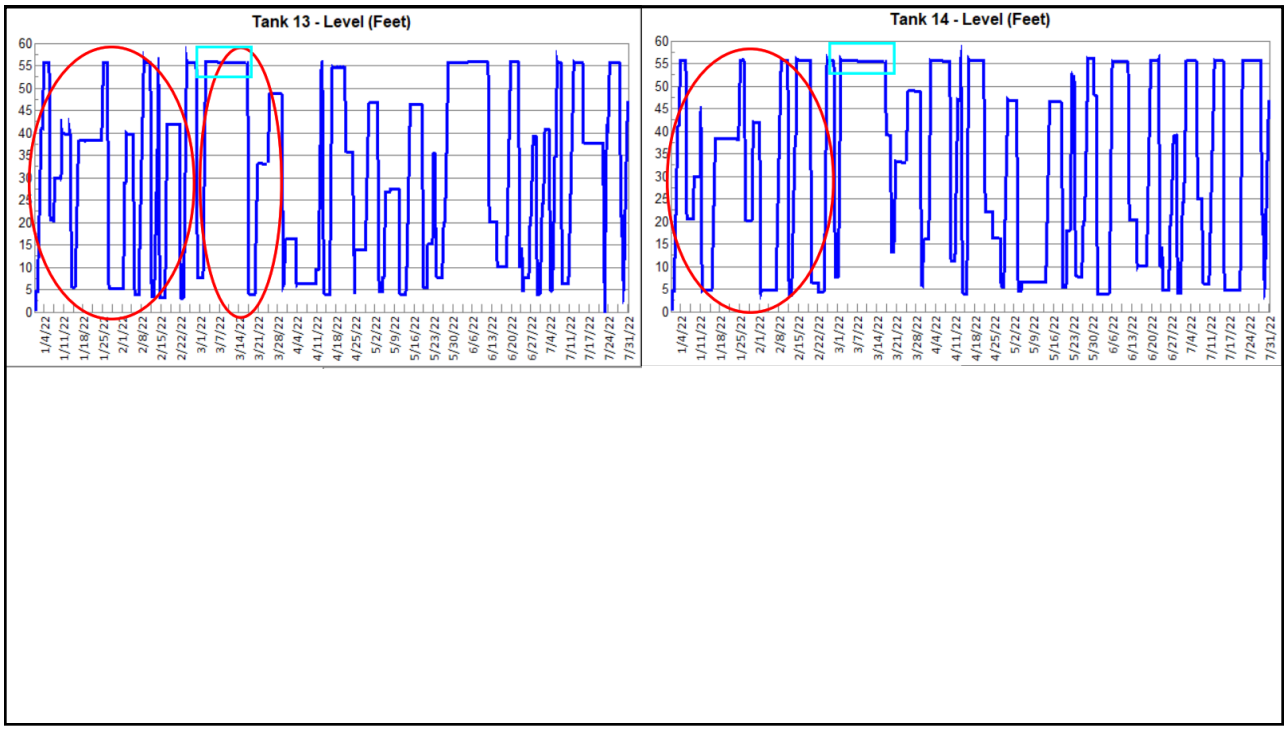
Estimate Conservatism

- **This estimate is highly conservative.**
- Only accounts for emissions from breathing losses from the crude oil storage tanks during this incident
  - Including working losses would substantially increase emissions
- Only accounts for time period of Alyeska pressure management (February – May 2022)
  - Relies on Alyeska data for when damage was first detected and repaired.

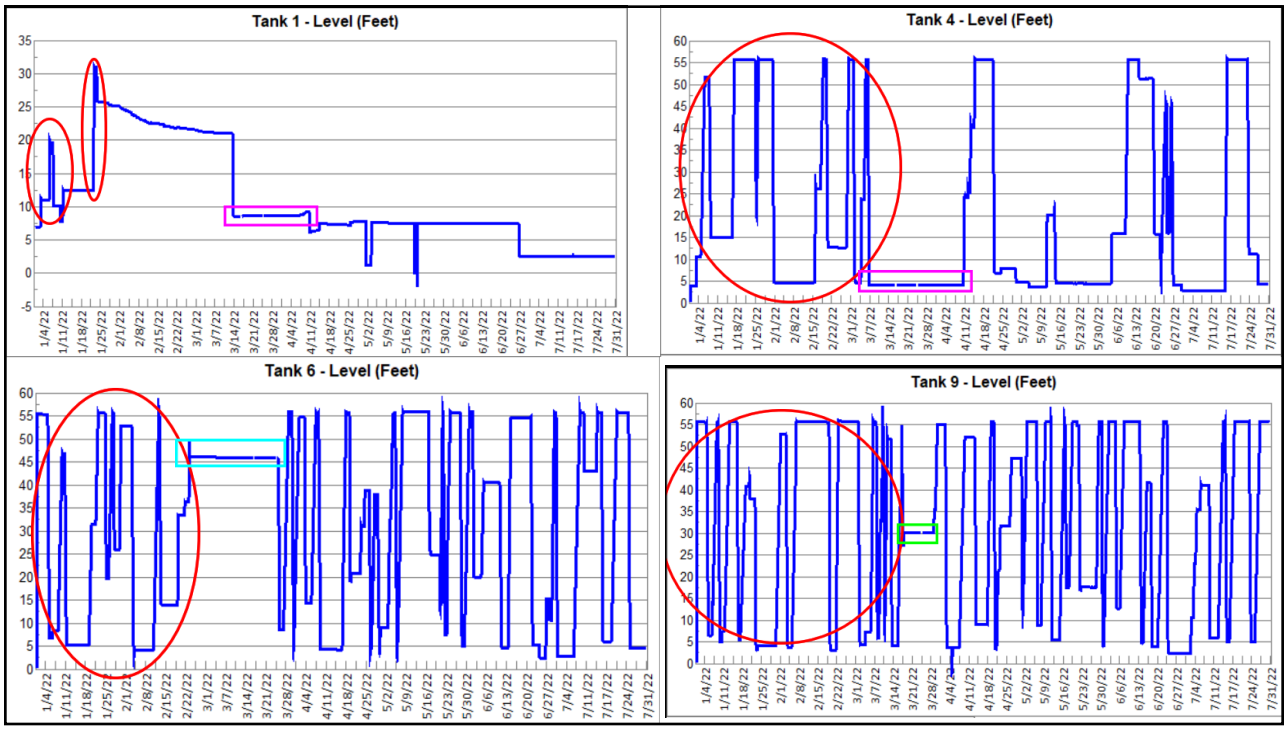
36


Tank 2 - Level (Feet)
Tank 5 - Level (Feet)
Tank 11 - Level (Feet)
Tank 12 - Level (Feet)

37


Tank 13 - Level (Feet)
Tank 14 - Level (Feet)

38



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2020 Updates to 40 CFR 63, Subpart EEEE - *National Emissions Standards for Hazardous Air Pollutants for Organic Liquids Distribution (Non-Gasoline)*

A Review of the Appeal by Alyeska Pipeline Service Company

Prepared by John Beath Environmental, LLC

Final Issued: January 13, 2022

Table 2. VOC Emissions from Crude Oil Storage Tanks

Parameter	VOC Emissions	Unit
Uncontrolled Working Loss	18,705,473	lb/yr
Uncontrolled Standing Loss	2,135,977	lb/yr
Tank Cleaning Loss[14]	0	lb/yr
Total Loss = VOC Emissions Routed to VCU	**20,841,450**	**lb/yr**
VCU Control Efficiency	99.7	%
Actual VCU Emissions from Tanks	62,487	lb/yr
Actual VCU Emissions from Tanks (unit conversion)	**31**	**tpy**
** Tank cleaning not quantified*		

40

Estimate excludes emissions from:

1. "Working" losses – i.e., when tank liquid levels rise
2. Documented leaks before Feb. 2022
3. Documented leaks after May 2022
4. Tanks 7 and 8, which sustained documented vent damage
5. Ballast Water Tanks, which sustained documented vent damage
6. Documented leaks from thief hatches during Feb. - May 2022

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1. Excluding Tank Working Losses from the Emissions Estimate

- Normally, Tank emissions are the sum of Breathing (or Standing) Losses PLUS Working Losses
  - Working Losses account for emissions that are expelled from the tank as the tank is filled, causing the vapors above the liquid level to the displaced
  - Unless a tank has very infrequent throughputs, working losses can **dominate** breathing losses.
  - Alyeska sought to reduce throughputs in the tanks that were leaking during pressure management.
  - Nonetheless there were occasions when there were changes in the liquid level for the leak period. These working losses, which could be substantial, are not included in the current emissions estimate.

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2. Excluding Documented Leaks Before Feb. 2022 from Emissions Estimate

33361	VMT - Power Vapor	VMT Operations	01/19/2022 01:37:00	Loss Incident	Closed	[redacted]	Tank Farm Tank 13	OCC notified control room operator crude incoming needed to be moved from tank 10 to tank 13. Control room operator prepared tank for incoming switch then notified OCC tank was ready for incoming switch. OCC started opening tank 13 inlet valve and tank 13 vent valve failed around 15% causing the tank pressure to immediately rise. Control room operator notified OCC to abort the incoming switch due to the vent valve failure at the same time the tank farm evacuation alarm was triggered tank 13 pressure increased to 1.53 IWC. OCC suspended the tank switch and incoming crude was returned to tank 10.

From: [redacted]
Sent: Saturday, June 13, 2020 8:35 AM
To: [redacted]
Cc: [redacted]
Subject: FW: 0245 Form CID#278176

[redacted]

Please review the attached documents for approval to stock a replacement seal for the crude storage tank thief hatches. During recent LDAR testing I discovered one that was leaking and had to use silicone to stop the leak. The hatch would not seal up with the adjustment handle. I could not find an existing part already in the system for these. think there are 4-5 hatches on each tank. The hatches are a Varec 42 series 8"

[redacted]

11	K	3/10/2022	Leak	4/1/2022 17:23	Repaired
12	D	2/28/2022 14:30	Leak	3/13/2022	Repaired
13	N/A	1/20/2022 1:37	Venting	1/20/2022 1:37	N/A - Reported per permit requirements
13	A	3/26/2022 12:08	Leak	3/27/2022	Repaired

Note: this study does not account for these documented leaks before Feb. 2022

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3. Excluding Documented Leaks after May 2022 from Emissions Estimates

						6/18/22 | [redacted] REPAIRING NOZZLE; VAC/VENT C| 54-TK-4| PSV-1023C | WO 221007668 - 60 WAS DOING LDAR Y1 PM ON ROOF PENETRATIONS. WALKED BY C AND COULD SMELL VAPORS. EXAMINED AND FOUND CRACK ON BACKSIDE OF NOZZLE. (IT MUST HAVE BEEN MISSED WHEN THE TANK WAS EXAMINED DURING SPRING AND/OR RECENTLY DEVELOPED.)REPAIRED USING PRO SEAL 34 (CID 164941). SEE PHOTOS. INITIAL LDAR: 100% (OR) LEL FINAL LDAR: 0% LEL NEW VALVE TO BE INSTALLED ON WO 221012397.
OMS,54-TK-4, DAMAGED AND LEAKING VACUUM VENT VALVES	54-TK-4		54,M,PSV-1023C, VACUUM VENT LEAKING	MECHANICAL				
33705	VMT - East Tank Farm	VMT Operations	06/20/2022 02:40:00	Loss Incident	Open	[redacted]	VMT, TK14, 54-PSV-1033C	During weekly tank top PVV monitoring by OPS the PVV was found to have a slight leak.

Note: this study does not account for these documented leaks after May 2022

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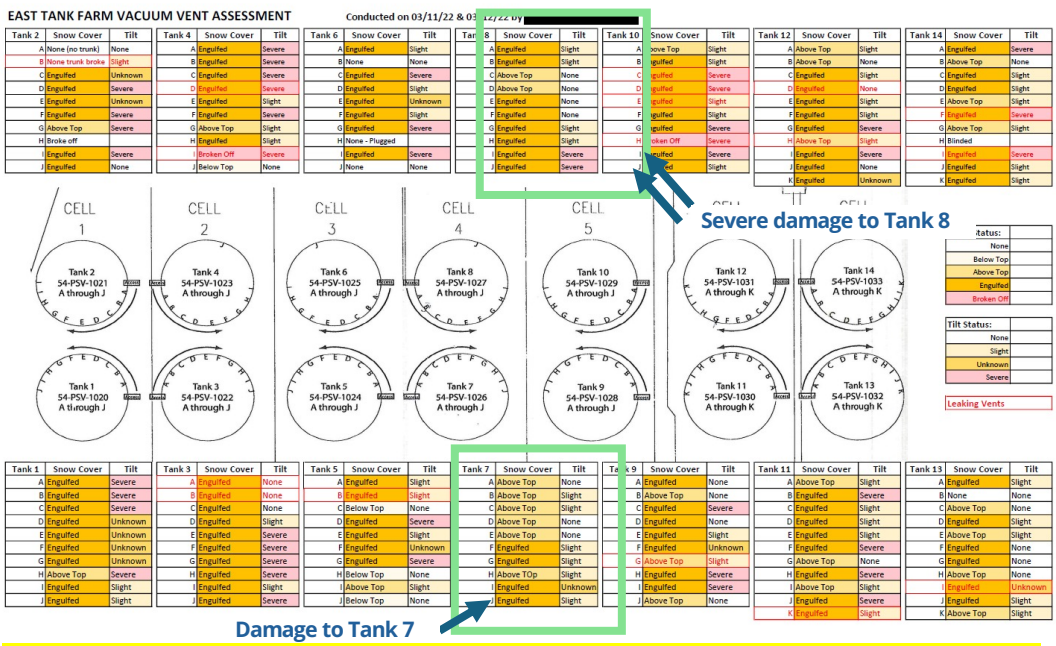

Note: this study does not account for potential emissions from Tank 7 and 8's damaged vents

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5. Excluding Documented Leaks from Ballast Water Tank Vent Valve Leaks from Feb. – May 2022 in Emissions Estimates

Operations

Operation #:	10	Description:	51,M,TK-93, ADJUST-REPAIR LEAKING VENT VLV TK 93 EAST SIDE
Operation Complete:	Yes	Scheduled Start Date:	03/08/2022
Estimated Hours:	8	Scheduled End Date:	03/08/2022
Crew:	VMT MNT CR		

Operation Long Description

REQUESTED BY: [redacted]
*
PROBLEM:
- LEAKING VENT VALVE ON TANK-93 EAST SIDE.
*
LOCATION:
- TANK TOP, TK 93
*
INITIAL ACTION TAKEN:
- VERIFIED BENZENE WITH GAS MONITER BY SAFETY.
*
ENERGY ISOLATION REQUIRED:
- NO
*
SCOPE OF WORK:

WO Type: CO Priority: EMERGENCY	Work Order #
Scheduled Start Date: 03/09/2022 Scheduled Completion Date: 03/09/2022 Estimated Hours: 24.01	221007961 *DUPLICATE - CANCELLED*51,MC-1,TK-93, Snow has moved down the tank and is pushing on and going over the top the pressure vents causing them to leak. WO Need Date: Status: Cancelled Created By: [redacted]

Note: this study does not account for these documented leaks from the ballast water storage tanks from Feb – May 2022

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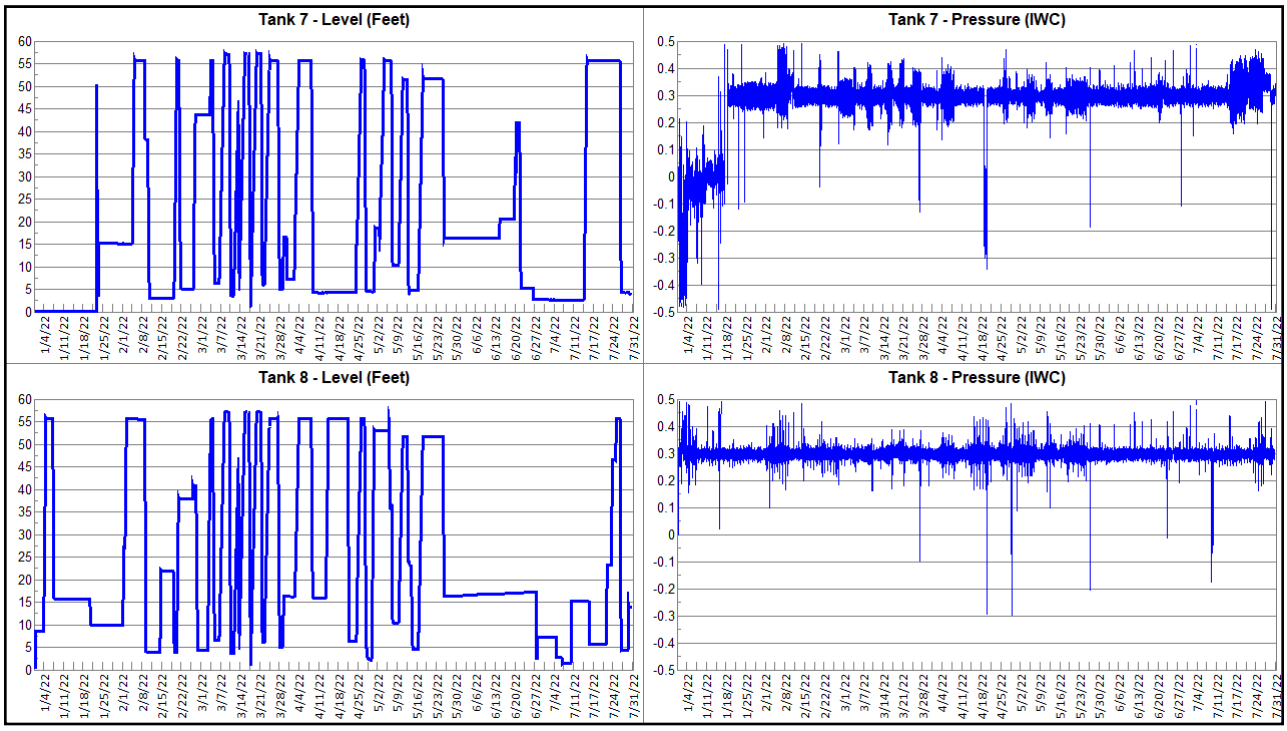

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6. Excluding Documented Leaks from Thief Hatches from Feb. – May 2022 in Emission Estimates

[redacted]

From: [redacted]
Sent: Tuesday, March 15, 2022 5:39 PM
To: [redacted]
Cc:
Subject: 0245; CID 173313; Thief Hatch; WO 221008049
Attachments: Thief hatch product data sheet; WO 221008049.pdf; 0245; Thief hatch; WO 221008049.pdf

All,
See attached 0245 and product data sheet. We'd like to stock one so that we can outright replace a thief hatch since they keep getting damaged from ice/snow and leak a significant amount of HC vapors. We have instances in the past where they have to be 5200'ed to get them to seal.

[redacted],
Please review and approve and let JW know so he can finish processing.

Thanks.

[redacted]
VMT Mechanical Maintenance; A Shift
Alyeska Pipeline Service Company

Additional Information

Tagout Required: No	**UNSAT:**	**PWR/SPO #:**	**Related FMA/RCM:**
Shutdown Type:	**PSMOC:**		**Planner:**

Operations

Operation #:	10	**Description:**	51,M,TK-93, SKIMMER HATCH LEAKING
Operation Complete:	Yes	**Scheduled Start Date:**	03/08/2022
Estimated Hours:	2	**Scheduled End Date:**	03/08/2022
Crew:	VMT MNT CR		

Operation Long Description

REQUESTED BY: [redacted] / X6241 / 3-14-22
*
PROBLEM:
- SKIMMER HATCH ON TK-93 IS LEAKING
*
LOCATION:
- TK 93
*
ENERGY ISOLATION REQUIRED:
- TBD
*
SCOPE OF WORK:
1. PREPARE FOR WORK (RESEARCH/TOOLS/MATERIALS/PERMITTING/ETC)
-REMEMBER YOUR SPSA
-NOTES:

Page 1 of 3 — Alyeska Work Order #221008185

Note: this study does not account for these documented thief hatch leaks from Feb. – May 2022

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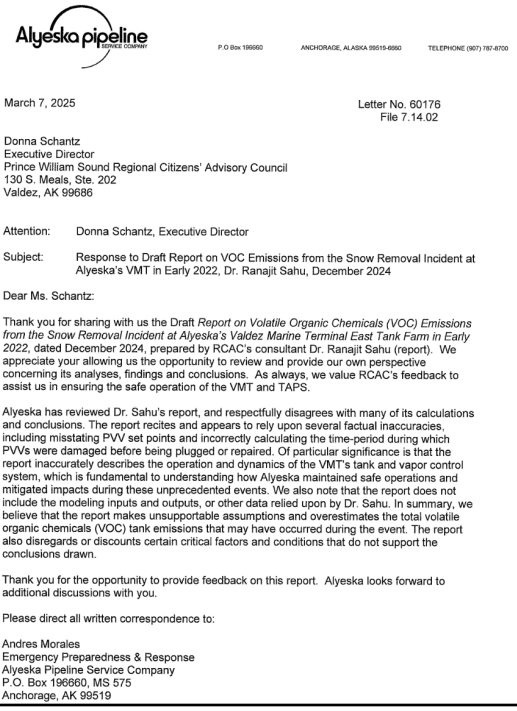
TIMELINE:

- **February 4, 2025:** A draft report of these findings was transmitted via email to Alyeska.
- **February 25, 2025:** A letter from Alyeska (GL60146) to PWSRCAC, dated February 25, 2025, confirmed receipt of this draft report and that the information contained herein was being reviewed by subject matter experts.
- **March 7, 2025:** A follow-up letter from Alyeska (GL60176, Appendix D) was transmitted on March 7, 2025, sharing that Alyeska reviewed Dr. Sahu's draft report, that Alyeska respectfully disagreed with many of the report's calculations and conclusions, and that they believe the total emission estimates are overestimated. Alyeska specifically cited that the report "...appears to rely upon several factual inaccuracies, including misstating PVV [pressure vacuum valve] set points and incorrectly calculating the time-period during which PVVs were damaged before being plugged or repaired. Of particular significance is that the report inaccurately describes the operation and dynamics of the VMT's tank and vapor system... We also note that the report does not include the modelling inputs or outputs, or other data relied upon by Dr. Sahu."
- **March 7, 2025:** During their regularly scheduled meeting, PWSRCAC's Terminal Operations and Environmental Monitoring (TOEM) Committee members verbally expressed to Alyeska staff present that the committee would like to collaborate with Alyeska to refine the report findings and address Alyeska's concerns.
- **March 13, 2025:** PWSRCAC transmitted the requested tank input/output data to Alyeska, per Alyeska's March 7 letter, noting the data was drawn from Alyeska source documents listed in the report body. Subsequently, Alyeska staff verbally confirmed receipt of the requested data, and stated that Alyeska would not be providing additional feedback or information on the report.
- **March 19, 2025:** Alyeska reconfirmed in writing that they would not be providing additional feedback on the report and expressed hope that PWSRCAC will work to make corrections and provide the context (such as the modeling) for how the report was generated. Some of the information requested had already been previously shared with Alyeska on March 13, 2025 (see above).



Alyeska pipeline SERVICE COMPANY

P.O Box 196660 ANCHORAGE, ALASKA 99519-6660 TELEPHONE (907) 787-8700

March 7, 2025

Letter No. 60176
File 7.14.02

Donna Schantz
Executive Director
Prince William Sound Regional Citizens' Advisory Council
130 S. Meals, Ste. 202
Valdez, AK 99686

Attention: Donna Schantz, Executive Director

Subject: Response to Draft Report on VOC Emissions from the Snow Removal Incident at Alyeska's VMT in Early 2022, Dr. Ranajit Sahu, December 2024

Dear Ms. Schantz:

Thank you for sharing with us the Draft *Report on Volatile Organic Chemicals (VOC) Emissions from the Snow Removal Incident at Alyeska's Valdez Marine Terminal East Tank Farm in Early 2022*, dated December 2024, prepared by RCAC's consultant Dr. Ranajit Sahu (report). We appreciate your allowing us the opportunity to review and provide our own perspective concerning its analyses, findings and conclusions. As always, we value RCAC's feedback to assist us in ensuring the safe operation of the VMT and TAPS.

Alyeska has reviewed Dr. Sahu's report, and respectfully disagrees with many of its calculations and conclusions. The report recites and appears to rely upon several factual inaccuracies, including misstating PVV set points and incorrectly calculating the time-period during which PVVs were damaged before being plugged or repaired. Of particular significance is that the report inaccurately describes the operation and dynamics of the VMT's tank and vapor control system, which is fundamental to understanding how Alyeska maintained safe operations and mitigated impacts during these unprecedented events. We also note that the report does not include the modeling inputs and outputs, or other data relied upon by Dr. Sahu. In summary, we believe that the report makes unsupportable assumptions and overestimates the total volatile organic chemicals (VOC) tank emissions that may have occurred during the event. The report also disregards or discounts certain critical factors and conditions that do not support the conclusions drawn.

Thank you for the opportunity to provide feedback on this report. Alyeska looks forward to additional discussions with you.

Please direct all written correspondence to:

Andres Morales
Emergency Preparedness & Response
Alyeska Pipeline Service Company
P.O. Box 196660, MS 575
Anchorage, AK 99519

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