

Wyoming AQD – New Process for Collecting and Managing Oil and Gas Production Site Emissions Inventories

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2019 International Emissions Inventory Conference

Background...



Until relatively recently, we managed air facility data in <u>four</u> data management systems: AQDS, WISE View, OGER and IMPACT (new).

OGER (Oil and Gas Emissions Reporting) system was used only for production site emissions inventories. Designed to aggregate data to county-level for <u>nonpoint</u> submission via our EN node, so <u>relatively little facility inventory</u> granularity captured from emissions inventory workbooks.

Now, internal drivers to consolidate all air program work streams into our integrated IMPACT ("Inventory, Monitoring, Permitting And Compliance Tracking") system.



Issues confronting us ...

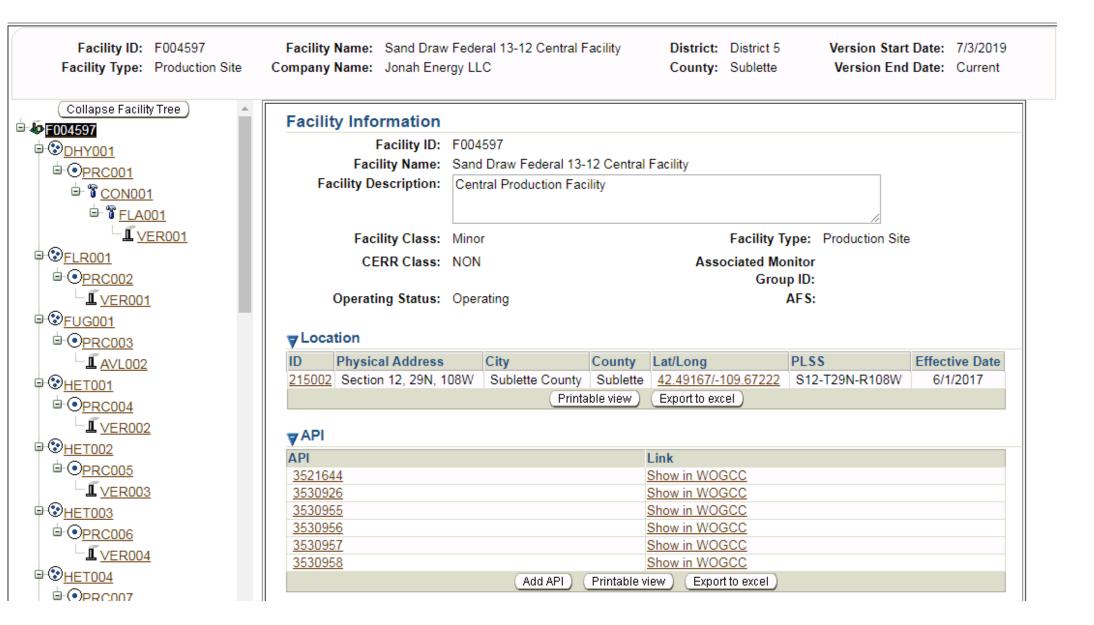
- IMPACT is designed for working only on <u>a single facility object at a time</u>; i.e., there are no front-end "batch upload" features.
- We need to get roughly 30,000 production-site facility inventories into IMPACT, that meet the system's strict validation standards designed for <u>point</u> <u>source</u> inventories (i.e., all the required data fields associated with emission units >> processes >> control equipment >> release points).
- SO, how to make it work for an oil and gas operator who has 1,000+ facility inventories and emissions inventories to put in...?



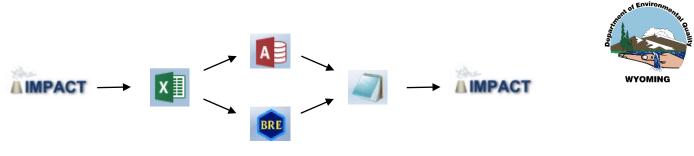
Let's assume all the facility inventories have been created* in IMPACT and get to the important stuff:

EMISSIONS INVENTORIES

IMPACT System – Facility Data Information Home Page

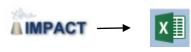






New El Process

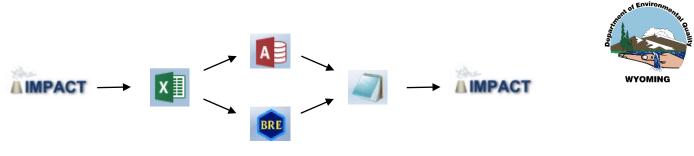
- 1. Facility Profile Information Extracted from IMPACT
- 2. Company Provides Operating Parameters
- 3. AQD Generates the Emissions
- 4. Emissions Imported to IMPACT
- 5. Company Review of Emissions





Facility Profile Extract with Operating Data

Facility S	ummary															
		Inventory Year	: 2018		Company Name:	Jonah					0					
		Inventoy Content	: Annual		riod Start Date:					Run All Macro	s					
		Regulatory Requirement	: Triennial Non-Title V Program	Inventory F	Period End Date:	12/31/2018										
							Pr	oduction / Facility	Material Throu	ıghput	Production Days /			Atmospheric C	onditions	
Facility ID	Facility Name	Company Name	API Numbers	County Name	Latitude	Longitude	Gas (mcf)	Oil/Condensate (bbls)	Water (bbls)	Average API Gravity (*)	Operating Days During Inventory Period	Location	Maximum Average Temperature (°F)	Minimum Average Temperature (°F)	Average Pressure (psia)	Daily Insul (BTU/f
	Yellow Point 1-13 Central Facility	Jonah Energy LLC	3521603;3521690;3521691;3521873; 3521885;3521887;3521973;3521975; 3521976;3522198;3522203;3522213;	Sublette	42.40893936	-109.7454376	3075014	22098	67807	53.884078	365	Lander	57.49166667		12.0205	145
F003044	Yellow Point 9-12 Central Facility	Jonah Energy LLC	3521692;3521717;3521816;3521860; 3522008;3522215;3522312;3522314; 3523148;3523149;3523150;3523151;	Sublette	42.41555023	-109.7455521	1484652	12122	34143	54	365	Lander	57,49166667	31.65	12.0205	145
	Sand Draw Federal 11-12 Central Facility	Jonah Energy LLC	3521702;3530858	Sublette	42.49499893	-109.6669388	45168	618	475	51	308	Lander	57.49166667	31.65	12.0205	145
and the second second second	Jonah Federal 13-7 Central Facility	Jonah Energy LLC	3521201;3521311;3521694;3521815; 3521886;3522051;3522208;3522344; 3522347;3522351;3522357;3522415;	Sublette	42.41249847	-109.7405624	3130757	24353	66018	54.410818	365	Lander	57,49166667	31.65	12.0205	145-
An and a second s	Stud Horse Butte 4- 35 Central Facility	Jonah Energy LLC	3521483;3521534;3521599;3521833; 3521834;3521945;3522205;3522209; 3522210;3522342;3522365;3522383;	Sublette	42.44444	-109.69138	4711314	39281	99128	53.733711	365	Lander	57.49166667	31.65	12.0205	145
F013347	Stud Horse Butte 1- 29 Central Facility	Jonah Energy LLC	3521425;3521453;3521634;3521706; 3521813;3521838;3521856;3522101; 3522106;3522113;3522114;3522115;	Sublette	42.45861053	-109.7347183	7485236	61953	198557	53.489972	365	Lander	57,49166667	31.65	12.0205	145
	Stud Horse Butte 19-36 Central Facility	Jonah Energy LLC	3523036	Sublette	42.44388962	-109.6577835	35950	411	349	58	359	Lander	57.49166667	31.65	12.0205	145
	Stud Horse Butte 11-17 Central Facility	Jonah Energy LLC	3521746;3522753;3522754;3522755; 3522768;3522778;3525533;3525551; 3525560;3525561;3525562;3525962;	Sublette	42.48083115	-109.7455597	5021213	53921	112548	53.724306	365	Lander	57.49166667	31.65	12.0205	145
	Antelope 6-4 Central Tank Battery	Jonah Energy LLC	3523084	Sublette	42.51256943	-109.6085815	5695	7563	91047	49.583333	343	Lander	57.49166667	31.65	12.0205	145
A 60 C 100 C 100 C 100 C 100 C	SOL 12-25 Central Facility	Jonah Energy LLC	3523808;3530401;3530414	Sublette	42.45217133	-109.7885666	27934	203	843	50	345	Lander	57,49166667	31.65	12.0205	145
norman l	Stud Horse Butte 12-15 Central Facility	Jonah Energy LLC	3521557;3521643;3521946;3521947; 3521948;3521991;3522009;3522025; 3522289;3522290;3522302;3522756;	Sublette	42.47972107	-109.7102814	7 <mark>4</mark> 50440	60262	162818	53.046193	365	Lander	57.49166667	31.65	12.0205	145
	Stud Horse Butte		3521660;3521923;3522642;3526031;													



New El Process

- 1. Facility Profile Information Extracted from IMPACT
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New Calculation Procedures

• Straightforward Throughput Calculations in Access

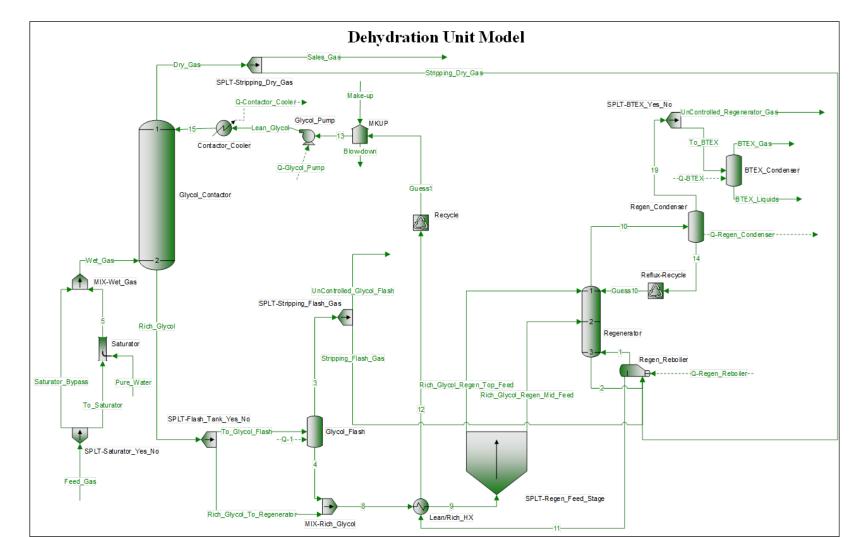


New Calculation Procedures





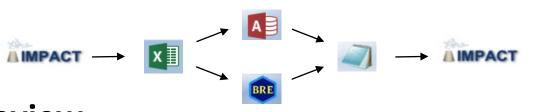
• ProMax for Tanks, Dehydration and Truck Loading





Estimated Emissions Combined into CSV File

A	В	С	DEFG	H I J	K L	M	0	P	Q	R S	Т	U	V	W	x	Y Z AAA		AEAFA		AK AL A	NANACAP	ACAFASA		AXAYA	Z BA BB	C BD
1 F002474	DHY001	PRC009	24 7 52 7000	25 25 25	25 Gas	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
2 F002474	DHY002	PRC010	24 7 52 7000	25 25 25	25 Gas	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
3 F002474	FLR001	PRC018	24 7 52 7000	25 25 25	25 Oil	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
4 F002474	FUG001	PRC017	24 7 52 7000	25 25 25	25 Well	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
5 F002474	HET001	PRC002	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
6 F002474	HET002	PRC003	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
7 F002474	HET003	PRC004	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
8 F002474	HET004	PRC005	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
9 F002474	HET005	PRC006	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
10 F002474	HET006	PRC007	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
11 F002474	HET007	PRC008	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	: 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
12 F002474	LUD001	PRC016	24 7 52 7000	25 25 25	25 Crude Oil	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	0 1 0	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
13 F002474	PNE001	PRC013	24 7 52 7000	25 25 25	25 Gas	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
14 F002474	PNE002	PRC014	24 7 52 7000	25 25 25	25 Material	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
15 F002474	PNE003	PRC015	24 7 52 7000	25 25 25	25 Material	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
16 F002474	SEP001	PRC001	24 7 52 7000	25 25 25	25 Crude Oil	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	0 1 0	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
17 F002474	TNK001	PRC011	24 7 52 7000	25 25 25	25 Condensa	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
18 F002474	TNK002	PRC012	24 7 52 7000	25 25 25	25 Produced	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
19 F002475	DHY001	PRC009	24 7 52 7000	25 25 25	25 Gas	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
20 F002475	DHY002	PRC010	24 7 52 7000	25 25 25	25 Gas	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	0 1 0	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
21 F002475	ENG001	PRC001	24 7 52 7000	25 25 25	25 Fuel	1000 HC	1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
22 F002475	ENG001	PRC001	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
23 F002475	ENG002	PRC018	24 7 52 7000	25 25 25	25 Fuel	1000 HC	1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
24 F002475	ENG002	PRC018	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
25 F002475	ENG003	PRC019	24 7 52 7000	25 25 25	25 Fuel	1000 HC	: 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
26 F002475	ENG003	PRC019	24 7 52 7000	25 25 25	25 Natural Ga	1000 HC	; 1	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
27 F002475	FLR001	PRC011	24 7 52 7000	25 25 25	25 Oil	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	5 0 6	070	3090	11 0 1	2 0 13 N	JLL NULL
28 F002475	FUG001	PRC017	24 7 52 7000	25 25 25	25 Well	1000 NU	L NULL	NULL	NULL N	ULL NUL	L NULL	NULL	NULL	NULL	AQD Gene	0 30 0 2	20 0 10	010	203	0 100 0	506	070	3090	11 0 1	2 0 13 N	JLL NULL
													·····	· · · · · ·												



0 0.004486904

0

0 0.000592867 5.92867E-04 TONS

0

0.0044869 TONS

0 TONS



IMPACT EI Data for Operator Review

AQD Generated

AQD Generated

AQD Generated

Benzene

Carbonyl Sulfide

Ethyl Benzene

Vilaterial Information, Annual Avera	ge Operating Schedule &	& Throughput Percent	<i>1</i> 1										
Maximum Hours Per Day:	24			Winter (Jan-Feb, Dec)%: 25									
Maximum Days Per Week:				Spring (Mar-May)%: 25									
Maximum Weeks Per Year:			Summer (Jun-Aug)%: 25										
Actual Hours:			Fall (Sep-Nov)%: 25										
			Variabl	Variable Amount in Gas Units & Meaning									
Material Action Throughput Units		The vari	ables table is er	noty because t	here are no varial	les in the formula	a assoc	iated with the FIRE rows fo					
Gas Produced 38.9435MILLIO	N CUBIC FEET		process.		npty bootdoo t								
Explanation		Ex	Explanation										
Process Emissions Criteria Air Pollutants/Other			Uncontrolled Emissions	Time-		Emissions Reported							
Pollutant	Method Used	Hours	Factor (Lbs/Throughput Units) (based Factor LBS/Hour)	Fugitive Amount	Stack Amount	Total	Units	Explanation				
PM Primary (includes filterables > 10 nicrons + condensibles)	AQD Generated	oncontrolled	onito) (Loomoury	0	0		TONS	LAplandion				
PM10 Primary (includes filterables + ondensibles)	AQD Generated				0	0	T 0	TONS					
PM2.5 Primary (includes filterables + condensibles)	AQD Generated				0	0	0 1	TONS					
	AQD Generated				0	0.001704869	0.00170487 1	TONS					
					0	0.006819475	0.00681948	ONS					
CO - Carbon Monoxide	AQD Generated				0	0	0 1	ONS					
CO - Carbon Monoxide NOx - Nitrogen Oxides	AQD Generated												
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide	AQD Generated AQD Generated				0	0.039422182	0.0394222 1						
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide /OC - Volatile Organic Compounds	AQD Generated				0 0	0.039422182 0		TONS TONS					
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide /OC - Volatile Organic Compounds	AQD Generated AQD Generated	(Printable view) (Ex	port to excel										
CO - Carbon Monoxide IOx - Nitrogen Oxides IO2 - Sulfur Dioxide /OC - Volatile Organic Compounds	AQD Generated AQD Generated	(Printable view) (Ex	(port to excel										
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide /OC - Volatile Organic Compounds	AQD Generated AQD Generated	(Printable view) (Ex	port to excel)										
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide /OC - Volatile Organic Compounds Ammonia	AQD Generated AQD Generated AQD Generated			ided to LISEDA	Ō	0	۲ 0	FONS	DEC generated emission				
CO - Carbon Monoxide IOx - Nitrogen Oxides IO2 - Sulfur Dioxide /OC - Volatile Organic Compounds Ammonia he following information was developed using V	AQD Generated AQD Generated AQD Generated Wyoming DEQ-generated polluta			ided to USEPA	Ō	0	۲ 0	FONS	DEQ-generated emission				
20 - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide /OC - Volatile Organic Compounds Ammonia he following information was developed using V alculations if you have more accurate informatio	AQD Generated AQD Generated AQD Generated Wyoming DEQ-generated polluta			ided to USEPA	Ō	0	۲ 0	FONS	DEQ-generated emission				
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide VOC - Volatile Organic Compounds Ammonia The following information was developed using V alculations if you have more accurate informatio Hazardous Air Pollutants/Greenhouse	AQD Generated AQD Generated AQD Generated Wyoming DEQ-generated polluta		e values may be provi Uncontrolled Emissions	ided to USEPA Time-	0 by the Wyomin	0 Ig DEQ. You may	0 1 modify these Wyr	FONS	DEQ-generated emission				
CO - Carbon Monoxide NOx - Nitrogen Oxides SO2 - Sulfur Dioxide VOC - Volatile Organic Compounds Ammonia The following information was developed using V alculations if you have more accurate informatio	AQD Generated AQD Generated AQD Generated Wyoming DEQ-generated polluta	int emission calculations. Th	e values may be provi Uncontrolled		0 by the Wyomin	0	0 1 modify these Wyr	FONS	DEQ-generated emission				



User Options for Submitting Emissions inventories

- **1.** This new El process just described.
- 2. Using the IMPACT interface to create individual emissions inventories for each production site.
- 3. Operator-generated CSV file after AQD approval of calculation methodologies.



THANK YOU!

Questions, Comments ...?