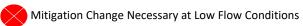
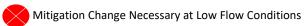
## CRUDE OIL TRANSPORTATION NETWORK / OIL BATTERIES TO REFINERY INTERNAL CORROSION DIRECT ASSESSMENT (ICDA) AND CORROSION MITIGATION GUIDANCE



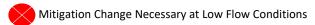
		j	PIPELINE SUSPENSION PROCEDURE		1																	
No.	OD Inches	Length miles	Suspension Option 1 (preferred)	Suspension Option 2 (alternative)	1	OIL RATE BPH 80	OIL RATE BPH 150	OIL RATE BPH 300	OIL RATE BPH 400	OIL RATE BPH 500	OIL RATE BPH 600	OIL RATE BPH 700	OIL RATE BPH 800	OIL RATE BPH 1000	OIL RATE BPH 1200	OIL RATE BPH 1500	OIL RATE BPH 1800	OIL RATE BPH 2200	OIL RATE BPH 3000	OIL RATE BPH 3500	OIL RATE BPH 3800	OIL RATE BPH 4000
			BATCH INHIBITOR APPLIED BETWEEN PIGS	GLYCOL-BASED CORROSION INHIBITOR SLUG		LOW	NORMAL				1		MAX									
1	6	36.8	662 gal	20 gal	BASELINE SCORE	100	100	50	50	25	25	25	25									
				4 hours prior to shut-in	OXYGEN INGRESS MITIGATION	100	100 PIGGIN		100 NHIBITOR - PRE Inhibitor: 662		75 RROSION DAM	75 MAGE	75									
			BATCH INHIBITOR APPLIED BETWEEN PIGS	GLYCOL-BASED CORROSION INHIBITOR SLUG		LOW			NORMAL		_		_		MAX							
2	6	22.1	398 gal	20 gal 4 hours prior to shut-in	BASELINE SCORE OXYGEN INGRESS	75 100	75 100	25 75	10 30	10 30	5 15	5 15	5 15	5 15	5 15							
_				·	MITIGATION	EXISTING	BATCH INHI	N DAMAGE		GLYCOL SLUG			GGING ONLY									
					]		tor: 398 gal /	90 days		gal		Pig	ging: 90 days									
2	•	4.54		ROSION INHIBITOR SLUG	BASELINE SCORE	LOW 10	NORMAL 10	10	10	10	10	10	MAX 10									
3	8	4.54	4 hours p	MITIGATION				PIGGING Pigging:	ONLY													
				ROSION INHIBITOR SLUG		LOW	NORMAL	25							-				MAX			
4	10	11.4		!0 gal rior to shut-in	BASELINE SCORE MITIGATION	25		GLYCOL SLUC		5	5	5	5	5 PIGGING		5	5	5	1			
	<u> </u>					Р	igging: 90 da	iys / Glycol: 2	0 gal					Pigging: 9	0 days							
			BATCH INHIBITOR APPLIED BETWEEN PIGS	GLYCOL-BASED CORROSION INHIBITOR SLUG				LOW			NORMAL								MAX			
5	10	5.2	156 gal	20 gal	BASELINE SCORE	75 100	75 100	75 100	75 100	50 100	50 100	50 100	10 20	10 20	10 20	10 20	5 10	5 10	5 5			
				4 hours prior to shut-in	OXYGEN INGRESS MITIGATION	100		ATCH INHIBIT	OR - PRE-EXIS	TING CORROS		100	20	20		PIGGING ON	ILY	10	5			
					Williamon			Inhibi	itor: 156 gal / 9	90 days					F	Pigging: 90 d	ays					
					DACEL INIE COORE	F0	F0	50	50	25	LOW	4						NORMAL	4		4	MAX
6	16	89.19	NO ACTIO	ON REQUIRED	BASELINE SCORE MITIGATION	50	50		50 GLYCOL SLUG	25	25	1	1	1	1	P	IGGING ONL	Y	1	1	1	1
	<b>.</b>				Williamon			Pigging: 60 da	ays / Glycol: 90	) gal						Pi	igging: 90 da	ys				
				ROSION INHIBITOR SLUG	DACELINE COORE	LOW 50	NORMAL 50	50	25	<b>MAX</b> 25												
7	6	11.86		!0 gal rior to shut-in	BASELINE SCORE MITIGATION	50	PIG	GING + GLYC	OL SLUG	25												
	<b>&gt;</b>				Williamon		Pigging	g: 60 days / G	lycol: 20 gal		_											
				ROSION INHIBITOR SLUG	]					LOW					NORMAL							MAX
8	12	32.37		!0 gal rior to shut-in	BASELINE SCORE MITIGATION	50	50		50 GING + GLYCOL		25	25	10	10	10	10	10 PIGGINO		1	1	1	1
				WITHGATION			Pigging:	60 days / Gly	col: 30 gal							Pigging:	90 days					
				ROSION INHIBITOR SLUG				LOW						NORMAL								MAX
9	12	7	20 gal 1 hour prior to shut-in		BASELINE SCORE	50	50 PIG	50 GING + GLYC	25 OL SLUG	25	10	10	10	10	10	10 PIGGIN	10 G ONLY	10	1	1	1	1
				MITIGATION		Pigging	g: 90 days / G	lycol: 20 gal							Pigging:	90 days						

## CRUDE OIL TRANSPORTATION NETWORK / OIL BATTERIES TO REFINERY INTERNAL CORROSION DIRECT ASSESSMENT (ICDA) AND CORROSION MITIGATION GUIDANCE



No.	OD Inches	Length miles	PIPELINE SUSPENSION PROCEDURE Suspension Suspension Option 1 Option 2 (preferred) (alternative)		OIL RATE BPH 80	OIL RATE BPH 150	OIL RATE BPH 300	OIL RATE BPH 400	OIL RATE BPH 500	OIL RATE BPH 600	OIL RATE BPH 700	OIL RATE BPH 800	OIL RATE BPH 1000	OIL RATE BPH 1200	OIL RATE BPH 1500	OIL RATE BPH 1800	OIL RATE BPH 2200	OIL RATE BPH 3000	OIL RATE BPH 3500	OIL RATE BPH 3800	OIL RATE BPH 4000
			BATCH INHIBITOR APPLIED BETWEEN PIGS  BATCH INHIBITOR GLYCOL-BASED CORROSION INHIBITOR SLUG								LOW			ı		NORMAL					MAX
10	12	26.7	961 gal 20 gal 4 hours prior to shut-in	BASELINE SCORE OXYGEN INGRESS	100	100 100	100 100	100	100 100	100 100	100	75 100	75 100	75 100	25 100	10 100	10 100	10 100	5 50	5 50	5 50
				MITIGATION			•	•	PIGGING + BA	TCH INHIBIT	OR - PRE-EX	ISTING COR	ROSION DA	MAGE					PIGGIN	IG + GLYCC	L SLUG
				WITIGATION						Inhibit	or: 961 gal	/ 30 days							Pigging: 9	0 days / Gl	ycol: 20 gal
			GLYCOL-BASED CORROSION INHIBITOR SLUG	]	LOW	NORMAL	]		MAX												
			20 gal	BASELINE SCORE	25	25	10	10	10												
11	10	6.8	4 hours prior to shut-in			+ GLYCOL		PIGGING ONL	Υ												
				MITIGATION	Pigging:	LUG 90 days /		Pigging: 90 da	ivs												
					Glyco	l: 20 gal		. 1881181 30 40	.,,=												
							LOW			NORMAL				MAX							
12	8	28.2	NO ACTION REQUIRED	BASELINE SCORE OXYGEN INGRESS	25 50	25 50	25 50	25 50	2	1 2	1 2	1 2	1 2	2							
				MITIGATION		PIGGING +	GLYCOL SLU	IG	_	_	PIGGING		_								
					Pi	igging: 90 da	ys / Glycol: 2	20 gal			Pigging: 9	0 days									
			GLYCOL-BASED CORROSION INHIBITOR SLUG			LOW	NORMAL			MAX											
13	8	50.67	20 gal 4 hours prior to shut-in	BASELINE SCORE	50	50	50 PIGGING	+ GLYCOL SLUG	50	50											
			•	MITIGATION		F	Pigging: 60 d	days / Glycol: 30	O gal		_										
			GLYCOL-BASED CORROSION INHIBITOR SLUG		LOW	NORMAL			1					MAX							
14	6	28.28	20 gal 4 hours prior to shut-in	BASELINE SCORE	50 PIGG	50 ING + GLYCO	50 L SLUG	10	10	1 PIGG	ING ONLY	1	1	1							
			·	MITIGATION Pigging: 60 days / Pigging: 90 days Glycol: 20 gal																	
				1		Ciycon 20 gc		'							]						
			GLYCOL-BASED CORROSION INHIBITOR SLUG 20 gal	BASELINE SCORE	LOW 50	50	NORMAL 50	25	1	1	1	1	1	1	1	MAX					
15	8	8.03	4 hours prior to shut-in	OXYGEN INGRESS	50	50	50	25	1	1	1	1	1	1	1	1					
				MITIGATION	Di	PIGGING + igging: 90 da	GLYCOL SLU					PIGGING Pigging: 9									
				_		igging. 30 ua	ys / Glycol. 2	20 gai				riggilig.	30 days								
			BATCH INHIBITOR GLYCOL-BASED APPLIED BETWEEN CORROSION INHIBITOR		LOW		NORMAL										MAX				
			PIGS SLUG	BASELINE SCORE	50	50	50	50	30	30	30	30	1	1	1	1	1				
16	8	18.75	450 gal 20 gal 4 hours prior to shut-in	OXYGEN INGRESS	100	100	100	100	30	30	30	30	5	5	5	5	5				
				AUTICATION	PIGGINO	G + BATCH INI	HIBITOR - PE ON DAMAGE		Р	IGGING + GL	YCOL SLUG				PIGGING ON	NLY					
				MITIGATION		Inhibitor: 45			Piggi	ng: 90 days /	/ Glycol: 20	gal		F	igging: 90 c	lays					
				J 1				•	1				1		•						
			BATCH INHIBITOR APPLIED BETWEEN PIGS GLYCOL-BASED CORROSION INHIBITOR SLUG		LOW		NORMAL									MAX					
17	8	20.6	494 gal 20 gal	BASELINE SCORE	100	100	100	100	10	10	10	10	1	1	1	1					
			4 hours prior to shut-in	OXYGEN INGRESS	100 PIGGING	100 G + BATCH INI	100 HIBITOR - PF	100 RE-EXISTING	50	50	50	50	5	5	5	5					
				MITIGATION		CORROSIO	ON DAMAGE	Ē		IGGING + GL					NG ONLY						
						Inhibitor: 49	14 gal / 90 da	ays	Piggi	ng: 90 days /	/ Glycol: 20	gal	]	Pigging	g: 90 days						

## CRUDE OIL TRANSPORTATION NETWORK / OIL BATTERIES TO REFINERY INTERNAL CORROSION DIRECT ASSESSMENT (ICDA) AND CORROSION MITIGATION GUIDANCE



No.	OD Inches	Length miles	PIPELINE SUSPEI Suspension Option 1 (preferred)	NSION PROCEDURE Suspension Option 2 (alternative)		OIL RATE BPH 80	OIL RATE BPH 150	OIL RATE BPH 300	OIL RATE BPH 400	OIL RATE BPH 500	OIL RATE BPH 600	OIL RATE BPH 700	OIL RATE BPH 800	OIL RATE BPH 1000	OIL RATE BPH 1200	OIL RATE BPH 1500	OIL RATE BPH 1800	OIL RATE BPH 2200	OIL RATE BPH 3000	OIL RATE BPH 3500	OIL RATE BPH 3800	OIL RATE BPH 4000
18	6	35.15	GLYCOL-BASED CORROSION INHIBITOR SLUG 20 gal 4 hours prior to shut-in		BASELINE SCORE	SL Pigging:	NORMAL 50 + GLYCOL UG 90 days / : 20 gal	5	5 PIGGING ONL Pigging: 90 da													
19	10	31.2	BATCH INHIBITOR APPLIED BETWEEN PIGS 936 gal	BASELINE SCORE OXYGEN INGRESS MITIGATION	100 100 PIGGI	100 100 NG + BATCH		100 100 PRE-EXISTING (		100 100 AMAGE		25 50 NG + GLYCO Pigging: ys / Glycol:			10 20 PIGGING ON							
20	6	14.9	NO ACTIO	BASELINE SCORE OXYGEN INGRESS MITIGATION	10 10	10 10	10 10		NORMAL  1  1  GGING ONLY ging: 90 days	1 1	1 1	1 1	1 1									
21	8	0.75	NO ACTION REQUIRED		BASELINE SCORE MITIGATION	50	50	50 Pi	25 PIGGING + Gi gging: 60 days		25 al	25	25	5	5 PIGGIN	NORMAL 5 NG ONLY 2: 90 days	MAX 5					
22	12	0.375	GLYCOL-BASED CORROSION INHIBITOR SLUG 20 gal 1 hour prior to shut-in		BASELINE SCORE MITIGATION	50	50	25		LOW  25 G + GLYCOL SL 0 days / Glycol		25	25	25	10		10 IGGING ONL gging: 90 da		MAX 10			
23	12	0.375	GLYCOL-BASED CORROSION INHIBITOR SLUG 20 gal 1 hour prior to shut-in		BASELINE SCORE MITIGATION	SL Pigging:	+ GLYCOL UG 60 days / I: 5 gal	10	10	10	10		10 ING ONLY g: 90 days	10	10	NORMAL 10	10	MAX 10				
24	6	7.4	2 1 hour pri (a uniquely conservat possible exposure to	ROSION INHIBITOR SLUG 0 gal ior to shut-in ive approach because of o oxygen ingress from n tankage)	BASELINE SCORE OXYGEN INGRESS MITIGATION	SL Pigging:	50 50 + GLYCOL UG 60 days / : 40 gal	5	5 5	5 5 PIGGING (		5 5	<b>MAX</b> 5 5 5									