

APPENDIX 1

Examples of Oxbow's Actions to Conceal or Avoid Detection of its SO₂ Emissions at the TCEQ Monitor

DESCRIPTION AND OVERVIEW: The data and information PASE compiled and provided as examples herein show Oxbow's development, implementation, and use of protocols to circumvent detection of its SO₂ emissions at the nearby TCEQ Monitor and to conceal from the TCEQ and public its emissions in excess of the NAAQS One Hour ground level standard (sometimes referred to herein as Oxbow's "SO₂ Monitor-Detection Warning and Concealment Protocol" or Oxbow's "Pollution Concealment Tactics").

As detailed more fully in PASE's Supp. MTV, in response to the TCEQ placing a SO₂ Monitor near Oxbow's Port Arthur facility to monitor and measure the amount of SO₂ pollution in the ambient air beginning in late 2016 (sometimes referred to herein as the "TCEQ SO₂ Monitor"), Oxbow immediately began developing and implementing its sophisticated and effective system of SO₂ Monitor-Detection Warning and Concealment Protocol. Oxbow's Pollution Concealment Tactics generally included (i) Oxbow's automated warning system notifying it of the specific and limited times when the TCEQ SO₂ Monitor is predicted to detect or actually is detecting and measuring Oxbow's emissions in increasing quantities (sometimes referred to herein as a "monitor detection window")¹ and of elevated TCEQ SO₂ Monitor readings, and (ii) Oxbow implementing temporary changes to its normal calcining operations to reduce its ordinary SO₂ emissions and increase the dispersion of such emissions in advance of and during those monitor detection windows and instances of elevated SO₂ readings so that monitor readings are likely to be reduced.

The primary and most consistent temporary change Oxbow makes to its normal calcining operations during monitor detection windows and in response to elevated TCEQ SO₂ Monitor readings is to simply reduce its normal calcining operations/output (i.e. its operations which produce its SO₂ emissions) during those times. Oxbow does this by reducing its kiln feed rates and sometimes even shutting its kilns down entirely. One of the ways Oxbow temporarily increases dispersion of its SO₂ emissions during monitor detection windows is by using large industrial fans (referred to as an "excess air fan" or "EAF") in advance of and during monitor detection windows which allows Oxbow to (i) temporarily dilute the concentration of SO₂ pollutants in its emissions, and (ii) increase the exit velocity of its emissions, thereby altering the trajectory of its pollution plume in an effort to avoid detection by the TCEQ SO₂ Monitor.²

¹ Oxbow's environmental scientists learned that sustained wind speeds blowing in a directional cone of approximately 170-200 degrees were required for the TCEQ SO₂ Monitor to detect and measure Oxbow's emissions at levels that were problematic under the NAAQS standard. *See* Ex. 6 (Tr., V. 4 at p. 859). Thus, Oxbow incorporated predicted wind forecasts, combined with 5-minute monitor data, to predict and take corrective action during times of likely monitor exceedances.

² Oxbow's environmental personnel, Doug Landwehr, confirmed at the arbitration hearing that the Excess Air Fan "affects the flow of the plume itself" and admitted that Oxbow "experimented with increasing the excess air fan." *See* Ex. 6 to PASE's MTV (Vol. 4, p. 879).

The following examples reveal how Oxbow implements its Pollution Concealment Tactics. These examples are substantiated by Oxbow's own documents which have been provided to the Court as supporting evidence.³ The examples reflect Oxbow engaging in this conduct while recording that it was operating in its all-hot stack mode before and after Oxbow completely and permanently shut PASE down on June 25, 2018 – which Oxbow claims to have done after concluding that its hot stacks supposedly complied with the required limit of 75 ppb; thereby making the installation of SO₂ pollution controls unnecessary and/or unreasonable.⁴

Pre-June 25, 2018 Examples of Oxbow's Implementation and Use of Its Pollution Concealment Tactics:

Date	Overview of Oxbow's Actions	Detailed Timeline of Pertinent Events	Wind Conditions	Citations
April 25, 2017	[REDACTED]	<ul style="list-style-type: none"> 10:00: 78.7 SO₂ ppb monitor reading 10:10: 76.7 SO₂ ppb monitor reading 10:30: Oxbow shuts kiln 2 down entirely [REDACTED] 	10:00: <ul style="list-style-type: none"> Wind Direction ("WD"): 189.7 (inside monitor detection window) Wind Speed ("WS"): 15.1 16:55: <ul style="list-style-type: none"> WD: 163.8 (outside monitor detection window) WS: 16.1 	Ex. 16 to PASE's MTV at p. 642-644 (Arb. Ex. C-236, Oxbow 0028101); [REDACTED]

³ For the Court's ease of reference, for each example below, PASE has provided specific citations to the exact source of the data and information detailed herein along with the specific location within such document that the information described can be located.

⁴ All of the following examples are from dates when Oxbow's records show that it was operating in an all-hot stack mode (either by bypassing PASE's boilers and the cold stacks by diverting its flue gas to be emitted directly through its hot stacks or by operating exclusively through its hot stacks after Oxbow forced PASE to completely cease operating its steam plant).

May 3, 2017	<p>During monitor detection window and period of elevated SO₂ readings triggering Oxbow's SO₂ monitor-detection warning and concealment protocol while recording that it was in an all hot stack mode, Oxbow significantly reduced the rate of its sulfur dioxide emissions</p>	<ul style="list-style-type: none"> • 10:30: 94.4 SO₂ ppb monitor reading • 10:35: 124.9 SO₂ ppb monitor reading • 10:55: 139.0 SO₂ ppb monitor reading • 11:03 "feed changes completed" 	<p>10:30:</p> <ul style="list-style-type: none"> • WD: 181.0 (inside monitor detection window) • WS: 17.0 <p>14:05:</p> <ul style="list-style-type: none"> • WD: 169.9 (outside monitor detection window) • WS: 14.3 	<p>Ex. 16 to PASE's MTV at p. 687-88 (Arb. Ex. C-236, Oxbow 0028101):</p>

⁵ See Ex. 16 to PASE's MTV at p. 688 (Arb. Ex. C-236, Oxbow 0028101) (showing kiln 3 "feed back into system" at 13:05 (meaning 1:05 p.m.));

		<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] 		
June 30, 2017	During monitor detection window and period of elevated SO ₂ readings triggering Oxbow's SO ₂ monitor-detection warning and concealment protocol while recording that it was in an all hot stack mode, Oxbow temporarily and significantly reduced its SO ₂ emissions by reducing the feed rates to all of its kilns.	<ul style="list-style-type: none"> • 6:10: Oxbow reduced feed rate on kiln 2 from 10 tph to 9 tph, kiln 3 from 18 tph to 17 tph, and kiln 4 from 20 tph to 18 tph • 9:05: 45.0 SO₂ ppb • 9:30: 46.1 SO₂ ppb • 9:40: Oxbow reduced feed rate on kiln 5 from 25 tph to 24 tph and kiln 4 from 18 tph to 17 tph • 10:10: 45.7 SO₂ ppb • 10:25: 59.6 SO₂ ppb • 11:00: Oxbow reduced kiln 2 feed rate from 9 tph to 8 tph 	6:00: <ul style="list-style-type: none"> • WD: 196.1 (within monitor detection window) • WS: 12.1 11:00 <ul style="list-style-type: none"> • WD: 179.5 (within monitor detection window) • WS: 13.4 	Ex. 16 to PASE's MTV at p. 1013-15 (Arb. Ex. C-236, Oxbow 0028101); [REDACTED]
April 6, 2018	[REDACTED]	<ul style="list-style-type: none"> • 12:30: 39.9 SO₂ ppb • [REDACTED] • [REDACTED] • [REDACTED] • 14:00: 76.8 SO₂ ppb • 14:10: 97.5 SO₂ ppb • 14:30: 103.6 SO₂ ppb • [REDACTED] • [REDACTED] 	12:30 <ul style="list-style-type: none"> • WD: 180.6 (within monitor detection window) • WS: 18.6 16:00 <ul style="list-style-type: none"> • WD: 194.5 (within monitor detection window) • WS: 17.1 	Ex. 16 to PASE's MTV at p. 2537-8 (Arb. Ex. C-236, Oxbow 0028101); [REDACTED]

[REDACTED] Oxbow continued these practices after shutting PASE down completely on June 25, 2018. The following are examples of Oxbow's continuing use of its Monitor-Detection Warning and Concealment Protocol after Oxbow shut down PASE's business on June 25, 2018 -- for the purported reason that Oxbow was compliant with the NAAQS 75 ppb SO₂ limit when it operated in an all hot stack mode and was not compliant when it emitted flue gas through its cold stacks after delivering heat to PASE's steam plant under the terms of its Heat Energy Agreement with PASE.⁸

Post-June 25, 2018 Examples of Oxbow's Pollution Concealment Tactics:

Date	Overview of Oxbow's Actions	Detailed Timeline of Pertinent Events	Wind Conditions	Citations
Nov. 5, 2018	During monitor detection window and period of elevated SO ₂ readings triggering Oxbow's SO ₂	<ul style="list-style-type: none"> Kiln status: Oxbow only operating kilns 2, 3, and 5 in hot 	8:00	Ex. 16 to PASE's MTV at p.

⁶ Oxbow developed similar systems for each of its three U.S. calcining facilities. See Ex. 86 to PASE's MTV (Oxbow 0017613).

⁷ Oxbow's experiments, if legitimate, should have resulted in across the board changes in its operations to control SO₂ emissions because Oxbow's Monitor-Detection Warning and Concealment Protocols demonstrably "worked." By implementing them, Oxbow decreased the SO₂ readings at the Monitor and could avoid exceedances when readings escalated. If Oxbow wanted to actually operate on a full-time basis within the NAAQS limit, it would have implemented the operational controls suggested from those "experiments" that resulted in reducing its SO₂ or preventing exceedances. Sometimes Oxbow made operational moves to decrease the monitor reading when no experiment was taking place. Oxbow representative Doug Landwehr recognized that on March 7, 2017 when the monitor reading went to 112.3 ppb and multiple moves were made, there was no "experiment" taking place. (MTV Ex. 6 at p. 922-25).

⁸ Because the Panel denied PASE's requests for discovery concerning Oxbow's activities involving the TCEQ SO₂ Monitor after it shut PASE down, PASE not obtain any writeups of those 75 or so experiments after PASE was shut down. Thus, PASE is unable to present the full extent of Oxbow's actions affecting the monitor after June 25, 2018. However, the evidence discussed below, based upon records that PASE received, establishes that Oxbow continued its same practices that it developed and implemented before it shut PASE down.

	<p>monitor-detection warning and concealment protocol (and with just 3 of its 4 kilns operating), Oxbow (i) significantly reduced its SO₂ emissions by reducing the feed rates on 2 of its 3 active kilns, (ii) altered the trajectory of its pollution plume by significantly turning up its excess air fans ("EAF") on 2 of its 3 active kilns (which increases the velocity of Oxbow's pollution plume as it exits into the atmosphere, thereby changing the trajectory of the plume), and (iii) diluted the concentration of its SO₂ pollution in the ambient air through its increased use of EAF fans on 2 of Oxbow's 3 active kilns.</p> <p>This example of Oxbow temporarily changing its operations to conceal its actual SO₂ emissions occurred over four months after Oxbow completely shut PASE down and while Oxbow was only operating three of its four kilns.</p>	<p>stack mode with kiln 4 off</p> <ul style="list-style-type: none"> 10:00: Oxbow significantly increased its EAF fans for kilns 2 and 3, turning both of them up to 15-20% greater than normal 11:45: 61.3 SO₂ ppb 12:45: 62.9 SO₂ ppb 12:55: 80.1 SO₂ ppb 13:55: Oxbow reduced feed rates for kilns 2 and 3 by 2 tph each 	<ul style="list-style-type: none"> WD: 91.6 (outside monitor detection window) WS: 4.0 <p>9:15</p> <ul style="list-style-type: none"> WD: 174.9 (within monitor detection window) WS: 11.1 <p>13:45</p> <ul style="list-style-type: none"> WD: 204.4 (outside monitor detection window) WS: 19.6 	3716-17 (Arb. Ex. C-236, Oxbow 0028101)
January 18, 2019	<p>During monitor detection window and period of elevated SO₂ readings triggering Oxbow's SO₂ monitor-detection warning and concealment protocol, Oxbow (i) significantly reduced its SO₂ emissions by reducing the feed rates on 2 of its 4 active kilns, (ii) altered the trajectory of its pollution plume by significantly turning up its EAF fan on kiln 2, and (iii) diluted the concentration of its SO₂ pollution in the ambient air through its increased use of its EAF fan on kiln 2.</p>	<ul style="list-style-type: none"> Kiln status: Oxbow operating all kilns (2, 3, 4, and 5) in hot stack mode 11:55: Oxbow significantly increased its EAF fan for kiln 2 to 15-20% more than normal 18:35: 45.6 SO₂ ppb 18:40: 65.1 SO₂ ppb 18:50: 78.7 SO₂ ppb 	<ul style="list-style-type: none"> WD: 174.4 (inside monitor detection window) WS: 7.6 <p>18:30:</p> <ul style="list-style-type: none"> WD: 176.6 (inside monitor 	Ex. 16 to PASE's MTV at p. 4134-36 (Arb. Ex. C-236, Oxbow 0028101)

	<p>This example of Oxbow continuing its Pollution Concealment Tactics occurred approximately seven months after Oxbow completely shut PASE down.</p>	<ul style="list-style-type: none"> 19:30: Oxbow reduced kiln 2 feed rate by 2 tph 19:35: 67.4 SO₂ ppb 19:40: 68.8 SO₂ ppb 19:50: Oxbow reduced kiln 5 feed rate by 2 tph 	<p>detection window)</p> <ul style="list-style-type: none"> WS: 21.7 	
March 7-8, 2019	<p>In advance of and during monitor detection window and period of elevated SO₂ readings triggering Oxbow's SO₂ monitor-detection warning and concealment protocol (and with Oxbow only operating 3 of its 4 kilns (kilns 2, 3, and 4)), Oxbow took drastic steps to conceal its SO₂ pollution from the TCEQ SO₂ Monitor and the TCEQ. This includes Oxbow shutting kiln 3 down entirely at the start of the monitor detection window and then -- even though operating just 2 of its 4 kilns -- further reducing its already significantly reduced operations and artificially deflating its SO₂ emissions even more by significantly reducing the feed rates on both kilns 2 and 4.</p> <p>On March 8, 2019, Oxbow temporarily cut back its normal operations and SO₂ emissions in response to the monitor detection window and elevated SO₂ monitor readings to approximately 25% of its normal production rate. (for instance, at 12:45, Oxbow was only processing a total of 21 tons per hour, which is 25.6% of Oxbow's average rate of 82 tons per hour for its Port Arthur. <i>See</i> Ex. 103 (C-11 [Oxbow-0022119 at Capacity Utilization sheet])). Despite this, --</p>	<ul style="list-style-type: none"> Kiln status: Oxbow only operating kilns 2, 3, and 4 in hot stack mode 3/7/2019 at 18:00: Oxbow completely shut down feed to kiln 3 in advance of upcoming monitor detection window 3/8/2019 at 0:00: only kilns 2 and 4 active 1:25: 21.0 SO₂ ppb 1:35: 28.0 SO₂ ppb 1:40: 31.4 SO₂ ppb 2:55: Oxbow decreased kiln 4 feed rate by 2 tph to 13 tph 3:55: Oxbow decreased kiln 2 feed rate by 2 tph to 7 tph 9:30: 28.0 SO₂ ppb 9:40: 48.3 SO₂ ppb 9:55: 61.6 SO₂ ppb 11:30: 64.2 SO₂ ppb (while Oxbow was 	<p>3/7/2019 at 21:00:</p> <ul style="list-style-type: none"> WD: 171.1 (within monitor detection window) WS: 9.7 <p>3/8/2019 at 1:05</p> <ul style="list-style-type: none"> WD: 181.3 (within monitor detection window) WS: 10.8 <p>3/8/2019 at 16:50</p> <ul style="list-style-type: none"> WD: 169.9 (outside monitor detection window) 	<p>Ex. 16 to PASE's MTV at p. 4407- 4412 (Arb. Ex. C-236, Oxbow 0028101); Ex. 103 (C-11, Oxbow-0022119 at Capacity Utilization sheet).</p>

	<p>even having temporarily and artificially reduced its regular operations and SO₂ emissions by 75% in an effort to conceal the actual amount of SO₂ pollution it regularly emits – <u>25.6%</u> of Oxbow's normal calcining operations and emissions still resulted in Oxbow's emission of SO₂ pollution <u>of 77.5 SO₂ ppb</u>. Put differently, <i>Oxbow exceeds 75 SO₂ ppb</i> even when it is conducting its SO₂-pollution causing calcining operations <i>at less than 26% of its normal rate</i>.</p>	<p>operating only 2 kilns at significantly reduced rates (kiln 2 at 7 tph and kiln 4 at 13 tph) and processing a <i>total of 20 tons per hour</i>, which is <i>less than 25% of Oxbow's average feed rate</i> for its Port Arthur facility <i>of 82 tons per hour</i>.)</p> <ul style="list-style-type: none"> • 12:45: 77.5 SO₂ ppb (kiln 3 and 5 off; kiln 2 at 8 tph and kiln 4 at 11 tph; and <i>operating at less than 25% of Oxbow's normal production rate</i>) • 12:00-14:00: Oxbow increased feed rates when the weather conditions indicated the monitor detection window was ending and then decreased feed rates again when it looked like the monitor detection window would continue longer than expected 	<ul style="list-style-type: none"> • WS: 12.3 	
April 11, 2019	<p>During monitor detection window and period of elevated SO₂ readings triggering Oxbow's SO₂ monitor-detection warning and concealment protocol, Oxbow temporarily significantly reduced its normal SO₂ emissions by reducing the feed rate on each one of its kilns.</p>	<ul style="list-style-type: none"> • Oxbow operating all kilns (2, 3, 4, and 5) in hot stack mode • 12:05: 25.3 SO₂ ppb • 12:10: 33.8 SO₂ ppb • 12:25: 40.4 SO₂ ppb 	<p>12:05</p> <ul style="list-style-type: none"> • WD: 182.9 (within monitor detection window) 	<p>Ex. 16 to PASE's MTV at p. 4604 (Arb. Ex. C-236, Oxbow 0028101)</p>

		<ul style="list-style-type: none"> 12:55: Oxbow reduced the feed rate on all of its kilns by 2 tph each 	<ul style="list-style-type: none"> WS: 15.9 	
June 23, 2019	<p>During monitor detection window and period of elevated SO₂ readings triggering Oxbow's SO₂ monitor-detection warning and concealment protocol, Oxbow temporarily and significantly reduced its normal SO₂ emissions by reducing the feed rate on each one of its kilns.</p> <p>This last example and the one prior are merely included to show that Oxbow's pollution and concealment activities continued for the entire period that records were made available to PASE, more than a year after PASE had been shut down.⁹</p>	<ul style="list-style-type: none"> Oxbow operating all kilns (2, 3, 4, and 5) in hot stack mode 9:05: 40.1 SO₂ ppb 9:55: Oxbow reduced the feed rate on all of its kilns by 2 tons per hour each 	<p>9:05</p> <ul style="list-style-type: none"> WD: 182.0 (within monitor detection window) WS: 15.7 	Ex. 16 to PASE's MTV at p. 5015-16 (Arb. Ex. C-236, Oxbow 0028101)

As previously referenced, after Oxbow significantly reduces its SO₂ emissions by reducing its feed rates during monitor detection windows, and once the monitor detection window passes, Oxbow resumes calcining coke and emitting SO₂ pollution at its normal higher rates as seen from the below chart with Oxbow's average feed rate and specific examples of Oxbow's feed rates when the wind is blowing towards, and when the wind is blowing away from, the monitor (feed rates below are in tons per hour or "TPH"):

Avg. Feed Rate (Ex. 103, Arb. Ex. C11)	Feed Rates When Wind Blowing Away From Monitor	Feed Rates When Wind Blowing Towards Monitor
K2: 14 K3: 21 K4: 21 K5: 26		<p>3/8/19 at 4:00 (Ex. 16 to PASE's MTV, Arb. Ex. C236)</p> <ul style="list-style-type: none"> K2: 7 K3: 0

⁹ Because PASE was denied discovery of Oxbow's continuing SO₂ operations and the source of this evidence only goes through July 8, 2019, PASE cannot provide the Court with additional and more recent examples. However, the evidence described herein establishes that Oxbow continued its practices well after shutting PASE down on June 25, 2018.

Total TPH: 82	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] 	<ul style="list-style-type: none"> • K4: 13 • K5: 0 • Total: 20 TPH
	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] 	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED]
	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] 	<p>6/30/17 at 11:00 (Ex. 16 to PASE's MTV Arb. Ex. C236)</p> <ul style="list-style-type: none"> • K2: 8 • K3: 17 • K4: 17 • K5: 24 • Total: 66 TPH
	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] 	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED]
	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] 	<ul style="list-style-type: none"> • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED] • [REDACTED]

Similarly, Oxbow's detailed daily production records from 2017 (the only year PASE was able to obtain discovery of such records) show that during monitor detection windows, Oxbow's kilns are often subject to "unscheduled down time," as seen from the following examples:

- Unscheduled kiln down times when wind blowing towards monitor (see [REDACTED] [REDACTED]); Ex. 16 to PASE's MTV (Arb. Ex. C-236, Oxbow 0028101)):

- 3/1/2017

• [REDACTED]

- 5/26/17
 - [REDACTED]
 - [REDACTED]
 - [REDACTED]
- 6/30/17
 - [REDACTED]
 - [REDACTED]
- 7/1/17
 - [REDACTED]
 - [REDACTED]

The preceding evidence has been largely hidden from the TCEQ and the public by Oxbow. Oxbow representative, Doug Landwehr, who testified that he interfaced with the TCEQ, confirmed that Oxbow did not give any of its “experiments” or experiment reports to the TCEQ, nor did the TCEQ receive the 5-minute data attached as Exhibit 16 to PASE’s MTV which is the primary source of actions detailed herein. (MTV Ex. 6, Vol. 4, p. 900, 902). Likewise, Landwehr testified about doing extensive modeling of its SO₂ emissions at Port Arthur when Oxbow was seeking bids for scrubbers in 2016, but that information was not provided to the TCEQ either. (MTV Ex. 6, Vol. 4, p. 905).