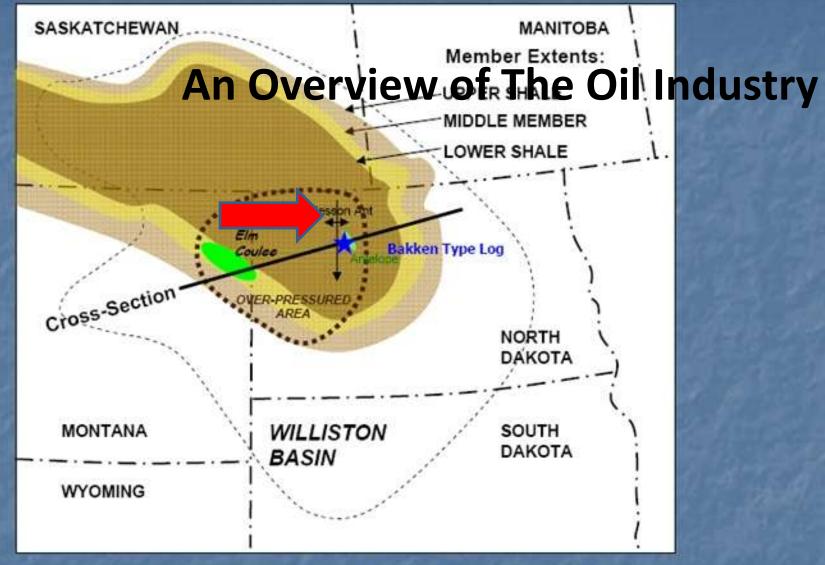
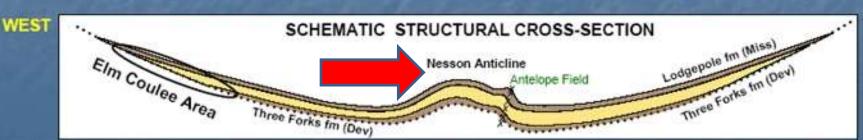


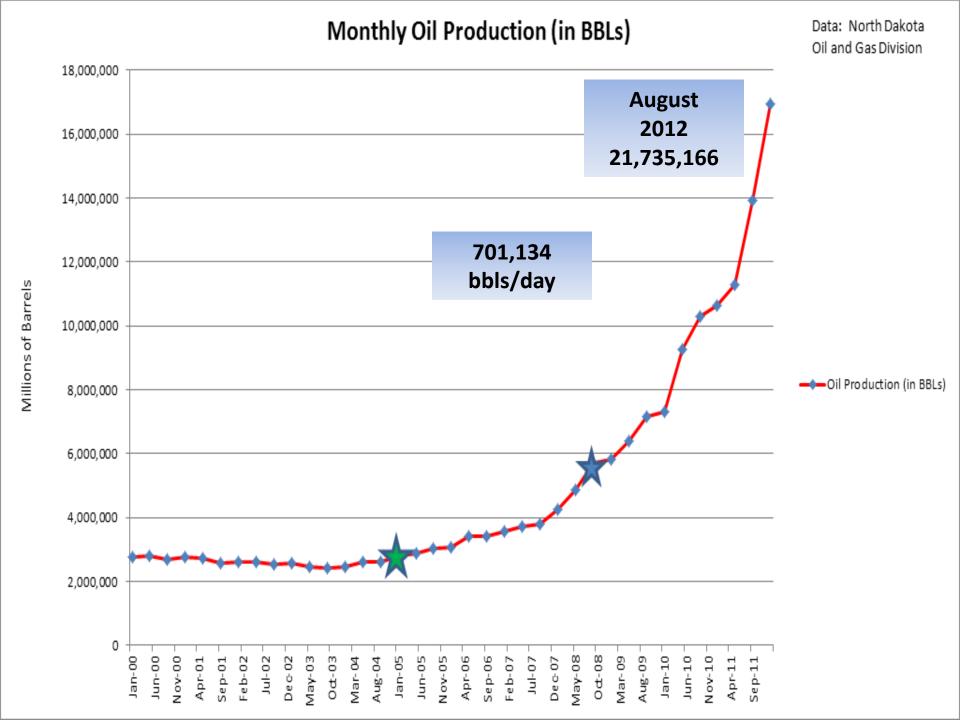
- 1. An overview of the oil industry in ND
- 2. Composition and volume of oil traffic
- 3. Quantify impacts (flexible/rigid pavements)
- 4. How NDDOT uses information

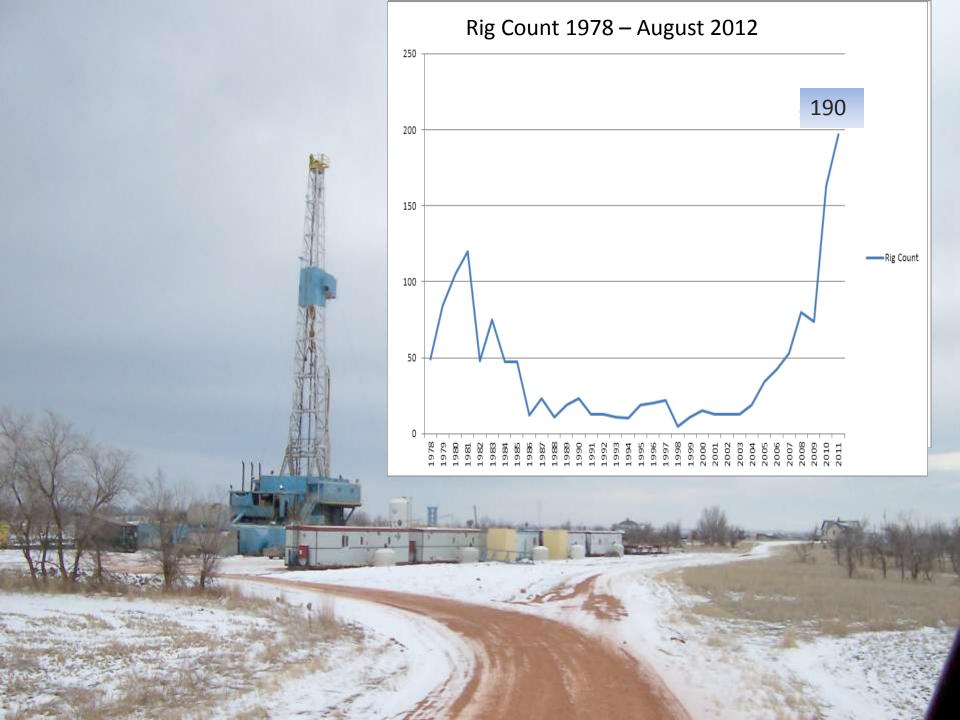


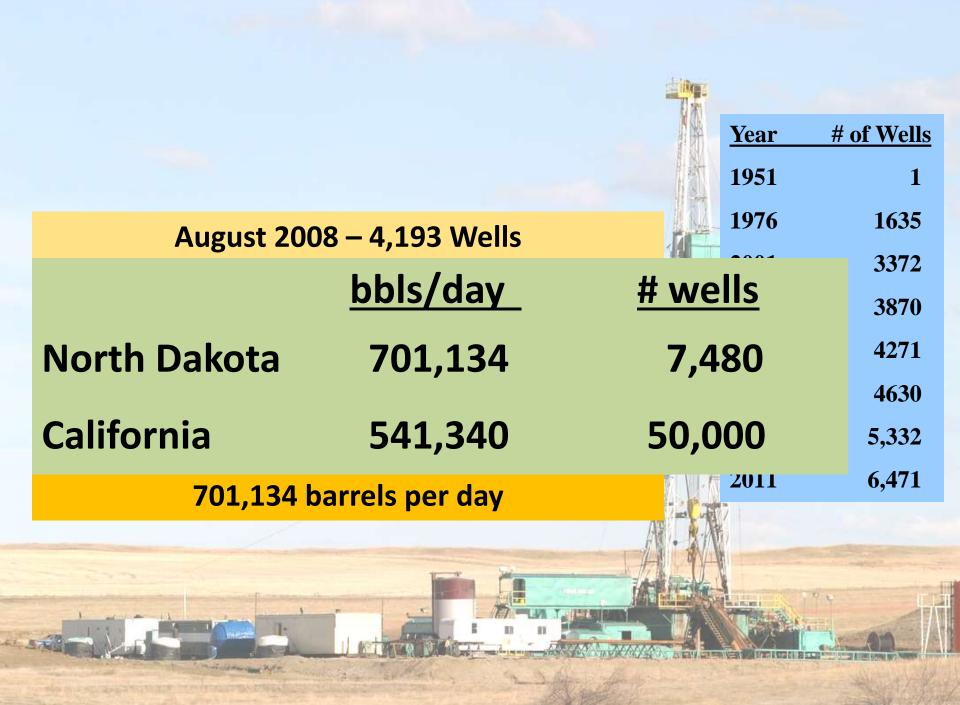




EAST

















# Average One-Way Truckload #s Vertical Well - 400

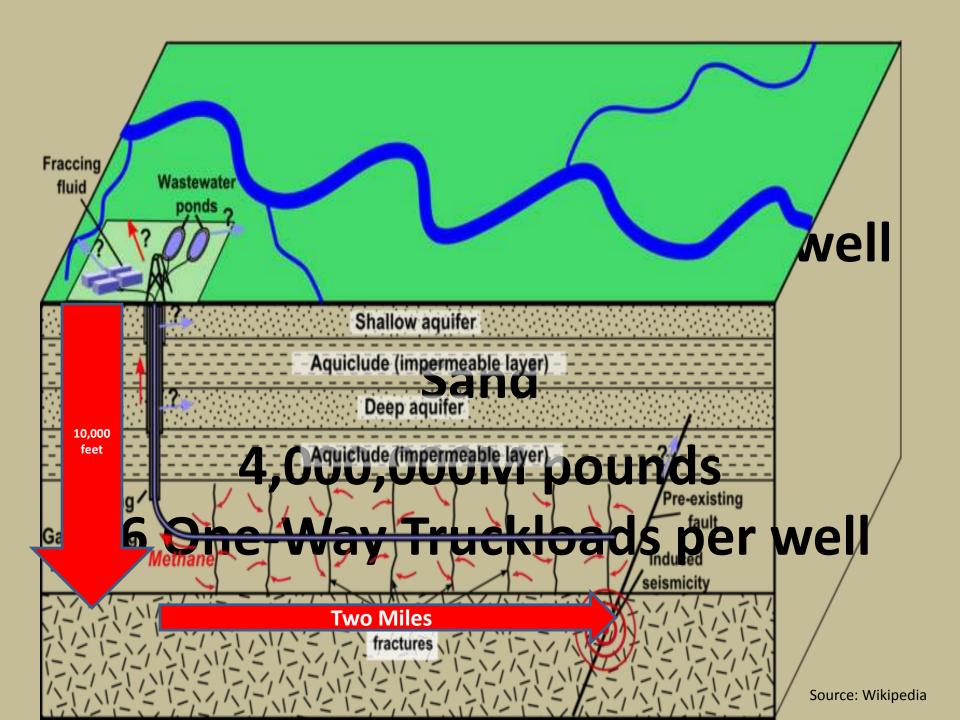
Harizantal Wall 1150

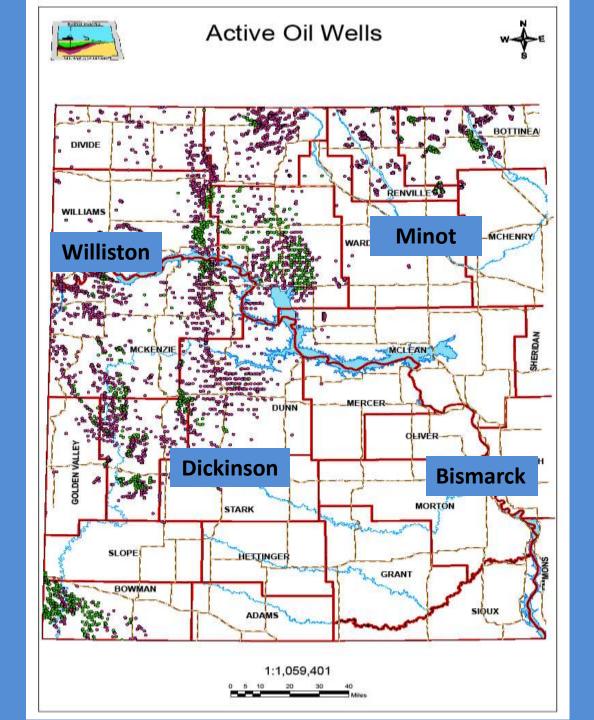
# **Over Weight Loads in Pounds**

**Choke Manifold** 

<b>Generator House (3)</b>	111,180	<b>BOP Setting Machine</b>	111,000
Shaker Tank/Pit	122,000	Derrick	159,000
<b>Suction Tank</b>	131,000	VFD House	130,100
Mud Pump (2)	164,000	Mud Boat	114,380
Shaker Skid	111,760	Substructure (2)	136,000
Draw Works	130,880	Centerpiece	139,440
Hydraulic Unit	127,640	Tool Room Junk Box	124,140
BOP Skid	138,680	MCC House	145,160
<b>Top Dog House</b>	117,000		
<b>Crown Section</b>	140,000		

126,000







## **Sand/Proppant Rail Loading Facilities**

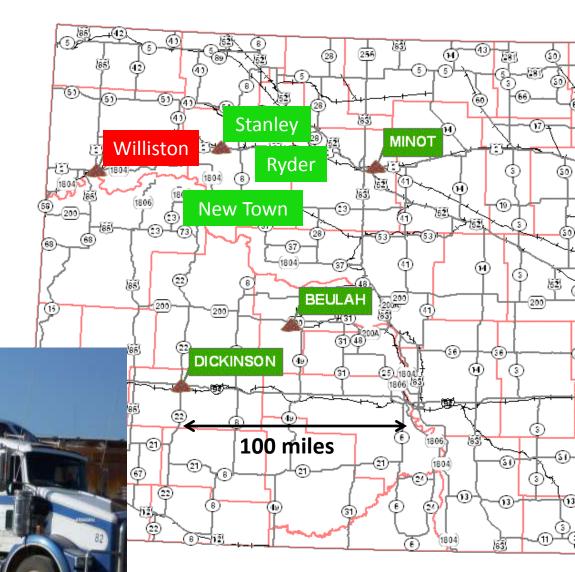


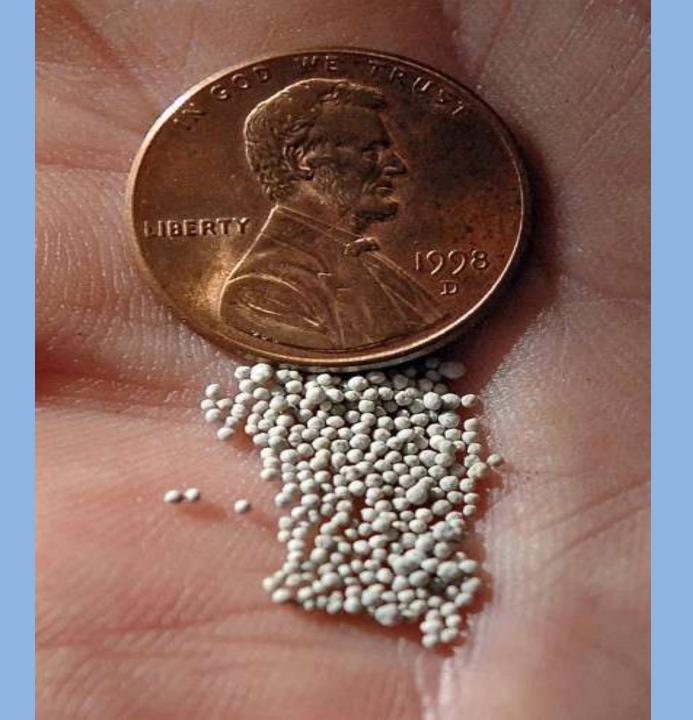
Rail Loading Sites -- Sand

---- State Roads

→ Railroads

County Boundaries





### Rail Loading Facilities -- Pipe

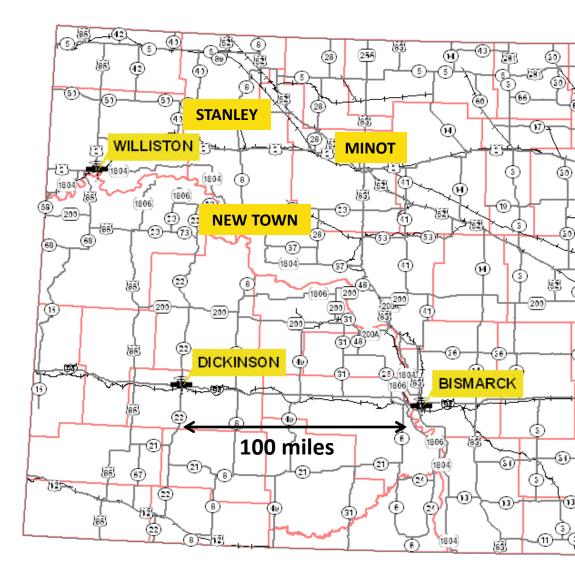
#### Legend



Rail Loading Sites-Pipe

---- State Roads

County Boundaries





### Rail Loading Facilities -- Oil



# Water Depots - Applied Permits

#### Legend

---- State Roads

----- Railroads

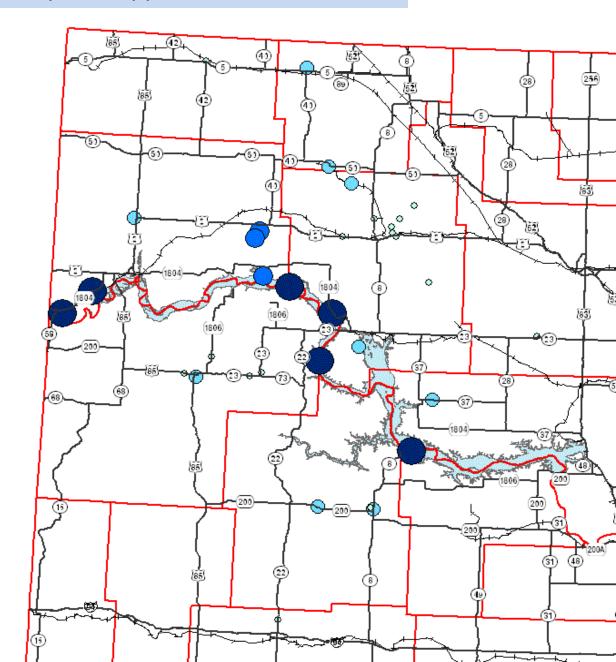
County Boundaries

1 - 9,698

9,699 - 38,790

**3**8,791 - 96,975

96,976 - 290,925









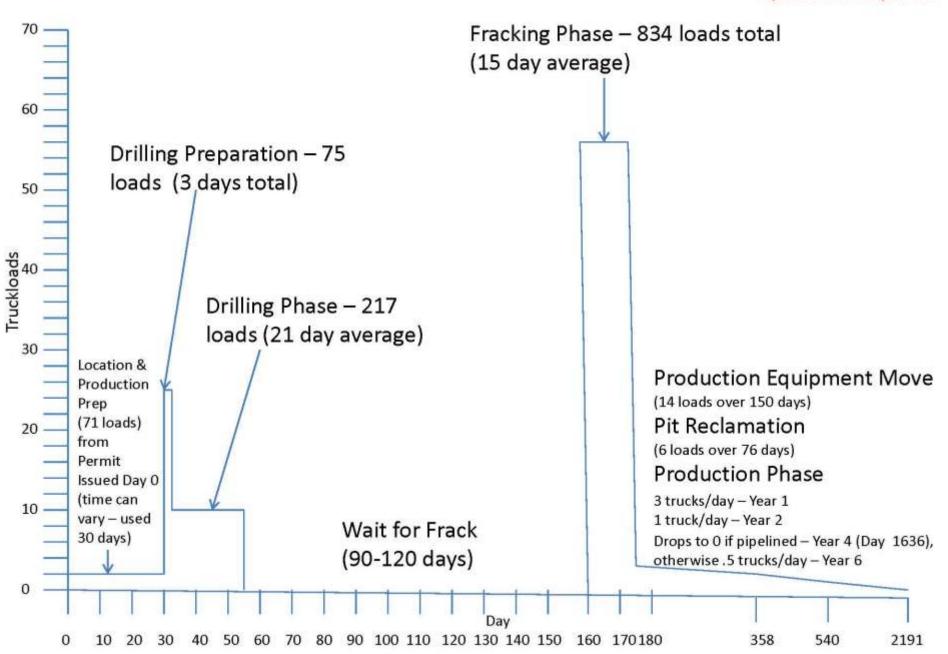


# Oil Impact ESALs per Well (Drilling Phase)

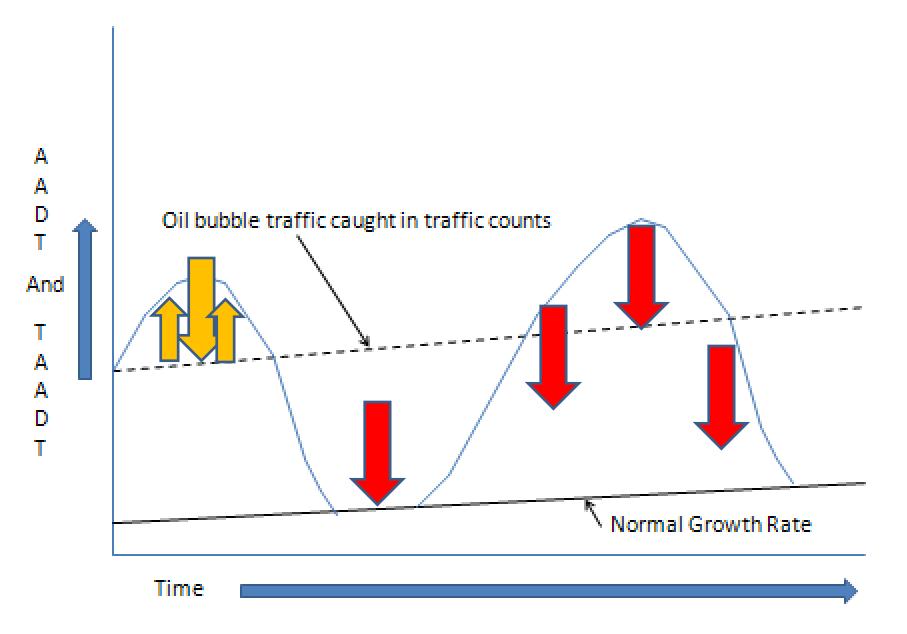
				Mu	ıd F	ur	np ·	<b>-</b> ]	164	,00	υP	oun	ds				of G	Group #4	Group	Type Totals Weight	y/Well Group Group	
							Steer								Grou	p #1		Group #2				
Load Type		Number of Loads per Well			# of Axels		roup Wt. kips)	Gro Fle ESA	ex	Group Rigid ESALs	d   # OI		Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axles	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs			
N	/lud Pu	ımp			4		1	1	12.9	0.3	399	0.34	1	3	54.3	1.900	4.630	3	56.5	2.170	4.630	
			ш				ш	_	_			ш		T			ш	ш				
	G	roup	#3							Group	p #4						Тур	e Totals/	Well			
# of Wt. Flex (kips)		Rigid # 0			# of Axle	\\\\\\			Flex F		Group Rigid ESALs		Axles		eight cips)	Group Flex ESALs		Group Rigid ESALs				
2	37	7.2	1.69	90	3.0	30		1		5.0	0.0	017	0.010		4	40	663.6	2	4.7	5	0.6	
resh Water				-,5%	1.00.0				-					Т				1 1		0		
Unpermitted Ov (25% of Divisible legal is 80k)		187	1	14.0	0.399	0.341	3	38	0.4							Туре Т	otals/W	ell				
resh Water Ley 76 kips) 75% of Divisible	gal Loads les)	562	1	10.0	0.118	0.082	3	33				Weight G			Group Flex			Group Rigid				
Fresh Winter Empty Return Loads (38 kips)		748	1	6.0	0.017	0.010	3	14	0.0		Axle	es	(kips)				ESALs			ESALs		
and Unpermitt overloads 25% of Divisibil legal is 80k)	oneson.	93	1	14.0	0.399	0.341	2	38	0 1.6			16,18	1		139,89	9.4	2.0	188	.9 3	3.29	90.!	
and Legal Load	100000000000000000000000000000000000000	281	1	10.0	0.017	0.082	2	33	0 1.11	1.920	1	33.0	1.110 1.9	~					1405	21356.UI	(SP 110)	
ips) (75% of Di	turn.		1 3	6.0	0.004	0.010	ુ	16	0.07	0.083	,	16.0	0.070 0.00	93	4 3 3	93	V5.50 St		1870	14212.0	3.9 68	
ips) (75% of Di and Empty Ret oads (38 kips)		374	- 1	6.0	0.004	oute	1 1			0.000		20.0	0.00	-	U. 10 83	357	JUNE 24 87					

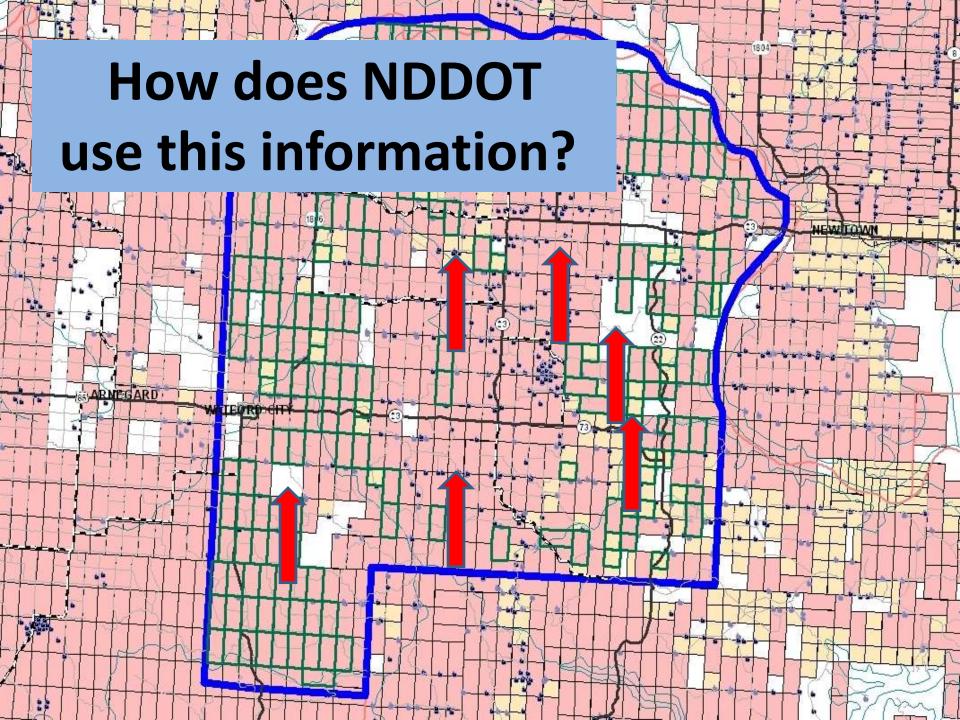
## New Bakken Well - Truckload Timeline



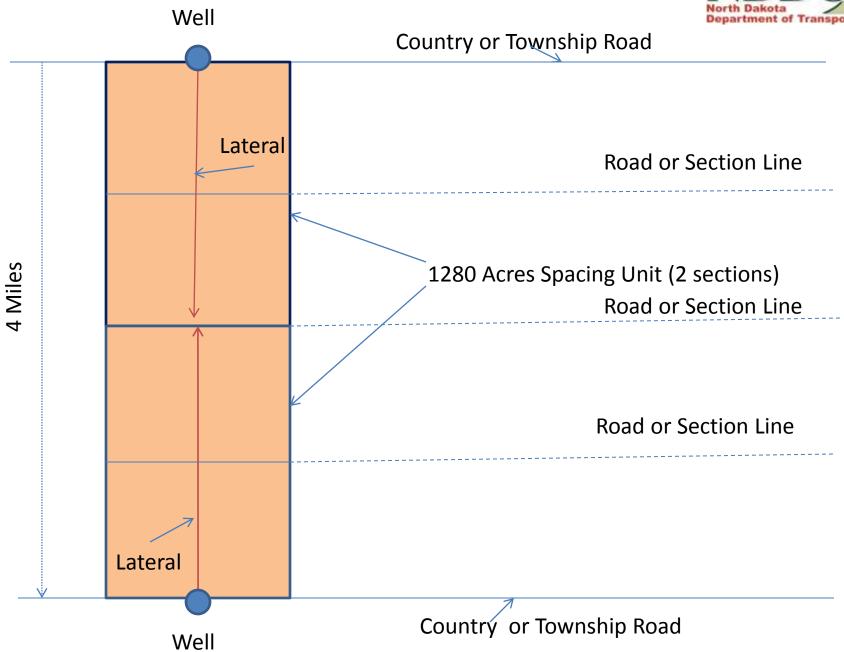


# Oil Bubble Impact on AADT/TAADT









#### Watford City-Keene Zone February 18, 2011 Legend

- State Roads

#### Pipeline Collection Points COMPANY

- Belle Fourche
- Enbridge
- Tesoro
- Multiple Companies

#### Water Depots

- Application
- Permit
- Frac Sand Rail Locations
- Incorporated City
- ----- Railroads
- 🧸 R
  - Rig Locations
- Oil Zone Boundary
  - Confidential Oil and Gas Wells
  - Oil and Gas Wells
  - Salt Water Disposal Sites
- County Boundaries
- Horizontals
- Large Water Features
- 1280 acre Spacing Units
  - 640 acre Spacing Units

Phase I completion -- 2011

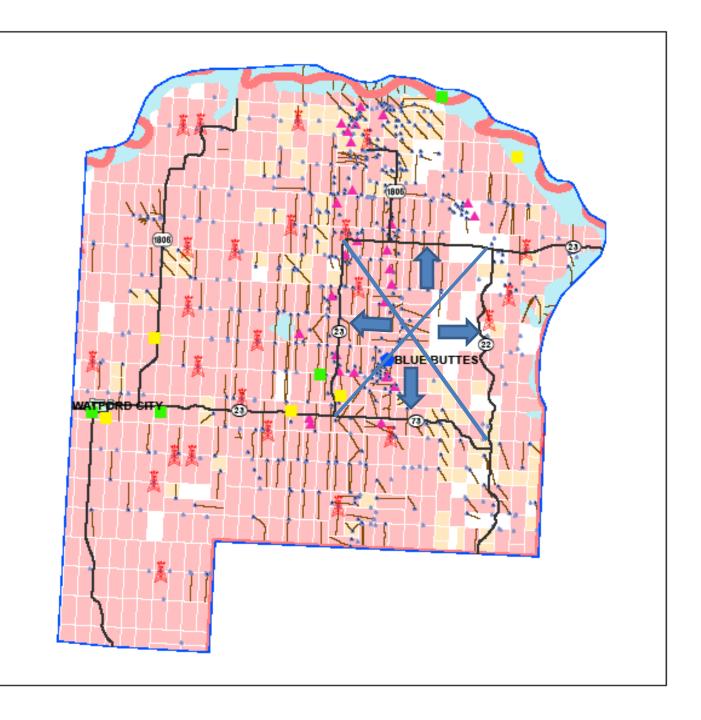
Phase II completion -- 2015-2017

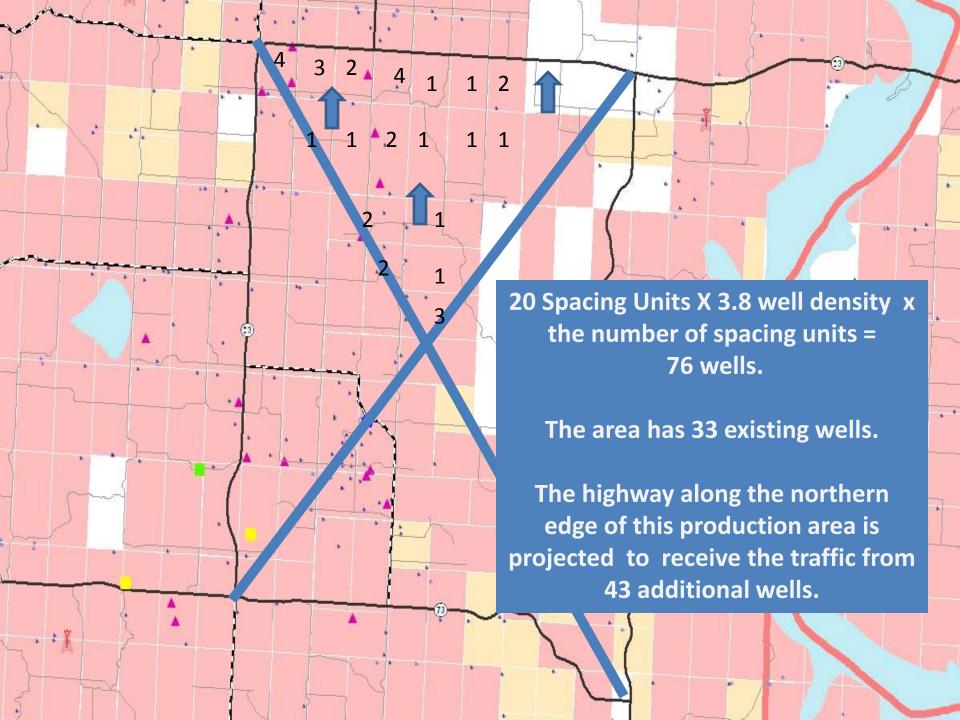
2100 Additional New Wells

By: Stewart Milakovic, Planning/Asset Management



Created: 3/3/11





# **Next Steps:**

