Exhibit A







Exhibit B

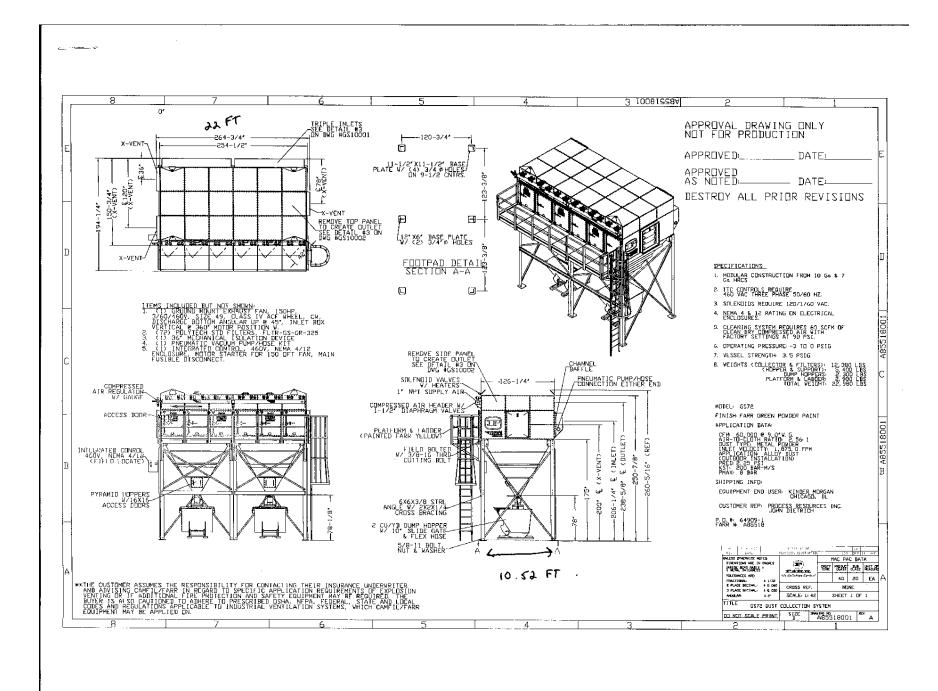


Exhibit C

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LISTS PROJECTS DIA BRITANNI YCLOPÆDIA BRITANNI GALLERIES QUIZZES **POPULAR TOPICS** Help School & Library Products SHOP

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Billets, bars, and rods

- Shapes
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- Open-die forging

Wire

Treating of steel Heat-treating

Surface treating

History

Primary steelmaking Secondary steelmaking

Steel

Written by: E.F. Wondris

Last Updated 7-16-2014

REMOVING OXYGEN

As the carbon level is lowered in liquid steel, the level of dissolved oxygen theoretically increases according to the relationship $%C \times %O = 0.0025$. This means that, for instance, a steel with 0.1 percent carbon, at equilibrium, contains about 0.025 percent, or 250 parts per million, dissolved oxygen. The level of dissolved oxygen in liquid steel must be lowered because oxygen reacts with carbon during solidification and forms carbon monoxide and blowholes in the cast. This reaction can start earlier, too, resulting in a dangerous carbon monoxide boil in the ladle. In addition, a high oxygen level creates many oxide inclusions that are harmful for most steel products. Therefore, usually at the end of steelmaking during the tapping stage, liquid steel is deoxidized by adding aluminum or silicon. Both elements are strong oxide formers and react with dissolved oxygen to form alumina (Al, O3) or silica. These float to the surface of the steel, where they are absorbed by the slag. The upward movement of these inclusions is often slow because they are small (e.g., 0.05 millimetre), and combinations of various deoxidizers are sometimes used to form larger inclusions that float more readily. In addition, stirring the melt with argon or an electromagnetic field often serves to give them a lift.

IMAGES

INTERACTIVE QUIZZES



VIDEOS





LISTS



ALLOYING

Deoxidation is also important before alloying steel with easy oxidizable metals such as chromium, titanium, and vanadium, in order to minimize losses and improve process control. Metals that do not oxidize readily, such as nickel, cobalt, molybdenum, and copper, can be added in the furnace to take advantage of high heating rates. In fact, alloying always has thermal effects on steelmaking---for example, the use of energy to heat and melt the alloying agents, or the heat of reaction or solution when they combine with other elements. Fortunately, there exists a large amount of empirical data, obtained from thousands of thermodynamic experiments, that, when supported by theoretical principles, allows steelmakers to predict such temperature changes.

steel | metallurgy :: Removing oxygen | Encyclopedia Britannica

POPULAR TOPICS

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QUIZZES^{Most} allow error of form of for percent grades are available. For example, ferrosilicon is supplied with levels of 50, 75, and 90 percent silicon and with varying levels of carbon and other additions.

REMOVING HYDROGEN AND NITROGEN

Also important for steelmaking is the absorption and removal of the two gases hydrogen and nitrogen. Hydrogen can enter liquid steel from moist air, damp refractories, and wet flux and alloy additions. It causes brittleness of solidified steel—especially in large pieces, such as heavy forgings, that do not permit the gas to diffuse to the surface. Hydrogen can also form blowholes in castings. Nitrogen does not move into and out of liquid steel as easily as hydrogen, but it is well absorbed by liquid steel in the high-temperature zones of an electric arc or oxygen jet, where nitrogen molecules (N₂) are broken up into atoms (N). Like hydrogen, nitrogen substantially decreases the ductility of steel.

REFRACTORY LINER

Basic steelmaking takes place in containers lined with basic refractories. These may be bricks or ram material made of highly stable oxides, such as magnesite, alumina, or the double oxides chrome-magnesite and dolomite. It is desirable that the refractories not participate in the steelmaking reactions, but unfortunately they do erode and corrode. Refractory bricks are produced in all shapes and grades by a highly specialized industry.

TESTING

Testing and sampling are an important part of liquid steelmaking. They are carried out by mechanized and often automated facilities, which immerse lances that are equipped with sensors for rapid computation of temperature and dissolved carbon, oxygen, and hydrogen. Test lances also take samples for analysis in laboratories. All results are usually fed automatically into a process-control computer.

Basic oxygen steelmaking

More than half the world's steel is produced in the basic oxygen process (BOP), which uses pure oxygen to convert a charge of liquid blast-furnace iron and scrap into steel. The basic oxygen furnace (BOF) is a refractory-lined, tiltable converter into which a vertically movable, water-cooled lance is inserted to blow oxygen through nozzles at supersonic velocity onto the charge (see figure). The use of pure oxygen at high flow rates results in such fast oxidation of the elements contained in blast-furnace iron that only about 20 minutes are required per heat—*i.e.,* to refine one charge. Converters vary in size and are operated for heats ranging from 30 to 360 tons.

THE CHARGE

When oxygen contacts blast-furnace iron, a great amount of heat is released by the ensuing exothermic reactions, especially the oxidation of silicon to silica, so that using only blast-furnace iron would result in a liquid steel temperature too high for casting. Therefore, before the hot metal is added, a specific amount of scrap is charged into the furnace. Melting this scrap consumes about 340 kilocalories per kilogram, effectively cooling the process. A typical BOP charge, therefore, consists of about 75 percent liquid iron and 25 percent scrap. This requires a reliable supply of low-cost iron with a uniform chemical composition, which is attainable only by keeping the operating condition of a blast furnace as constant as possible; this in turn requires a consistent iron consumer. There are also certain iron properties—for example, the silicon and sulfur content—that are selected to optimize the blast furnace and BOF operations and to produce steel at minimal cost. Such interdependence requires that blast furnaces and BOFs work within a well-integrated operating system.

Molten Metal Splash and Furnace Refractory Safety

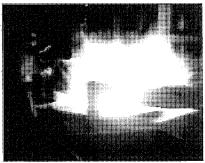
Molten metal splash is the most common cause of melt deck injuries and is caused by the addition of wet materials to the molten bath. It can be minimized by diligently inspecting and treating scrap. Metal run-out ranks among the most severe accidents that

Molten metal splash is the most common cause of melt deck injuries and is caused by the addition of wet materials to the molten bath. It can be minimized by diligently inspecting and treating scrap. Metal run-out ranks among the most severe accidents that

By Emad Tabatabei and Robert C. Turner, P.E.

Wet charge materials, sealed scrap, and bridging are all safety hazards that can lead to catastrophic explosions in foundries. By diligently examining and treating scrap, following induction furnace safety procedures, properly training and retraining personnel, and use of automated melt shop equipment, founders can be confident their operations are as safe as possible.

Wet charge materials are a serious safety hazard in all foundries. Water, moisture, or any liquid-bearing material instantaneously turns to steam when coming in contact with molten metal — expanding to 1,600 times its original volume and producing a violent explosion. This occurs without warning and throws molten metal and possibly high-temperature solids out of the furnace, putting workers, the furnace itself, and nearby plant and equipment at risk.



An explosion occurs when moisture is confined by molten metal.

A water/molten metal explosion can occur in any type of furnace. For an induction furnace, however, the aftereffects may be more serious, including the possibility of additional explosions caused by liquid in a ruptured cooling system coming in contact with molten metal in the bath. Molten metal need not be present in the furnace for a water/molten metal explosion to occur. Explosions also can occur if sealed drums or containers containing water are charged into an empty but hot furnace. In this case, the force of the explosion will eject the newly charged material and quite likely damage the refractory



lining as well.

The violent and unpredictable nature of a water/molten metal explosion makes the wearing of appropriate Personal Protective Equipment (PPE) by melt shop workers imperative. PPE can help to prevent disfiguring, incapacitating or fatal burns.

Some foundries reduce the possibility of water/molten metal explosions by storing scrap under cover for a least one day and then carefully inspecting bales and containers for any residual moisture. But a more reliable solution employed by an increasing number of foundries is to use remote charging systems with charge dryers or preheaters. Remote charging systems permit the operator to stand safely back from the furnace or behind protective screens during charging. Dryers and preheaters maximize the removal of water and moisture before the scrap enters the bath.

Exhibit D

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Observer's Position	OBSERVER'S NAME (PRINT) WILLIAN ROOGP	22
	OBSERVER'S SKONATURE	DATE 9/3/1/
Sun Location Line	CARGANIZATION Binder Mon	10/14
ADDITIONAL INFORMATION	CERTIFIED BY	DATE
	CONTINUED ON VEO FORM NUN	

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UNDER	IGAL SIM	No.
Minder Margan	OBSERVATION DATE	START TIME END TIME
STREET ADDRESS	SEC 0 15 30	45 COMMENTS
	1 5 0 0	0
CATY STATE ZIP (20633	$\begin{array}{c c} 2 \\ \hline 3 \\ \hline \end{array} \begin{array}{c} 0 \\ \hline 0 \\ \hline \end{array} \begin{array}{c} 0 \\ \hline 0 \\ \hline \end{array} \begin{array}{c} 0 \\ \hline \end{array} \end{array}$	
PHONE (KEY OONTACT) SOURCE ID NUMBER		0
RROCESS EQUIPMENT OPERATING MODE	·5 0 0 0	0
CONTROL EQUIPMENT OPERATING MODE	6 0 0 0	0
DESCRIBE EMISSION POINT	$\begin{array}{c c} 7 & 0 & 0 & 0 \\ \hline 8 & 0 & D & D \end{array}$	0
bading of trucks, w side of	9 0 0 C	\Diamond
HEIGHT ABOVE GROUND LEVEL HEIGHT RELATIVE TO OBSERVER	10 0 0 0	Õ .
O-20 Star End DISTANCE FROM OBSERVER DIRECTION FROM OBSERVER	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0
Start 140' End 140' Start 5' End 5		0
DESCRIBE EMISSIONS, Star OVAL AUST End OVAL VUST	14 0 0 0	D
	$\begin{array}{c c} 15 \\ \hline 16 \\ \hline \end{array} \\ \hline \\ \\ \hline \end{array} \\ \hline $ \\ \hline \\ \\ \hline \end{array} \\ \\ \\ \hline \end{array} \\ \\ \\ \\ \\ \\ \end{array} \\ \\ \\ \\	0
POINT INTHE PLUME AT WHICH OPACITY WAS DETERMINED SING OVER LOAD DOOR END OVER LOAD DOOR		0
DESCRIBE PLUME BACKGROUND Start Freeline End Freeling.	18 0 0 0	0
BACKGROUND COLOR SKY CONDITIONS		0
Start Green End Green Start Clear End Clear WIND SEPEED WIND DIRECTION Start 4 Mph End, 3 Mph Start SSW End SSW	20 0 0 0 21 0 0 0	0
STAR 4 Mph End 3 Mph Star SSW End SSW AMBIENT TEMP Star 79 F End 78 F	²² 0 0 0	0
	23 0 0 0	0
Plume Sun +	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
Wind -		0
X Emission Point	27 0 0 0	Õ
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0
	OBSERVER'S NAME (PRINT)	<
Observer's Position	Dillian Rodan Observer's signature	DATE GIS//4
Sun Location Line	ORGANIZATION	MONT -
ADDITIONAL INFORMATION	CERTIFIED BY	DATE

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No.

								140	J.
COMPANY NAME Minder Morgan			OBS	ERVATIO			START	TIME	END TIME
STREET ADDRESS 2926 126th St			SEC	0	15	30	45		COMMENTS
				0	0	0	0		
	STATE	ZIP	2	0	5	S	5	1	
Chicago PHONE (KEY CONTACT)	SOURCE ID NUM	60633	3	0	0	0	0		<u> </u>
			4	0	0	0	U	<u> </u>	
PROCESS EQUIPMENT	1	ERATING MODE	· 5	0	0	0	0		
CONTROL EQUIPMENT		FATING MODE	6	0	0	0	0		
			7	0	0	0	0		
loading into tr	uck, E	side	8	0	0	0	0		
	ville		9	0	0	0	5		
OF breezeway, K	HEIGHT RELATIVE	TO OBSERVER	10	5	5	0	S		•
0-20' DISTANCE FROM OBSERVER	Stan		. 11	5	5	5	0		
Start 40' End 40'	sun NW	End N W	12	0	0	0	6		
DESCRIBE EMISSIONS	ما دولا		13	0	0	0	0		·
	IF WATER DROPL	ET PLUME	15	0	0	0	0	•	
STRAT WHILE END WHICH OPACITY		Detached 🗆	16	0	0	0 0	٥ 0		
	End OVERY	1 1 1	17	0	0	0	5		
DESCRIBE PLUME BACKGROUND		·····	18	5	0	0	0	·	
SUM DUI Iding Side E BACKGROUND COLOR	End DUI 1011 SKY CONDITIONS	ng side	19	0	0	5	5	<u> </u>	
START VELION END VELION	SEAR CROUT	End Clear	20	5	0	0	S	· ··· ···	
Start 2mph End Omph	sign SW	End S	21	0	0	0	υ		
AMBIENT TEMP Star 76F End 79F	WET BULB TEMP	RH, percent	22	0	0	0	5		·····
		Draw North Arrow	23	0	0	0	0		
with C			24	0	0	0	0		
Sun + Wind			25	0	0	0	0		
······································	¢		26	0	0	0	0		
X	Emission Point	1	27	0	0	0	<u> </u>		
			28	0	0	0	0		
			29	0	0	0	0		
			30	0		0	0		
·	Observer's Pasitio	n	Ĺ	llia		KO	dger	-5	
			OBSER	VER'S S	GNATUR	5	<u> </u>	<i>«</i>	DATE 12/11
		\sim	ORGAN	IZAZION	-3				10/14
Sun Locatio	Din Line		CERTIF	TN I					DATE
			CONTI		VEO FO		ивея		
		J .	L,		,				

	<u> </u>	NU	9 <u>0</u> 0					NO.		
Kinder Morgan	·		9	13/1	H DATE		START	TIME 3	END TIME	5/
Kinder Morgan STREET ADDRESS 2926 (26th S).			SEC	0	15	30	45		COMMENTS	
			1	D	0	5	0			
Chicago	STATE ZIP	22	2	0	5	0	0			
PHONE (KEY CONTACT)	SOURCE ID NUMBER		3	<u>0</u> ひ	5	0	0			
PROCESS EQUIPMENT	OPERATING MODE		• 5	$\frac{0}{0}$	0	0	0	break	to re-	110
CONTROL EQUIPMENT	COPERATING MODE		6	Ò	0	0	0	bara		TIC
]	7	<u>()</u>	0	<u>Ď</u>	Ō			
DESCRIBE EMISSION POINT UN DADING OF HO	FM barge		8	0	0	Õ Q	$\frac{0}{0}$			
U .			10	0	$\overline{0}$	0	0		 	
HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER	1	11	Ō	0	Ŭ 0	0		• •	
DISTANCE FROM OBSERVER Start 301 End 30	DIRECTION FROM OBSERVER	,	12	0	0	0	0			
DESCRIBE EMISSIONS			13	$\begin{array}{c} 0\\ 0 \end{array}$	$\begin{array}{c} 0\\ 0\\ \end{array}$	0	0 0			
	End CLOYK GRAY SMOL	2	15	$\frac{0}{0}$	5	0	10			
STUR () KGRAV END () K GRAY		hed 🗆	16	5	0	0	0			
SEAN OFOP POINT	End droppoint		17	0	15	5	5			
STER DAVAL IIDS	End harge lids		18	0	0	5	0			
Start H. Gray End H. Gray	Start CRAY End CLLAY		20	$\frac{0}{10}$	0	0	0			
Star 2mph End 2mgh	WIND DIRECTION Start 55W End 55W		21	10	5	0	0			,
AMBIENT TEMP Start BF End	WET BULB TEMP RH, percen		22	0	0	0	15			
Stack SOURCE LAYO	DUT SKETCH Draw North	Arrow	23 24	$\frac{0}{0}$	$\frac{0}{0}$	0	5			
Plume Sun — —	(25	8	ID	5	5	·······		
Wind			26	5	5	0	0		· · · · · · · · · · · · · · · · · · ·	
X			27	0	$\frac{0}{0}$	0	5		. <u></u>	
	,		28 29	$\frac{0}{0}$	$\frac{0}{0}$	0	0		- <u></u>	
			30	ŏ	10	Ö	0			
			1.11							
	Observer's Position		OBSER	QVA VEBSS	KQ	ars	·		DATE	
140					- ^			. <u></u>	913/14	<u>t</u>
Sun Locatio					Y110	<u>(gon</u>	L		DATE	
		[[
] [CONTIN		I VEO FO	IRM NUN	IBER			

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· · · · · · · · · · · · · · · · · · ·	UNUFF	<u>IV</u>					NO.	
COMPANY NAME Kinder Mord	100	OBSE	Prvation 912	N DATE		START	TIME) 6 2	END TIME 10,32
STREET ADORESS 2926 E 126th		SEC		15	30	45		COMMENTS
0.420 1 120	190	<u>мн \</u> 1	0	$\overline{0}$	0	0		
СПҮ	STATE ZIP	2	Ō	0	0	0		
PHONE (KEY CONDIACT)	SOURICE ID NUMBER	з	$\int 0$	0	5	0		···· • · · · · · · · · · · · · · · · ·
PHONE (RET CONDACT)	SOURCE ID NUMBER	4	0	Õ	5	10		مر بر دو ماندر بر ۲ ۰ مربع المربع م
PROCESS EQUIPMENT	OPERATING MODE	· 5	0	0	0	0		·····
barge unloadin	g, MCFM Normal OPERATING MODE	6	0	0	\bigcirc	5		
L NA	NA	7	5	0	0	5		
Describe Emission Point Warge Un Cading	MCEM	8	5	D	O	0		
punge uncarry,		9	0	D	0	0		
HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER	10	5	5	0	0		······
DISTANCE FROM OBSERVER	Start 841 End 841	11	10	5	0	0		
Stan 240' End 2540'		12	\overline{O}	0	Ó	0		
DESCRIBE EMISSIONS	· aca d d	14	$\frac{0}{0}$	0	0	0		
STAR AVAY CLUST EMISSION COLOR	END AVAL OUST	15	$\frac{0}{0}$	0	0	0		
STER GYAY END GYAY POINT (M THE PLUME AT WHICH OPACIT	Attached Detached Detached	16	$\overline{0}$	5	0	ŏ		
	End Oron Doint	17	0	5	5	0		
DESCRIBE PLUME BACKGROUND	troplin	18	Ō	\overline{O}	Ŏ	0		
BACKGROUND COLOR	End TYPE line SKY CONDITIONS, MOSTLY	19	0	0	0	Õ		
Star GILLN End GILLN WIND'SPEED	SKY CONDITIONS MOSTLY Start MOULY End CLOUDY WIND DIRECTION	20	0	0	0	5		
Start 11 M ph End 1 mph	Start W End W	21	5	0	0	0		
Stan 73F End 74F	WET BULB TEMP RH, percent	22	0	0	0	0		
Stack SOURCE LAYO		23	5	0	0	0		
with CEEPiume Piume Sun +	\bigcirc	24	5	0	0	0	<u></u>	
Sun - P - Wind		25	$\frac{0}{0}$	$\frac{0}{0}$	0	$\frac{0}{0}$		·
X		26 27	$\frac{0}{0}$	0	$\frac{O}{2}$	$\frac{0}{2}$		
~		28	$\frac{0}{0}$	$\frac{0}{2}$	5	$\frac{0}{5}$		
	7	29	$\frac{0}{2}$	$\frac{0}{0}$	10	5	·····	
		30	$\frac{0}{0}$	$\frac{0}{0}$	$\frac{10}{0}$	$\frac{3}{0}$		
		OBSEF	IVER'S N	<u> </u>				
	Observer's Position	1		in	Roc	lger	<u>`S</u>	DUTE
140			O	D	~	~		DATE 912/14
Sun Locali	on Line	ORGAN	NIZATION	W	brook	n		
ADDITIONAL INFORMATION		CERTIF	IED BY		21.52	· · ·	·····,	DATE
		L						
3		CONTI		I VEO FO		18ER		

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No.

COMPANY NAME	· · · · · · · · · · · · · · · · · · ·		RVATIO		· I	START	TIME 39	END TIME
STREET ADDRESS		SEC	112	114		0	(5	9:09
2926 126 #	n 81.	MIN	0	15	30	45		COMMENTS
		1	5	5	0	10		, <u></u>
СПҮ	STATE ZIP	2	ID	5	U	0		
Chicago	11 60630	<u>-</u>		+ -		- <u> </u>		
PHONE (KEY CONDACT)	SOURCE ID NUMBER		$\left O \right $	$ \mathcal{O} $	10	15		
•		4	5	0	0	0		
PROCESS EQUIPMENT	OPERATING MODE	· 5	5	5	5	0		
barge un loadir control equipment	19 Normal OPERATING MODE	6	0	0	0	0		
NA	NA	7	0	D	5	5		
DESCRIBE EMISSION POINT		8	0	E	10	5	· · · · · · · · · · · · · · · · · · ·	
barge unloadin	a of	9	}	12	1 -			
MCFM 2×112	2		0	0	0	0		
HEIGHT ABOVE GROUND LEVEL		10	0	0	0	0		
854	stan 4ft End 4ft	11	5	5	5	D		
DISTANCE FROM OBSERVER	DIRECTION FROM OBSERVER	12	0	D	5	0		
Start SO' End 50'	Start N End N	13	0	0	\cap	0	•	
DESCRIBE EMISSIONS		14	Õ	0	0	0		
STAR GYAY QUST EMISSION COLOR	End Gray CUST	15			$\overline{0}$	t		
POINT UN THE PLUME AT WHICH OPACT			5	0		5		
		16	10	5	0	0		
	End drop point	17	0	Ø	O	0		
DESCRIBE PLUME BACKGROUND STAR FRELINE	End treeline	18	0	0	Ó	0	•	
BACKGROUND COLOR	SKY BONDTHONS POURTLY	19	O	\mathcal{O}	0	5		
Stangreen End Green	Stanc DUDY End CLOUDY	20	0	\mathbf{O}	0	5		
WINDUSPEED Start (Mph End (1)mph	WIND DIRECTION Start WEST End WEST	21	5	5	\overline{O}	0		
AMBIENT TEMP	WET BULB TEMP RH, percent	22		$\mathbf{)}$	0	0		i
Start 72 F End	NA 90		0	\mathcal{O}	$\overline{\bigcirc}$			
Stack SOURCE LAY	OUT SKETCH Draw North Arrow	23	0	0	0	5		·····
Plume		24	0	0	0	5		
Sun 🗣 Wind 🗻		25	5	0	0	0		
		26	0	0	0	0		-
Х	Emission Point	27	0	5	5	5	· · · · · · · · · · · · · · · · · · ·	······································
		28	5	5	0	5		
	IImph	29	0	10	5	5		
	intripin	┝╍╍╍┥	\mathbf{H}	$\frac{1}{0}$		0		4 99
		30			0	O		·····
			VER'S N	AME (PF	(TAIL			
	Observer's Position	OBSER	VER'S					DATE
140		A	-	\leq)		_	DATE 912/14
Sun Locati			nde		m			
ADDITIONAL INFORMATION		CERTIF	I ICLE	<u> </u>	114	orga	<u>, </u>	DATE
		L						
		CONTIN	IUED ON			4868		
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VISIBLE EMISSION	N OBSERVATION FORM
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		OBSE	RVATI	ON FO	DRM		No	•
COMPANY NAME KINDER MORA	VIVII DIAL		ERVATIC		······	STAR	гтіме : 40	END TIME
STREET ADDRESS	an th St.	MIN	0	15	30	45		COMMENTS
			0	0	Q	0		
Chicago	STATE ZIP	2	0	0	0	0		1
PHONE (KEY CONTACT)	SOURCE ID NUMBER	3	0	0	0	0		
		4	0	0	0	0		
PROCESS EQUIPMENT	OPERATING MODE] · 5	0	0	0	0		
CONTROL EQUIPMENT	OPERATING MODE	6	0	0	0	Ó		-
] _ 7	0	0	0	0		
DESCRIBE EMISSION POINT truck loading, W	Cida of bla E	8	0	0	0	0		
	Sine of Dig. F	9	0	0	0	0		
Si Mn 2× 1/2 HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER	10	0	0	0	0		
0-20'	Start O' End O /	11	0	0	0	0		
DISTANCE FROM OBSERVER Start 300' End 300'	DIRECTION FROM OBSERVER	12	0	0	0	0		
DESCRIBE EMISSIONS		1 13	0	0	D	0	SiMn	3×1
Start	End	14	0	0	0	0		
EMISSION COLOR Start End	IF WATER DROPLET PLUME Attached D Detached D	15	0	0	0	0		
POINT IN THE PLUME AT WHICH OPACI	TY WAS DETERMINED	16	0	0	0	Ő		
	End	17	0	0	0	0		
sun treeline	End freeline	18	0	0	0	0		
BACKGROUND COLOR Star Green End Green	SKY CONDITIONS MOSTLY	19	0	0	0	0		
WIND SPEED	WIND DIRECTION	20	∂	0	0	0		·····
AMBIENT TEMP	Start SW End WET BULB TEMP RH, percent	21	0	0	0	0	·	· · · · · · · · · · · · · · · · · · ·
Stan 74F End		22	0	0	0	0		
	OUT SKETCH Draw North Arrow	23	0	0	0	0		
Plume Sun — — —	(\mathbb{N})	24	0	0	0	0		
Wind -		25	0	0	0	0		
		26	0	0	0	0		
×	Emission Point	27	0	0	0	0		·
	1	28	0	0	0	0		
		29	0	0	0	0		
		30	0	0	0	0		
	Observer's Position		IAN		inti Her	. 5		
				KONATUR		J		DATE
140	CORGAN	IZATION	2				DATE 912/14	
Sun Locat	ion Line							······
ADDITIONAL INFORMATION		CERTIF	IED BY					DATE
		CONTIN		VEO FO				

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		<u>) </u>						NO.		
COMPANY NAME Kindly MC STREET ADDRESS	rgan		ÖBSI C	FVATIO 1/2/	N DATE		START	TIME 32	END TIN	(0:00
STREET ADORESS	+1 51	<u> </u>	SEC	0	15	30	45		COMMENT	
VIG C IZU	<u> </u>	•, ••,	1	10	0	0	10			
СПУ	STATE ZIP		2	10	10	10	10			
Chicago PHONE (KEY CONTACT)	SOURCE ID NUMBER	630	J	5	5	5	D			
PHONE (REY CONTACT)	SOURCE ID NUMBER		4	0	0	0	0		<u> </u>	
PROCESS EQUIPMENT	OPERATING M	ODE	· 5	0	0	0	5			
Truck loading	, 752 FESI Norm	100E	6	5	5	5	0			······
NANA	NA		7	0	0	0	0			
DESCRIBE EMISSION POINT	Idia E		8	0	0	0	0			
Eside of bu	J '		9	0	0	0	0			
HEIGHT ABOVE GROUND LEVEL 0 - 20"	OF 152 FEST	2x1/2	10	0	0	0	0	Swite	ch.to	MCFN
0-20'	Start O End C)	11	0	0	0	0			
DISTANCE FROM OBSERVER Start 25' End 25	DIRECTION FROM OBSERVE Start NW End N		12	0	O	0	0	<u> </u>		
DESCRIBE EMISSIONS			13	0	0	0	\bigcirc			
Star Gray dust EMISSION COLOR	End Gray du	st	14	0	0	0	0			
STERT Q VAY END GLAY POINT IN THE PLUME AT WHICH OF		Detached 🗆	15	$\frac{0}{2}$	0	0	0			
SUNT IN THE PLUME AT WHICH OF SUN OVER LEAD NOC	C End DIDIC HOAD	loor 1	18 17	0 0	0	\overline{O}	0			
DESCRIBE PLUME BACKGROUND			18	$\frac{0}{0}$	0	\overline{O}	$\frac{O}{O}$			
SEEN DUILDINGSIDE BACKGROUND COLOR	End building Sic	12	19	0	0	$\frac{0}{0}$	$\frac{0}{2}$			
STAR YELLOW END YELLON WIND SPEED	D Stan COUCH End CIC	SUCH	20	0	0	$\frac{0}{0}$	8			
Sizer 11 mph End 11 mph	WIND DIRECTION	$\overline{\mathcal{N}}$	21	$\overline{\bigcirc}$	0	$\frac{0}{0}$	0			 ,
AMBIENT TEMP	WET BULS TEMP 8H. C	ercent	22	ŏ	ŏ	0	0			
Start 72 End	NA	90%	23	0	0	0	0			
Stack SOURCE	LAYOUT SKETCH Draw N	Horth Arrow	24	0	0	0	0			<u> </u>
Sun 🕂	(\mathcal{N}	25	0	0	0	0			
Wind _>	1.1001		26	0	0	0	0	··· <u>·</u> ································	·	
	X Emission Point	wind	27	0	0	0	0			
			28	0	0	0	0			
			29	0	0	0	0			```
			30	0	0	C	0			
				VER'S N						
\checkmark	Observer's Position		OBSER	VER'S S	1 IC	o da	ers	 	DATE	
	140*		ORCAN		\leq				DATE 9121	14
Sun Lo	ication Line		Ki	nde	r ľ	nor	jan			
ADDITIONAL INFORMATION	······································	· · · · · · · · · · · · · · · · · · ·	CERTIF				, –		DATE	
			CONTIA			AN NUK				<u> </u>
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EPA METHOD 9

VISIBLE EMISSIONS OBSERVATION FORM

CLIENT SOURCE SOURCE ADDRESS		W.O.# DATE
		······································
Distance from Observer: July fit Direc Plume Type: (Continuous, Fuguilve, or Intermittent) Description of Emission: (Coning, Faming, Looping, Lofting	ht Relative to Observer;	nt End: End: End:
Plume Color: Start: <u>AA</u> End: End: Water Dropiets Present: (Y/N) Plume Background Description: Start: T/CC.1	Plume: (Attached, Detached, or N/A)	Background Color: Creen
Point in Plume Where Opacity was Determined: ~4 Sky Conditions: Start: Plant H Cloved End: Dar. Wind Direction: Start:End: Relative Humidity: Start:End:	rom slack evit	Amblent Temperature: Start: 24 F° End: 74 F° Wind Speed: Start: 6 mph End: 6 mph Wet Bulb Temp: Start: F° End: F°
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	15 30 45 Avg	SOURCE SKETCH LAYOUT
$1 \ \mathcal{O} \ \mathcal{O} \ \mathcal{O} \ \mathcal{O} \ 31$		
2 0 0 0 0 0 32	Emission	North Arrow
$3 \mathcal{O} \mathcal{O} \mathcal{O} \mathcal{O} \mathcal{O}$, 33	Point	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Plume	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sun	
8 0 0 0 0 38		Chserration 1400 Point
9 00 00 0 39	. Wind	140° Paint
10 η η θ θ η 40		-9
11 $\mathcal{Q}_{\mathcal{O}}}}}}}}}}$		
12 0 0 0 0 0 42		
13 Q Q Q Q 43		Sun Direction Line
14 0 0 0 0 0 44		
15 0 0 0 0 0 45		
	Highest six m	inute average;
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	A six minute	average greater than 20% opacity
	occured	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		average greater than 40% opacity
21 0 0 0 0 . 0 51		
22 0 0 0 0 $(, 52)$	Opacity Time	times. : Start: 10: 40A End: 11:10A
23 0 0 0 0 0 53	60-Minute Av	erge:
24 0 0 0 0 0 54		
25 Q Q Q Q Q 55	Observer's Na	ame: Jp/e/1/0/J
26 0 0 0 0 0 56	Certified By:	Carl Koontz AS
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Certification #	Exp. Date:
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Signature: (ame: <u>Jorephy Doss</u> <u>Carl Koontz Ass</u> : <u>Exp. Date:</u> <u>912114</u> Zorom Gold Date: <u>912114</u>
29 () () () () () 59		/

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EPA METHOD 9

VISIBLE EMISSIONS OBSERVATION FORM

CLIENT							_	W.O.#
SOURCE	*							DATE
SOURCE ADDRESS							_	_
	.							
						<u>.</u>		
Control Device, Process Equipme	~	<i>t</i> .		VA.	lýøy	2:00	3 6a	ge HCFM
Emission Point Description:	∿D_ 2_#	QCK		are	je_			· /_ · · ·
Source Height: Distance from Observer: 4	οπ Ο _{ft}		-		e to Ob		01	
Plume Type; (Continuous, Fuguliv		litant	Directio	л пол	Obset	er:	Start: Start:	End: End:
Description of Emission: (Coning,			ofilna	or Fuml	(onited		Start:	End:
Plume Color; Start: 6			Gre		3		otur.	^A
Water Droplets Present: (Y/N)	N	-		,	- Plume	: (Aitact	ied, Detaci	hed, or N/A) ////
Plume Background Description;	Start:		<u>Aline</u>	2		End:	Trel	line Background Color: Green
Point in Plume Where Opacity was				n stack		1	•	
	HY Clavi		ICCT	ψĽ	400	-		Amblent Temperature: Start: <u>75 F°</u> End: <u>75 F</u>
Wind Direction: Start: >	K-	_ End:	<u> </u>			-		Wind Speed: Start: Start: End: Start
Relative Humidity: Start:	8.5	_End:	X	5				Wet Bulb Temp: Start: <u>F°</u> End: <u>F</u> *
Min. 0 15 30 45	Avg	Min.	0	15	30	45	Avg	
$ \circ \cap \circ \cap \circ \circ \circ \circ \circ \circ $	10	30						SOURCE SKETCH LAYOUT
	Ŏ							
	- in	31	···	1				
2 0 0 5 43	3	32		·				Emission North Arrow
30005	17	33						Point
4 9 0 0 0	6	1 1						
	I-Y-	34						
500005		35					• • • • • • • • • • • • • • • • • • • •	Plume
6 0 0 0 5		36						
75000		37						Sun 📙
	\mathbf{a}							
	LA LA	38			[Wind 140° Children Print
9 10 S 0 15	$ \chi$	39]		,	Wind 140°
10 10 0 0 0	3	40						
11 0 0 0 0	O	41						and the start of the last to the start of th
	1-1/2-							177
12 0 0 0 0		42	····					
13 0 0 0 1/	LV.	43						Sun Direction Line
14 0 0 0 0	$ \mathcal{O} $	44						
15 10 0 05	11	45						
	-7			-+	· -			
$\frac{16}{10} \frac{10}{0} \frac{0}{0} \frac{0}{0} \frac{0}{0}$		46						Highest six minute average:
17 () 0 0 0	$ \mathcal{U} $	47						
18 0 0 0 0	\mathcal{O}	48					·	A six minute average greater than 20% opacity
	77	_						
		49						occured times.
20 0 0 0 0	V	50					/	A six minute average greater than 40% opacity
21 $O O O O$	0	51						pocured times.
22 8, 5 () 10	5	52						
$\square \square $	77							67
23 0 0 0 0 0 0 0 0 0	471	53					⁶	30-Minute Averge: '
$24 \cup 0 0 0$		54						
$25 \cap 0 \cap 0$	$O \mid$	55					· 6	Deserver's Name: Derepty, Dost
$26 \alpha \beta \delta \delta$	0	56						Certified By: Carl Kownth ASS
	047							
$27 \cup 10 Q \cup$	<u> </u>	57				_	C	Certification #: Exp. Date:
	6	58					s	Denoity Time: Start: 10.004 End: 10.304 S0-Minute Averge: 20 Deserver's Name: 200 Deretified By: 000 Certification #: Exp. Date: $917/17$
29 (1000	0	59			T	Γ		
البريش المشطعكات بالهابر ويلبي					_			

EPA METHOD 9

VISIBLE EMISSIONS OBSERVATION FORM

	CLIENT SOURCE SOURCE ADDRESS			W.O.# DATE
	Control Davice, Process Equipment Emission Point Description: Source Height: Distance from Observer: Plume Type: (Continuous, Fuguitve, Description of Emission: (Coning, Fr	ft Height ft Directi or Intermittent)	LOCIONS HL F 15 reczewa Relative to Observer: on from Observer; Start Start or Fumigating) Start	$= \underbrace{\begin{array}{c} \hline \\ \hline \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
	Plume Color: Start: Gre Water Droplets Present: (Y/N) Plume Background Description:		<u>сил</u> Д. Grey Plume: (Atlached, Deta End: HVC	ached, or N/A)
	Point in Plume Where Opacity was t Sky Conditions: Start: PATH Wind Direction: Start: MA Relative Humidity: Start:	Y CloudyEnd: Derf	mistacrexit 17 Cloud + WW 6 4.90	Ambient Temperature: Stari: 77 F° End: 72 F° Wind Speed: Stari: [2] mph End: /2 mph Wet Bulb Temp: Start: F° End: F°
	Min. 0 15 30 45	Avg Min. 0	15 30 45 Avg	
	050201510	14 30		SOURCE SKETCH LAYOUT
	245 55 40 25	4 <u>31</u> 4 32		Emission North Arrow
	3 25 15 15 1D	16 33		Point
	45555	5 34		
	555010	5 35		Plume
Brown	6 25 50 S0 45	43 36		
	7 40 25 20 5	23 37		sun /
	8 0 0 0 B	/ 38		
	9501515	9 39		Wind 140°
	10 10 5 5 5	6 40		
	$\frac{11}{5} \frac{5}{5} \frac{5}{5} \frac{5}{5} \frac{5}{5}$	<u> </u>		
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 42 0 43	· · ·	- One Direction Line
Gra	13 0 0 0 0	U 43 14 44		Sun Direction Line
1	154+5 50 50 10	37 45		· · · · · · · · · · · · · · · · · · ·
`	16 10 5 5 5	6 46		Highest six minute average:
	17 5 5 10 -5	14 47		
	1845504530	43 48		A six minute average greater than 20% opacity
	19 25 15 20 55	29 49		occured times,
	20 70 50 40 20	² +5 50		A six minute average greater than 40% opacity
	21 15 10 10 5	10 51		
	22 5 15 25 20	6 52		Opacity Time: Start: 1: 24 End: 1: 55P
	23 1 5 10 5 10	10 53		Co-Minute Averge: 1670
	24 10 5 5 5	6 54		A A A A A A A A A A A A A A A A A A A
Ļ	25 5 5 5	5 55		Observer's Name: Jeremy DOSS
		5 56		Certified By: <u>Carl Koontz Hes</u>
		57		Certification #: Exp, Date:
	$\frac{28}{20}$ 10, 10, 10, 10, 15, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10	0 59		Signature: John Mate: 8127/14
	29 20 10 5 3 1	0 59		V 1*

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	-10			RM		No.	
Kinder Morgan, Inc. Arrow Terming	81	271	DATE		START	TIME 24P	END TIME
STREET ADORESS 29210 F126th St.	SEC	0	15	30	45		COMMENTS
	1	45	35	15	ID	white	smoke
Chirado IL 60633	2	10	5	10	25	"	
PHONE (KEY CONTACT) SOURCE ID NUMBER	3	60	40	35	30	• • •	
PROCESS EQUIPMENT	4 · 5	20	15	10	10	N N	
Loader Semitruck Loading	6	10 5	5	5	5	\) \)	
CONTROL EQUIPMENT OPERATING MODE	7	5	50	0 50	40	<u> </u>	Carolo O
Describe EMISSION POINT Naterial handling of HCEM and	8	40	25	20	5	11	n smoke
WI CONTRACT VINCE	9	0	5	5	5	11	
Magnesite 9010 in Dreezeway of Bbb F HEIGHT ABOVE GROUND LEVEL HEIGHT RELATIVE TO OBSERVER J	10	5	10	10	5	11	
4F1. Stan Off. End OFT.	11	10	5	5	5	11	
DISTANCE FROM OBSERVER Start 200' End 200' Start S End S	12	5	5	.5	5	14	
DESCRIBE EMISSIONS	13	0	0	0	0		· · · · · · · · · · · · · · · · · · ·
Star White SMOKE End White SMOKE	14	0	0	0	0		
START WHILE END WHILE ABLACTOOD DOLLACTOOD DOLLACTOODOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLACTOODOLLACTOOD DOLLACTOOD DOLLACTOOD DOLLA	16	15 50	15	25 40	40 25	white	smoke.
SUM EXIT OF ODOC END EXIT OF COOC	17	15	10	10	5	11	
DESCRIBE PLUME BACKGROUND	18	10	5	20	40	11	
BLACKGROUND COLOR BLACKGROUND COLOR BLACKGROUND COLOR BLACKGROUND COLOR BLACKGROUND COLOR BLACKGROUND COLOR BLACKGROUND COLOR BLACKGROUND COLOR	19	50	50	40	30	11	
STATOYEED END OVERN STATE DUDY END COULD FIND SPEED WIND DIRECTION	20	25	20	25	45	11	
STAR 12 mph End 12 mph Star NNW End NNW	21	55	50	45	<u>35</u>	1)	
AMBIENT TEMP AND	22	15	10	10	10	N	
Stack SOURCE LAYOUT SKETCH Draw North Arrow	23	5	25	35	10		
Sun +	24 25	10	15	15	15 5	<u> </u>	
Wind	26	10 5	10 5	10 10	5 5	11	
	27	5	5	5	5	<u>)/</u>	
	28	10	20	25	20	11	
	29	15	25	15	15	11	
	30	50	20	15	10	11	
		ILIAY			~		
Observer's Position	985E	the second s	I KC	<u>dg</u> e			DATE 127/14
140*	ORGA			<u>v</u>	\sim		012/114
		NORY	· (Y)	orga	In		DATE
ADDITIONAL INFORMATION							
	СОМТІ		N VEO F		MBER		
· · · · · · · · · · · · · · · · · · ·	L			·····			

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COMPANY NAME					BVATIO	E DATE	·	START	INU.	
Kinder 1	Morgan,	Inc. A	rrow Terminal	$ \theta$	127	114		Ŷ,	58	ID:28
STREET ADDRESS		St.		SEC	0	15	30	45		COMMENTS
				1	0	0	0	0		
CITY		STATE		2	0	0	0	O		· ·
CHICAGO PHONE (KEY-CON	TACT)	SOURCE ID	NUMBER	3	0	0	0	0		
773-6	46-8000			4	0	0	0	0		
PROCESS EQUIPM	IENT Somi Low	~ L	OPERATING MODE	· 5	0	0	0	0		
CONTROL EQUIPM	Semitru		OPERATING MODE	6	0	0	0	0		
NA			NA	7	0	0	0	0		
DESCRIBE EMISSIC Matchial	nandlin(I DE C	SIMN in	8	0	0	0	0		
	_			9	0	0	0	0		
HEIGHT ABOVE GR	V V V V V V V V	HEIGHT REL	ATIVE TO OBSERVER	10	0	0	0	O		
Ц1		Start O	End D'	11	0	0	0	0		
DISTANCE FROM C	End 20)	Star SV	ROM OBSERVER J End SVJ	12	0	0	0	0		
DESCRIBE EMISSIC	DNS			13	0	0	0	0		
EMISSION COLOR	<u>Smoke</u>	End UV	TOPLET PLUME	14	0	15	15	15	white	Smoke
sour White	End White	Attached 🗆	Detached 🗆	15	10	5	0	0		
	NE AT WHICH OPACT		amined Lit of door	16	5	0	0	0	11	
DESCRIBE PLUME				17	0	0	0	0		
Start SK V		ENSKI		18	0	0	0	0		
BACKGROUND COL	End White	SEAL CLOCK	Phis partly Fly End Cloudy	19 20	0	0	0	0		
		WIND DIRECT	TION	20	0	Û Ú	0	$\frac{0}{c}$	<u>v</u>	
AMBIENT TEMP	End 10mph	SEAN EN		22	0	n S	0	5		
sun 75F	End 75F		78%	23	0			$\frac{\circ}{\circ}$	<u></u>	······
Stack with C	SOURCE LAY	OUT SKETCH	Draw North Arrow	24	0	0	0 0	0		
Sun +				25	0	ŏ	Ð	0		
Wind -	\mathbf{X}_{I}			26	0	0	6	0		
	X	Emission P	oint	27	0	0	Ď	0		
	[28	0	0	0	0		
				29	0	0	0	0		<u></u>
				30	0	0	0	0		<u> </u>
				OBSER	VER'S N			<u>_</u>		
		Observer's Po	noilien	<u>ر</u> 089	<u>llic</u> Verks s		Ka	<u>xdg</u>	2-2	
_	140			2	\rightarrow	- 1		L		8/27/14
<i>∠</i>		ORGAN	-1 M		More	Jan				
ADDITIONAL INFORM	IATION			CERTIF	IED BY		<u>-101</u>	Jun		DATE
								······································		······································
				CONTIN		VEO FO	NUM NUM	18ER		
			······································							

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		UNVEE							
Kinder Marapun, Ir	rc. Ar	row Termina	8	I27	DATE		START	TIME 34	END TIME
STREET ADDRESS JUHNS			SEC	0	15	30	45		COMMENTS
	- -		1	0	0	0	0		
CITY	STATE	ZIP, O.C. D.D.	2	0	0	0	0		
Chicago PHONE (KEY CONTACT)	SOURCE ID	60633	3	٥	0	0	0		
773-646-8000			4	0	0	0	0		Here, 177
PROCESS EQUIPMENT		OPERATING MODE	· 5	0	0	0	0		
Loader, Semitru	CK	OPERATING MODE	6	0	0	0	0		
NA		NA	7	0	0	0	0		
Material Mardling	1 00	FESI 75%	8	0	0	0	0		
	ر د		9	0	0	0	0		
IN E breezeway (ATIVE TO DESERVER	10	6	0	0	0		
4	stan D'	End D'	11	0	0	0	0		
DISTANCE FROM OBSERVER Start 2000 End 2000			12	0	0	0	σ		
DESCRIBE EMISSIONS			13	0	0	0	0		
Stan NA EMISSION COLOR		A ROPLET PLUME	14	0	0	0	0		
SULA End NA	Attached 🗆	Detached 🗖	15	0	0	0	0		
POINT IN THE PLUME AT WHICH OPACI	TY WAS DETE		17	0	0	0	0	• <u>.</u>	······································
DESCRIBE PLUME BACKGROUND			18	0	0	0	0		
SILIT SKN BACKGROUND COLOR	End SK		19	0	0		0		
Start White End White	SKY CONDIT	Slouchend cloudy	20	0	0	0	0		
WIND SPEED	WIND DIRECT	TION	21	0	0	0	0		
AMBIENT TEMP	WET BULE 1	EMP RH, percent	22	0	0	0	0		
Start 76F End 76F	 	65 <u>%</u>	23	0	0	0	0		
Stack SOURCE LAY	OUT SKETCH	Draw North Arrow	24	0	0	0	0		
Sun 🕂		$\langle \mathbf{A} \rangle$	25	0	0	0	0		
Wind			26	0	0	0	0		· · · · · · · · · · · · · · · · · · ·
>	C Emission	Point	27	0	0	0	0		
			28	0	0	0	0		
			29	0	0	0	0		
		5	30	0	0	0	0		
			OBSE	AVER'S M	\sim				
	Observer's	Position	OBSE	VEB'S	L <u>K</u>	nda RE	ers		DATE
			NIZATION	2_	K			B127/14	
Sun Loca		L'I	100	er	M	oran	n		
ADDITIONAL INFORMATION			CERTI	FIED BY			J		DATE
			<u> </u>						
· · · · · · · · · · · · · · · · · · ·			CONTI		N VEO F	ORM NU	MBER		

EPA METHOD 9

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VISIBLE EMISSIONS OBSERVATION FORM

CLIENT SOURCE SOURCE ADDRESS				W.O.# DATE
Control Device, Process Equipment, Emission Point Description: Source Height: Distance from Observer:	<u>pock</u> ft He ft Dir	<u>Unicadi</u> or <u>9</u> Ight Relative to Observer rection from Observer	rver: : Start:	- <u>F</u> <u>F</u> <u>F</u> <u>End:</u> <u>End:</u>
Water Droplets Present: (Y/N)	nning, Looping, Lofli	<u>ル (八.</u> Plume: (ル : <u>(八て</u> E : \from sleck oxil	Start: Start: Atteched, Detect End:	End: Hed, or N/A) <u>A/IA</u> Background Color: <u>Green</u>
Sky Conditions: Start: <u>perf 14</u> Wind Direction: Start: <u>perf 14</u> Relative HurnIdity: Start: <u>7</u>		or+ly claudy NE 77		Ambient Temperature: Start: 25 F° End: 25 F° Wind Speed: Start: 6 mph End: C mph Wet Bulb Temp: Start: F° End: F°
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Avg Min. (30 31	0 15 30	45 <u>Avg</u>	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$) 32 / 33			Emission North Arrow
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 0 & 34 \\ \hline 0 & 35 \\ \hline 0 & 36 \\ \end{array}$			Plume
7 <u>()</u> () () () 8 () () () () () () () () () () () () ()	0 37 38			sun observation point
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} () & 39 \\ \hline 0 & 40 \\ \hline 0 & 41 \end{array}$			Wind
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	() 42 () 43			Sun Direction Line
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 0 & 44 \\ \hline 0 & 45 \\ \hline 0 & 46 \end{array}$			Highest six minute average:
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 47 0 48			A six minute average greater than 20% opacity
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 0 & 49 \\ \hline 0 & 50 \\ \hline 0 & 51 \\ \hline \end{array}$			occured times. A six minute average greater than 40% opacity occured times c. c.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	0 52 0 53			Opacity Time: Start: <u>8:494</u> End: <u>9,1%</u> 60-Minute Averge: <u>090</u>
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c c} 0 & 54 \\ \hline 0 & 55 \\ \hline 0 & 56 \\ \end{array}$			Observer's Name: <u>Jerni/ Coss</u> Certified By: <u>Carl Kathtz</u>
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0 57 Q 58			Certification #: Exp. Date: Signature: Image: Ima
29 0 0 0 0 0	() 59			

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EPA METHOD 9

VISIBLE EMISSIONS OBSERVATION FORM

CLIENT		W.O.# DATE	
SOURCE ADDRESS	· · · · · · · · · · · · · · · · · · ·		;
Source Height: <u>1</u> ft Distance from Observer: <u>20</u> ft Plume Type: (Continuous, Fugutive, or Description of Emission: (Coning, Fannia Plume Color: Start: <u>A</u>	Sull UM Ø F Breeze Height Relative to Observe Direction from Observer: Intermittent) ng, Looping, Loiting, or Fumigating) A End:	ver: /ft Start: End: Start: End: Start: End:	
Water Droplets Present: (Y/N) Plume Background Description: Sta	A	Attached, Detached, or N/A)Background Color: BIVE	İ
Wind Direction: Start: ENE	Immuned: ~ ' from stack exit Clow/End: Partit End: Clow/L End: Clow/L Control Clow/L End: Clow/L Control Clow/L End: Clow/L	Amblent Temperature: Start: <u>76</u> F* End: <u>76</u>	F° mph F°
		45 Avg	
	0 30	SOURCE SKETCH LAYOUT	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<u>Ø</u> 32	Emission North Arrow	
		Point	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Plume Plume	
7 0 0 0 0	0 36 0 37		
80000	0 38	Sun Sun Pohservahion	
90000	0, 39	Wind 140°	
10 0 0 0 0	0 40		
11 0 0 0 0 0	7 41		
12 0 0 0 0	0 42		
13 0 0 0 0	0 43	Sun Direction Line	
14 0 0 0 0	0 44		
15 0 0 0 0	0 45		
16 0 0 0 0	0 46	Highest six minute average:	1
	O 47		
	2, 48	A six minute average greater than 20% opacity	
19 0 0 0 0	49	occured times.	
	50	A six minute average greater than 40% opacity	
2100000000	51	occured times and the second	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	52	Opacity Time: Start: 0:34A End: 11:04A	
	53	60-Minute Averge:	
	9 54	S cand D D P	
25 0 0 0 0 0	55	Observer's Name: Der 47 10 55	
26	56	Certified By: <u>Carl Noontz Ast</u>	I
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		Certification #: Exp. Date:	1
		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
29 () <i>Q</i> <i>Q</i> <i>Q</i> ()) 59	her .	_

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•		VISIBLE EMISSION	UBSER					No. ACL 00217
COMPANY NAME		Chicus UNOF	OBSE	RVATION	DATE 9.14)	START	TIME END TIME 10:45 DW
KINC	her Morgo	N Childge Hard	K SEC	<u>入日日</u> - 14 例示:				
STREET ADDRES	S *		MHN	0	15	30	45	COMMENTS
			1	52	52	alerano.	10%	3%
		STATE	- 2	# 92334	dens	104	10%	58
СПҮ	and the second		3	102	15%	antina anti-	-	5%
PHONE (KEY CON	VTACT)	SOURCE ID NUMBER		1	1.010	100000	· · · · ·	NO TRUCKS
								NO LOUGH
PROCESS EQUIP	AL- Hae	DEPATING MODE			aren;		~	li p
CONTBOL EQUIP	MENT	OPERATING MODE	6	, danta .		2450 C		U N
Pierre	Moust	20 Worker		-	e. . (B	17		
DESCRIBE EMISS	SION POINT	ed of Truck	é 8	102	5%	5%		58
Buch	- 9	600		-		NO TOURIS		
	· · ·		10		. C ^{an}			U O
HEIGHT ABOVE C		HEIGHT RELATIVE TO OBSERVER	111	• em#+	-entries	-	1002825	el el
	OBSERVER SD PT	DIRECTION FROM OBSERVER	12	5%	10%	10%	\$2340°	6.256
Start 10415		Start End	13				1920-	NO TRUCKS
DESCRIBE EMISS	enser i Filmer est	End 10; 45 du	14		her	_	-	u u
EMISSION COLOF	5 AM	IF WATER DROPLET PLUME	15	5%	10%			3.75%
Start	End		16	10%	_	1000	Mangajan	5%
POINT IN THE PL	UME AT WHICH OPACI	End	. 17		10%		~	2.5%
DESCRIBE PLUM	E BACKGROUND		- 18	58		5%		2.5%
	Rown Keees)	End 10:45		20		-	~	NO TRUCK
BACKGROUND C	End 10:45	Start 10: 15 End 10:45	20	106				2.5%
WIND SPEED		WIND DIRECTION NOT H	21	106		+		
Start	End Z45	Star. 10 15 End 10:45	22		<u>. </u>			Changing, LIDS
Start /D 11					<u> </u> 	<u> </u>	 	
Stack		OUT SKETCH Draw North Arro	23 w				<u> </u>	
with Plume		\bigcap	24				<u> </u>	
Sun 🔶			25	· .	<u> </u>			
Wind >		and a start of the second start	26		<u> </u>			
		Emission Point	27			; ,	<u> </u>	
			28	<u> </u>			<u> </u>	
			.29					A
		n an an tha an	30	·	-			
		en la companya de la La companya de la comp	OBS	ERVER'S	NAME (E	BINT	1	 A second s
		Bil		Buc	hm	SKT DATE		
			R	CHVEH'S	BIGNAT	- Ar	\sum_{n}	2, 11.19.14
		40*	ORG	ANIZATIC	DN	1.2		
L	Sun Loc	Blion Line		TIFIED B	Y			! DATE
ADDITIONAL INF	ORMATION							
							IMRER	
		•••••		IINUED	ON VEO	FURMIN	UMBER	

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	VISIBLE EMISSION OBSERVATION FORM							
COMPANY NAME	UNOFF		RVATIO		·····	START	1	END TIME
Kinder Morgan	-	SEC	<u>312</u>	$\frac{1}{1}$	<u>† </u>		8:49	9:19
STREET ADDRESS 2926 E 126+n	S.	MH	0	15	30	45		COMMENTS
	-	1	0	0	0	0		
CTY .	STATE ZIP	2	0	0	0	0		
PHONE (KEY CONPACT)	IL 60633	c l	0	0	0	0		
773- 646-8000		4	0	0	0	0		
PROCESS EQUIPMENT	OPERATING MODE	1 · 5	0	0	0	0		
Barge, Dump Truck	, Crane Unbading	6	0	0	0	0		
NA	NA NA	7	0	0	0	0		·····
DESCRIBE EMISSION POINT	_	8	0	0	0	0		
Barop unloading c	of pig iron	9	0	0	0	0		
at dock	. 0	10	0	0	0	0		
HEIGHT ABOVE GROUND LEVEL	HEIGHT RELATIVE TO OBSERVER	11	0	0	0	0		
	Star 5' End 5' DIRECTION FROM OBSERVER	12				<u> </u>		
Start 50' End 50'	Start N End N	13	0	0	0	0		
			0	0	0	0		
STAR NA	End NA IF WATER DROPLET PLUME	14		0	0	0		
SOUT NA End NA	Attached Detached	15	0	0	0	0		
POINT IN THE PLUME AT WHICH OPACI		16	0	0	0	0		
Sen NA	End NA	17	0	0	0	0		
DESCRIBE PLUME BACKGROUND Soun Treeling	END TREELIDE	18	0	0	0	0	•	
BACKGBOUND COLOR	SKY CONDITIONS DOCHLY SHAPPCID ON END COLOLI	19	0	0	0	0		
Stan areen Engreen	WIND DIRECTION	20	0	0	0	0		
Star (OMDH End OMDH	SEAR NNE END NNE	21	0	0	0	0		
AMBIENT TEMP	WET BULE TEMP RH, percent	22	0	Õ	0	0		
		23	0	0	ð	0		
with C	OUT SKETCH Draw North Arrow	24	0	Ø	0	0		
Sun 🔶		25	0	0	0	0		
Wind	V	26	0	0	0	0		
X		27	0	0	0	0		MARTIN
		28	0	0	D	0		
		29	0	0	0	0		
		30	0	0	0	0		
		OBSER	IVER'S N	AME (PF		<u> </u>		
	Observer's Position	LL	liar) Ke	Aa	ers		
		OBASEF	INER'S S	ignatur		· ·		DATE QUATIN
		OFIGA	IZATION		n	0		
Sun Location Line			<u>hir</u>	ider	[]	locq	an	DATE
ADDITIONAL INFORMATION						0	· · ·	DATE
		CONTI		VEO FO				

EPA METHOD 9

VISIBLE EMISSIONS OBSERVATION FORM

CLIENT		W.O.#
SOURCE ADDRESS		DATE
Control Device, Process Equipment, Opera	the lact ac	
Emission Point Description:		AY - WESTEND
Source Height:	Height Relative to Observer:	start - CTAT Brade SW
Distance from Observer:	Direction from Observer:	Start: End: Start: End:
Description of Emission: (Coning, Fanning,	Looping, Lofting, or Fumigating)	Start: End:
Plume Color: Start: Grey	End: Grey	
Water Droplets Present: (Y/N)		Detached, or N/A) <u>////</u> Green Background Color:
Point in Plume Where Opacity was Determined Sky Conditions: Start: $pa(f1) C f$		
Sky Conditions: Start: Darfly Ck	WEnd: Parti Clove	Ambient Temperature: Start: 73 F° End; 75 F°
Wind Direction: Start: ENE Relative Humidity: Start: 69.70	End: EM End: $(p 9 2p$	Wind Speed: Start: <u>(0 mph</u> End: <u>10 mph</u> Wet Bulb Temp: Start: F° End: F*
Min. 0 15 30 45 Avg		Avg
		SOURCE SKETCH LAYOUT
		SOURCE SKETCITERIOUT
		Emission North Arrow
		Point (F)
	/ 34	
		Plume
	36	
		sun - of servation
	38	point point
900000		Wind 140° 0
10 0 0 0 0 0	40	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	41	
	42	
13 0 0 0 0 0	43	Sun Direction Line
14 0 0 0 10 3	44	
15 10 5 0 0 4	45	
16 0 0 0 0 0	46	Highest six minute average:
1705001	47	·
18 0 0 0 0 0	48	A six minute average greater than 20% opacity
19 0 0 0 0 0 0	49	occured times.
20 0 0 0 5 1	50	A six minute average greater than 40% opacity
21 5 5 5 7 4	51	occured times. Opacity Time: Start: 9:58A End: 10:28A 60-Minute Averge: 070
22 0 0 0 0 0	52	Opacity Time: Start: $\underline{9.5}$ OA End: $\underline{10.70A}$
23 0 0 0 0 0	53	60-Minute Averge:
24 0 0 0 0 0	54	
25 0 0 0 0 0 0	55	Observer's Name: Dereny Poss Certified By: Carl Rountz Ass.
26 0 0 0 0 0	56	Certified By: Carl Kountz ASS.
$27 0 0 0 \delta 0$	57	Certification # Exp Date:
$_{28}$ O Q O $^{\circ}$ O	58	Signature: Line on Date: 8/27/14
29 0 0 0 0 0	59	

1177

FUGITIVE OR SMOKE EMISSION INSPECTION OUTDOOR LOCATION						
Company KINCLY Location Arrow Company Rep. Heve	Margan Terminal Caurlle		Observer) Affiliatio Date 812		lers	
sky Conditions partly Cloudy			Wind Direction NNE Wind Speed 6MPH			
Industry Bulk 1	Narenousir	19	Process Un	it Barge		
Sketch process unito source; indicate actual emission po	te potential e pints.	wind	_			
OBSERVATIONS	Clock Time	Observat perio duratic min:se	de on,	cumulated mission time, nin:sec		
Begin Observation	9:37	<u>6:00</u>	<u> </u>	00:00		
		<u></u>				
	<i>k</i>					
			······			
End Observation	9:42			· ·		
	Figure 2	22-1				

.

• •	EMISSION INSPECTION TION – METHOD 22				
company Kinder Murgan	Observer Devery Doss				
Location Ferro Terminal	Affiliation Kinder Morgan				
Company Rep. Sterr Caudle	V179/111				
Sky Conditions Partly (10004	Date $O \neq 1/17$ Wind Direction $M NE$				
ദ്രം	1 Azall				
Industry Bulk Wavehousing	Wind Speed & //IPH				
Industry 1/011 Vaveneuring	Process Unit Barge - Pig Iron				
一般的复数形式形式形式形式形式形式形式形式形式形式形式形式 法法律法律法 法法律法律法律法律法律法律法律法律法律法律法律 法法律学生的 化相相合物	m relative to source; indicate potential emission				
points and/or actual emission points. Location 1. Location 2. Locat	ton 3. Location 4				
S. S. S.					
River for how					
Kiber Excapitor					
- No (the					
x-observetion					
γ : ροπτ					
OBSERI	ATIONS				
Location Clock Time	Observation Period Actual Emission Time				
Location	Duration (min:sec) (min:sec)				
Location 1: Start 9:374					
Location 1: Stop . 9:43A	(°:00 0:00				
Location 2: Start					
Location 2: Stop					
Location 3. Start					
Location 3: Stop	The second se				
Location 4. Start					
Location 4: Stop					
Location 5: Start					
Location 5: Stop	Total Sample Time: 6:00				
	Total Emission Time: O				
	Emission Frequency: 0 %70 (Total Emission Time/Total Sample Time) x 100%				

FUGIT	IVE OR SMOKE EM OUTDOOR LC		CTION
Company Kinder Location Arrow Company Rep. Ste	Morgan Terminal re Caudle		rver J. Rodgers liation KM 8127114
Sky Conditions P Precipitation N	artly cloudy	Wind	Direction NNW Speed 12 mph
Industry Bulk V	Varehousing	HCFM Proc	ess Unit Bba,7
Sketch process un to source; indica actual emission p	nit: indicate ate potential en) Observer pos mission poin	ition relative
12676 Pence	observation	N	2
OBSERVATIONS	Clock Time	Observation period duration, min:sec	Accumulated emission time, min:sec
Begin Observation	2:13	6:00	0:00
	· · · · · · · · · · · · · · · · · · ·	······································	
End Observation	2:13		
	Figure 2	2-1	

UNOFEICIAL

•	EMISSION INSPECTION TION – METHOD 22			
Company Kinder Morgan	Observer Jeremy Doss			
Location Ferry Terminal	Affiliation Linder Margan			
Company Rep. Steve Caudle	Date 8/27/14			
Sky Conditions Parifly Cloudy	Wind Direction NNE			
Precipitation 090	Wind Speed 12 MPH			
Industry BUIK Warehousing	Process Unit Landing - HCFM			
	n relative to source; indicate potential emission			
points and/or actual emission points.				
Location 2 Locat	ion 3. Location 4			
JAN SC				
17 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
ter les				
Kobsenvition				
P0.04				
OBSERV	ATIONS			
Location Glock Time	Observation Period Actual Emission Time			
	Duration (min:sec) (min:sec)			
Location 1: Start 2:07 pm				
Location 1. Stop 2,13 pm	6:00 0:00			
Location 2: Start				
Location 3. Start				
Location 3: Stop				
Location 3: Start				
Location 4: Stop	andra in an			
Location 5. Start				
Location 5: Stop				
,	Total Sample Time: 6:00 Total Emission Time: 0:00			
•	Emission Frequency: 0% (Total Emission Time/Total Sample Time) x 100%			

1	1	7	7	
1	Т	1	1	

FUGITI	VE OR SMOKE OUTDOOR	EMISSION INSP LOCATION	ECTION
Company Kinder Location Arrou Company Rep. Jilli		Aff	erver J. Rodger iliation KM e 9/2/14
Sky Conditions P Precipitation	artly clos NO		d Direction W d Speed 11M00
Industry Wareh	ousing, Spe	cial Prod	cess Unit barg
Sketch process un to source; indica actual emission p	it: indicat te potential	e observer pos	
o sho e	130	ft pN Wind	× enis
OBSERVATIONS Begin Observation	Clock Time 9;/2	Observation period duration, min:sec 6:00	Accumulated emission time, min:sec
End Observation	9:18 Figure	 e 22-1	

FUG	TIVE OR SMOK			N			
company Kinder	Morgan	Observer Jil	lian Ro	obers			
Location Dock	V	Observer Jil	И-EHS.	specialist			
Company Rep. Jillian	Rodgers	같은 것 같은 감독을 물고 있는 것이다.	Date 13/11/14				
Sky Conditions CLOU	는 것은 12년 12년 12년 12월 12일 (11일 - 11일 - 1 11일 - 11일 - 11 11일 - 11일 - 11	Wind Direction					
Precipitation N/A		A 11					
Industry Alloy ha	ndling Istorage	And the second s		nloading -DBM			
Sketch Process Unit: In points and/or actual em	ndicate observer posi ission points.	tion relative to sou					
	OBSEI	RVATIONS					
Location	Clock Time	Observation P Duration (min		al Emission Time (min:sec)			
Location 1: Start	12:01						
Location 1: Stop	12:07	6:00	0	:00			
Location 2: Start							
Location 2: Stop							
Location 3: Start							
Location 3: Stop							
Location 4: Start Location 4: Stop							
Location 5: Start							
Location 5: Stop							
		Total Sam	R	6:00 0:00			

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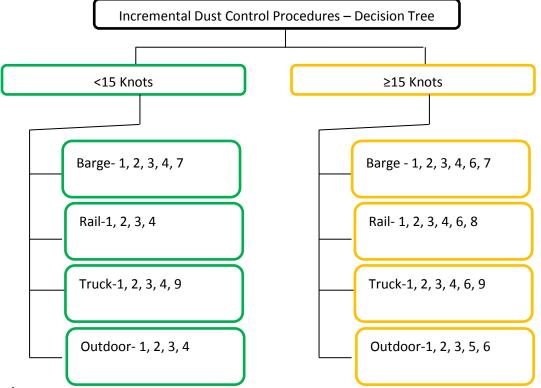
Exhibit E

<u>Chicago Arrow Terminal – Incremental Dust Control Procedures and Decision Tree for Bulk</u>

<u>Products</u>

Four bulk product categories

- 1. Barge Bulk Unloading (Barge)*
- 2. Rail Car Bulk Loading (Rail)*
- 3. Truck Bulk Loading or Unloading (Truck)
- 4. Outdoor storage piles; Pig Iron, Aggregates and other non-moisture sensitive products. (Outdoor)



Control Procedures

- 1. Follow Best Management Practices
- 2. Utilize "You Can Stop" when visible emissions and/or opacity are in question.
- 3. Any transfer point will cease operation if opacity or visible emission limits are reached and/or in question, until corrective actions are taken.
- 4. Apply water to non-moisture sensitive products (Ex. Pig iron), weather (temperature) permitting.
- 5. Apply water to non-moisture sensitive products (Ex. Pig iron), weather (temperature) permitting. If weather does not permit water suppression and the pig iron is neither snow-covered nor frozen, loading will take place indoors.
- 6. Personnel on site who can measure opacity and/or visible emissions; according to EPA Method 9 and/or 22.
- 7. Limit the number of barge lids removed from a covered barge at a time, as follows:
 - a. Fiberglass Stacking Barge Lids 3.
 - b. Metal Rolling/Sliding Barge Lids 3
 - c. Metal Stacking Barge Lids 5.
- 8. Open and load or unload rail cars through one access point at a time.
- 9. Load outbound trucks (from indoor storage) indoors.

* Loading of barges and unloading of railcars occurs very infrequently