

FHWA's Talking Freight

May 16, 2012

Understanding, Calculating & Applying the Impact of Oil-Related Traffic



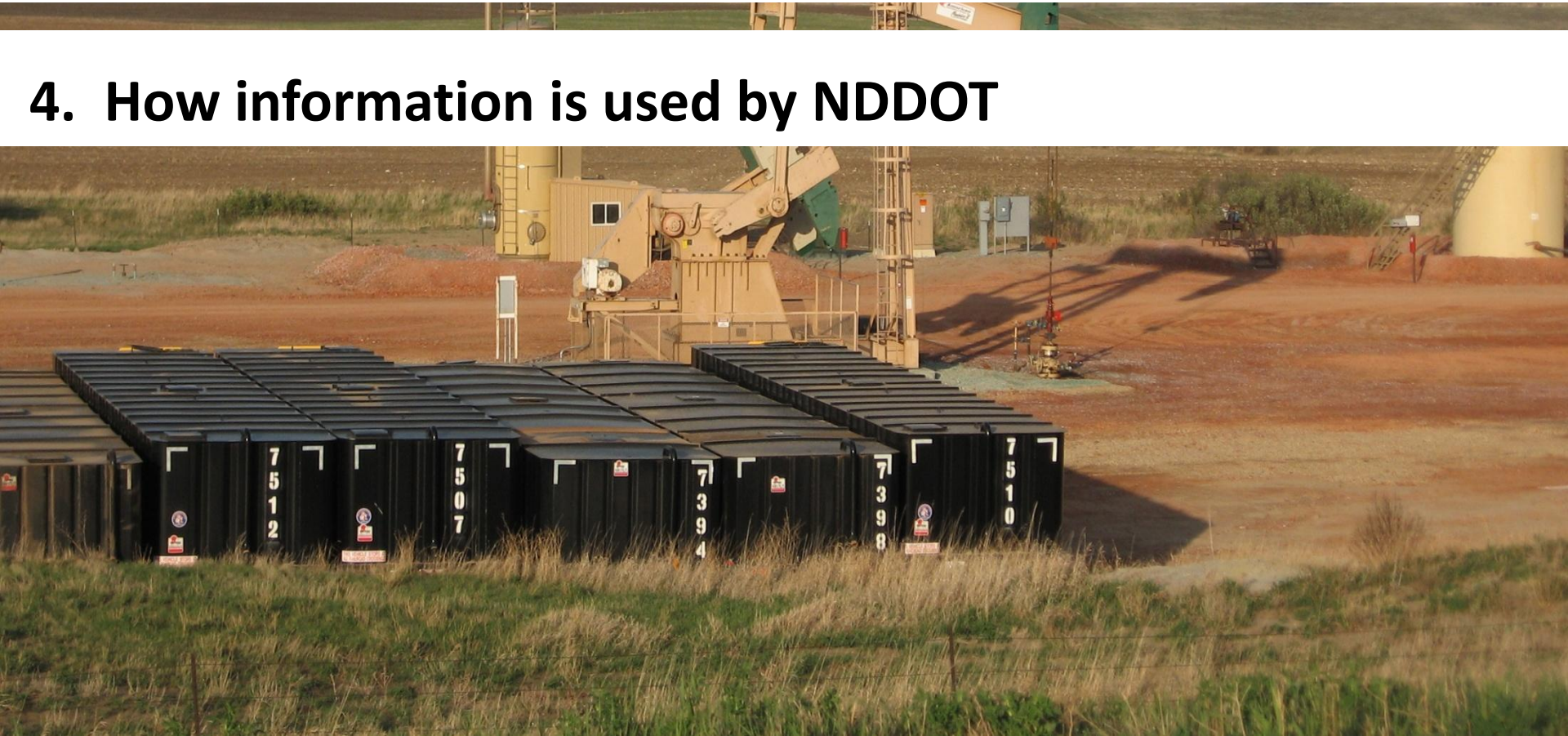
**Jack Olson, Assistant Director
Planning Asset Management Division
North Dakota Department of Transportation**

1. An overview of the oil industry in ND

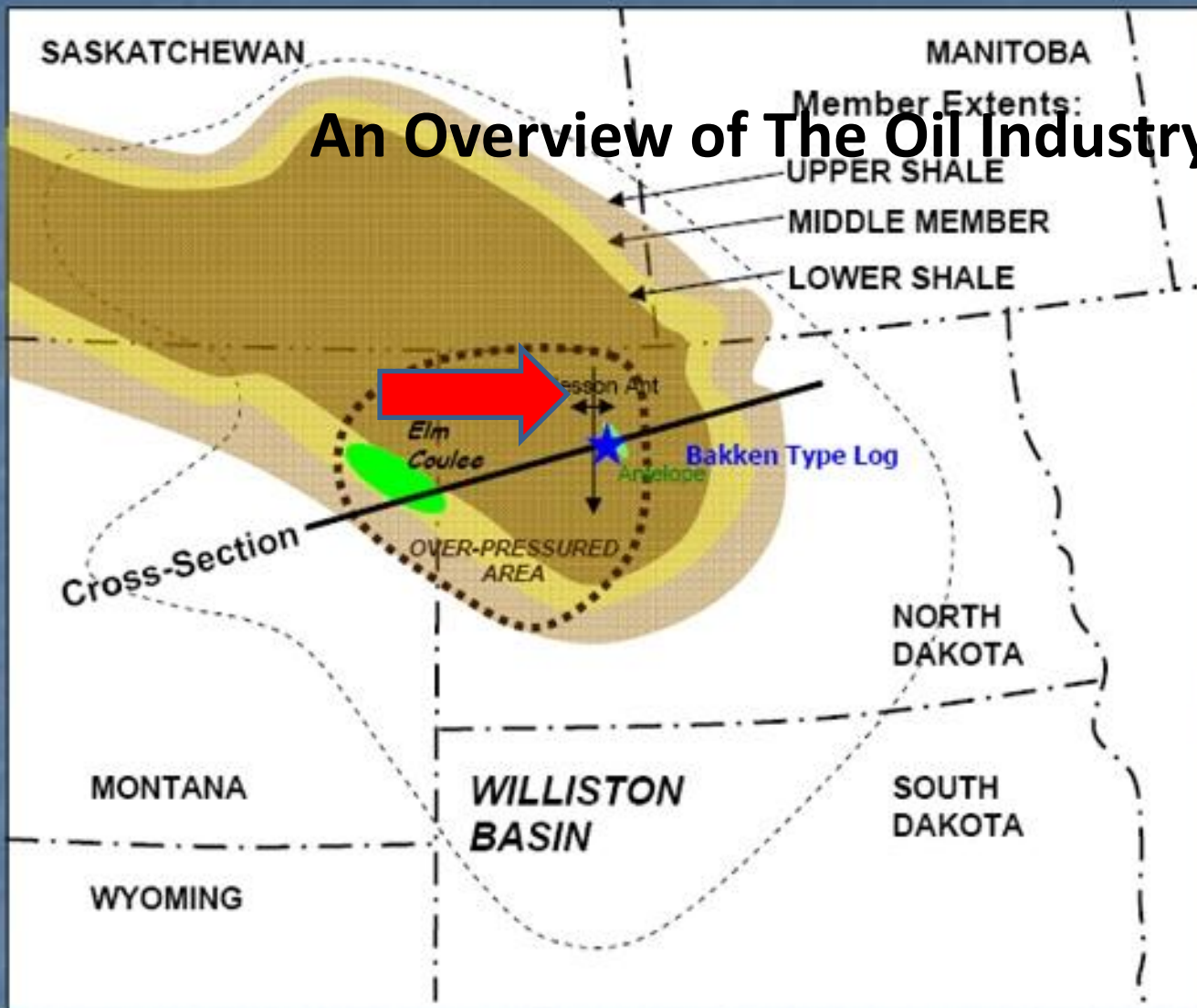
2. Composition and volume of oil traffic

3. Quantify impacts (flexible/rigid pavements)

4. How information is used by NDDOT



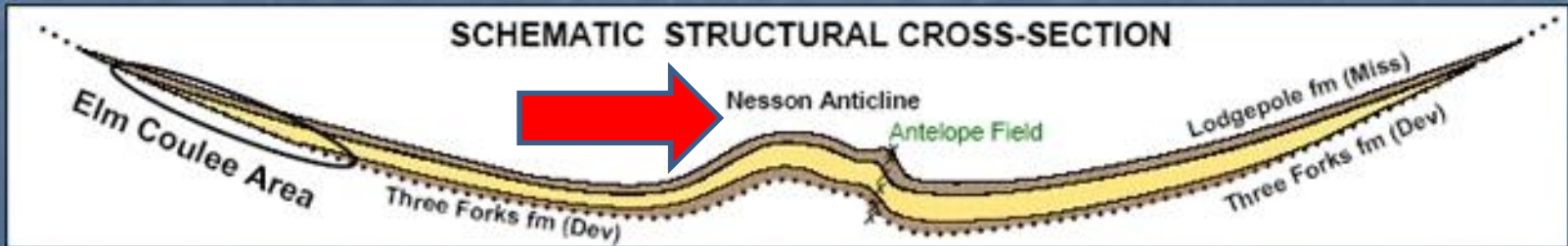
An Overview of The Oil Industry



WEST

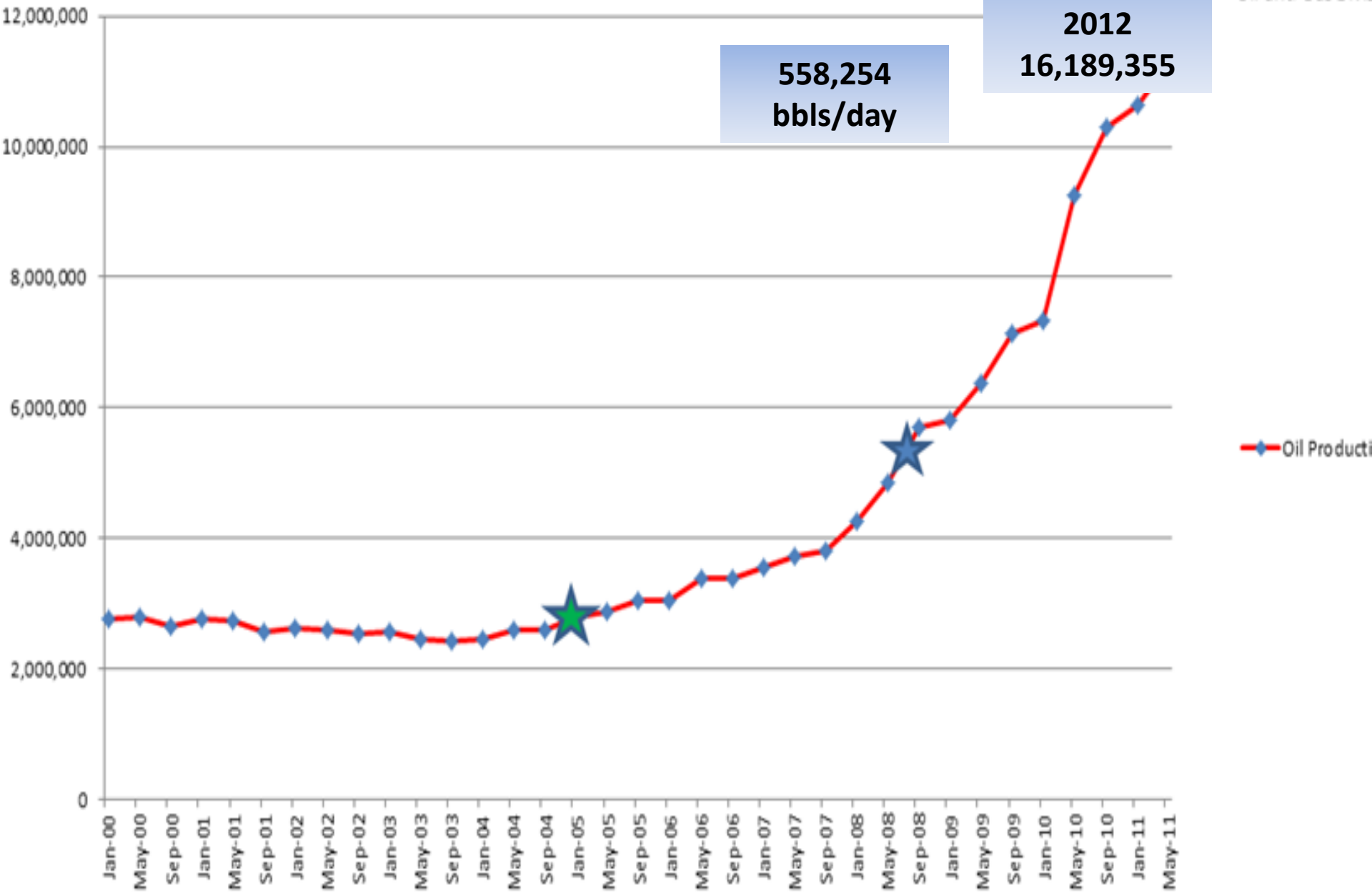
SCHEMATIC STRUCTURAL CROSS-SECTION

EAST

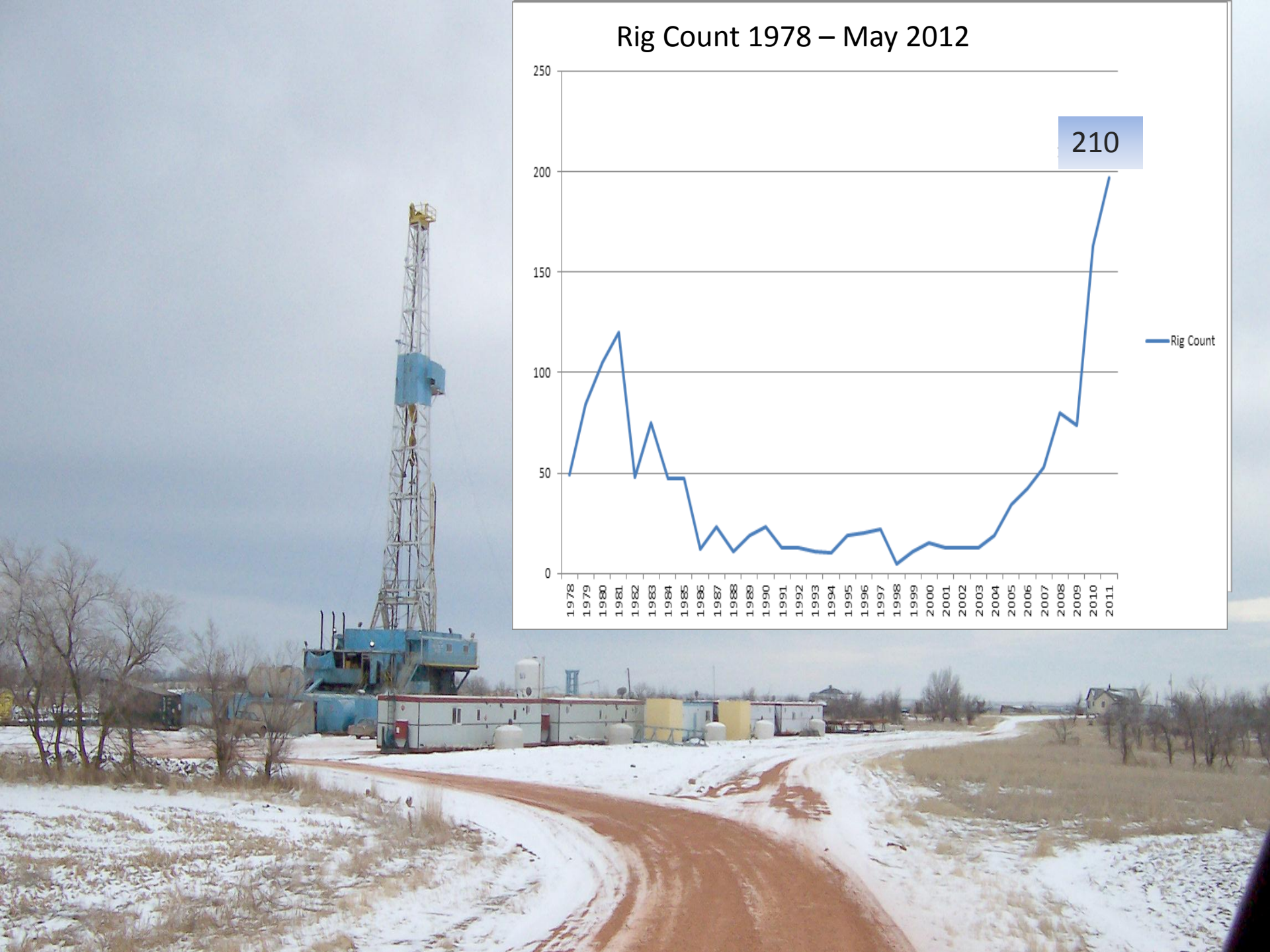
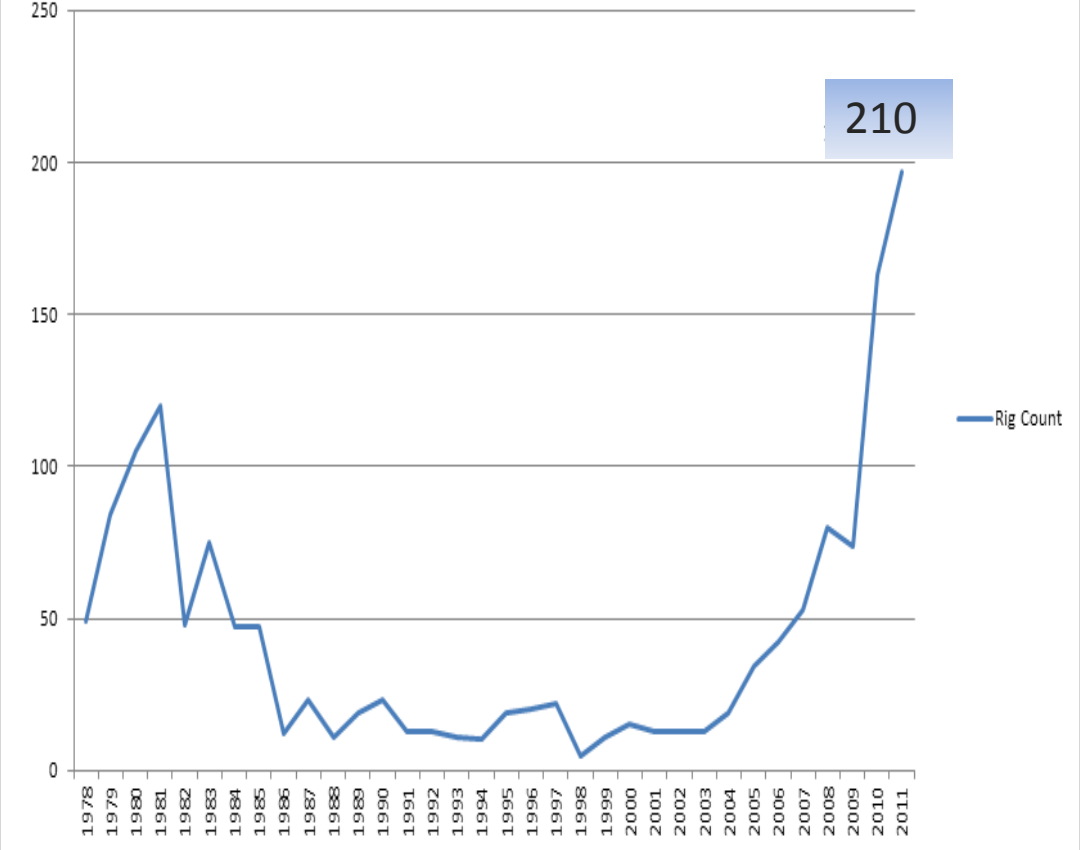


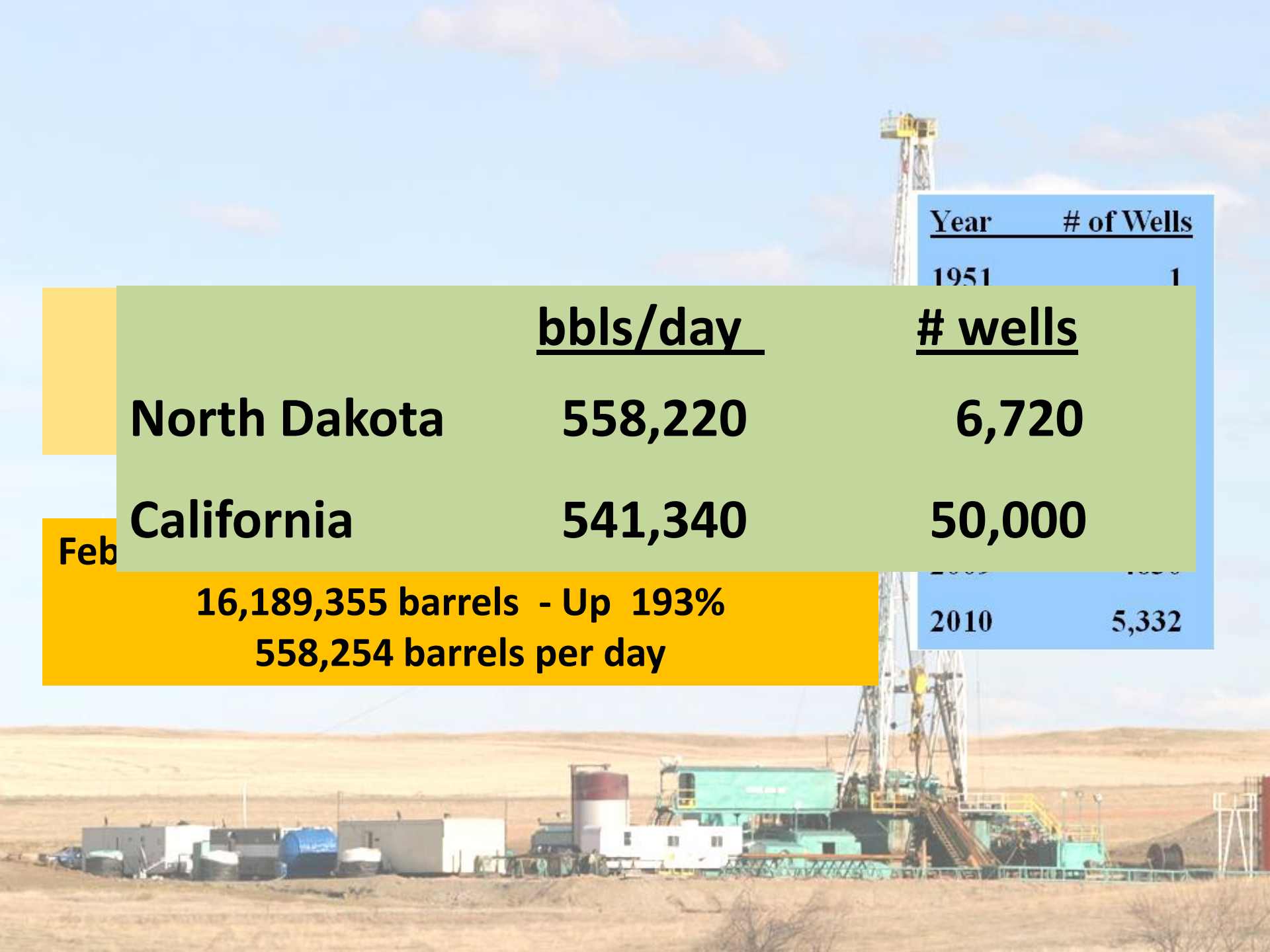
Monthly Oil Production (in BBLs)

Data: North Dakota
Oil and Gas Division



Rig Count 1978 – May 2012





<u>Year</u>	<u># of Wells</u>
1951	1
2010	5,332

	<u>bbls/day</u>	<u># wells</u>
North Dakota	558,220	6,720
California	541,340	50,000

Feb
16,189,355 barrels - Up 193%
558,254 barrels per day


Composition and Volume of Oil Traffic



A blue and white drilling rig is positioned in a field of dry, yellowish-brown grass. The rig has a complex structure of pipes and metal frames. A blue banner is overlaid on the image, containing text. The rig's cab is white with blue accents and has a 'CCC' logo on the front. The ground is dry and dusty.

**Early 1990s
90,000 Pounds**

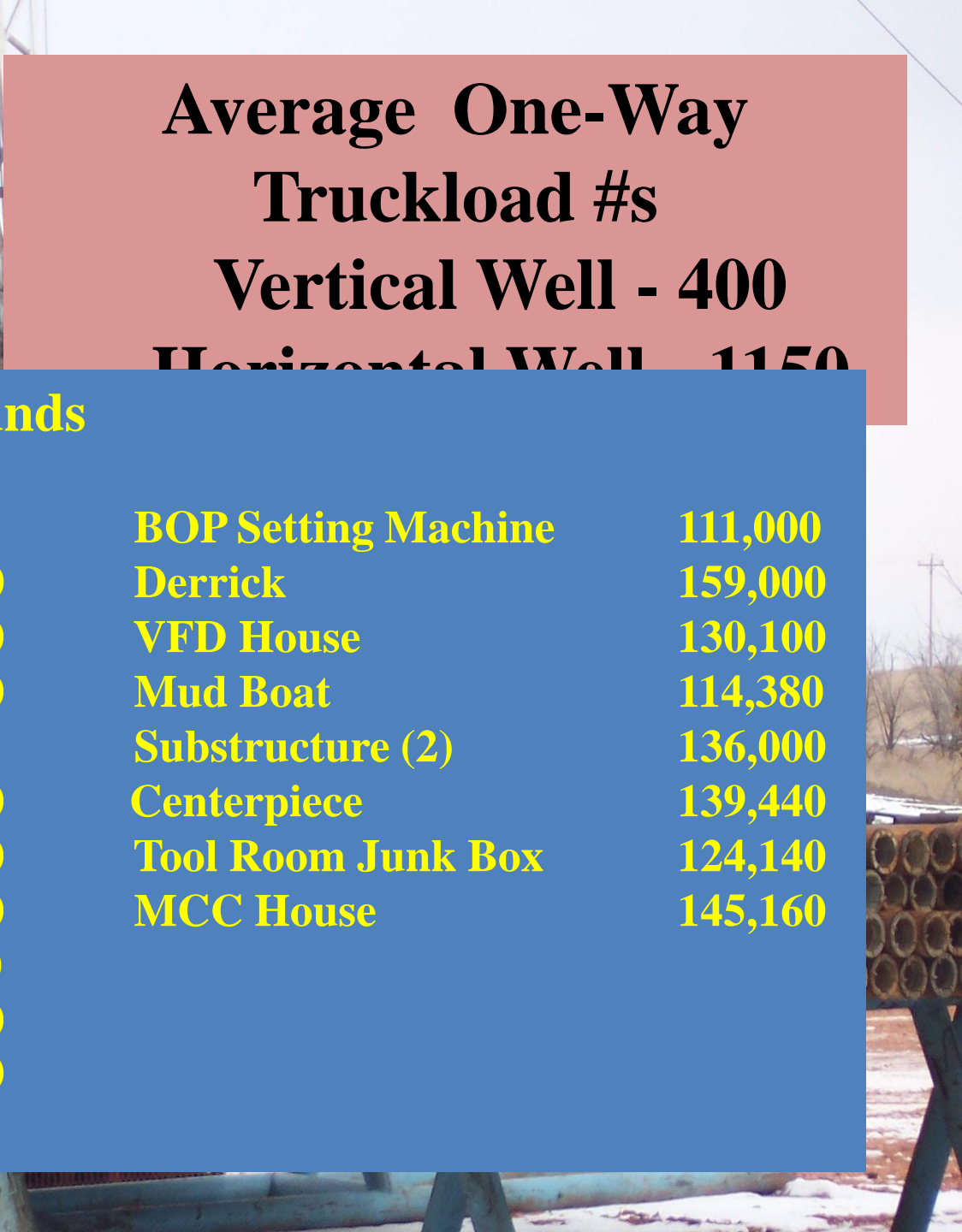
**2012
110,000 Pounds**

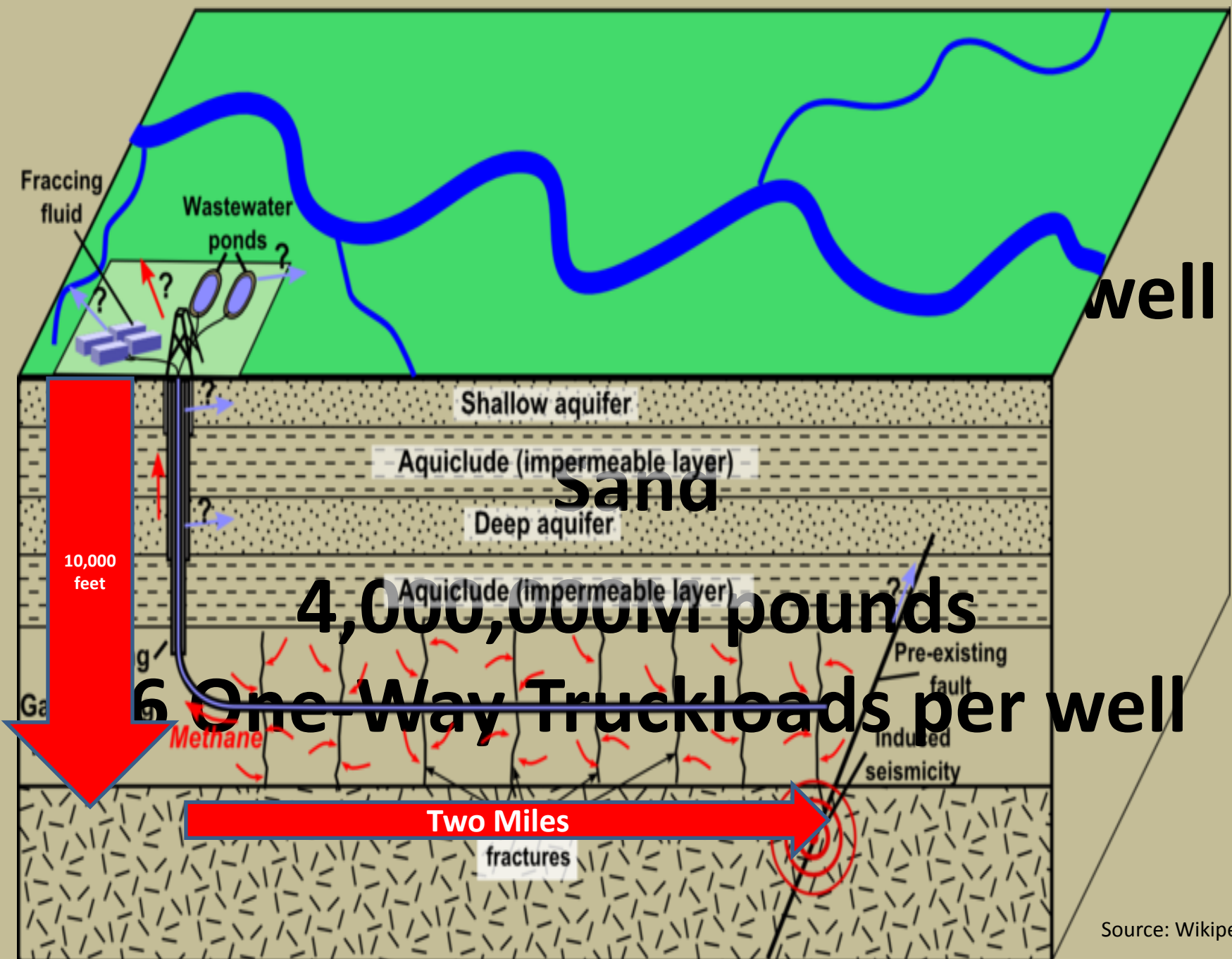


**Average One-Way
Truckload #s
Vertical Well - 400
Horizontal Well - 1150**

Over Weight Loads in Pounds

Generator House (3)	111,180	BOP Setting Machine	111,000
Shaker Tank/Pit	122,000	Derrick	159,000
Suction Tank	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
Top Dog House	117,000		
Crown Section	140,000		
Choke Manifold	126,000		





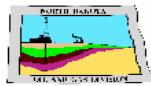
sand

4,000,000 pounds

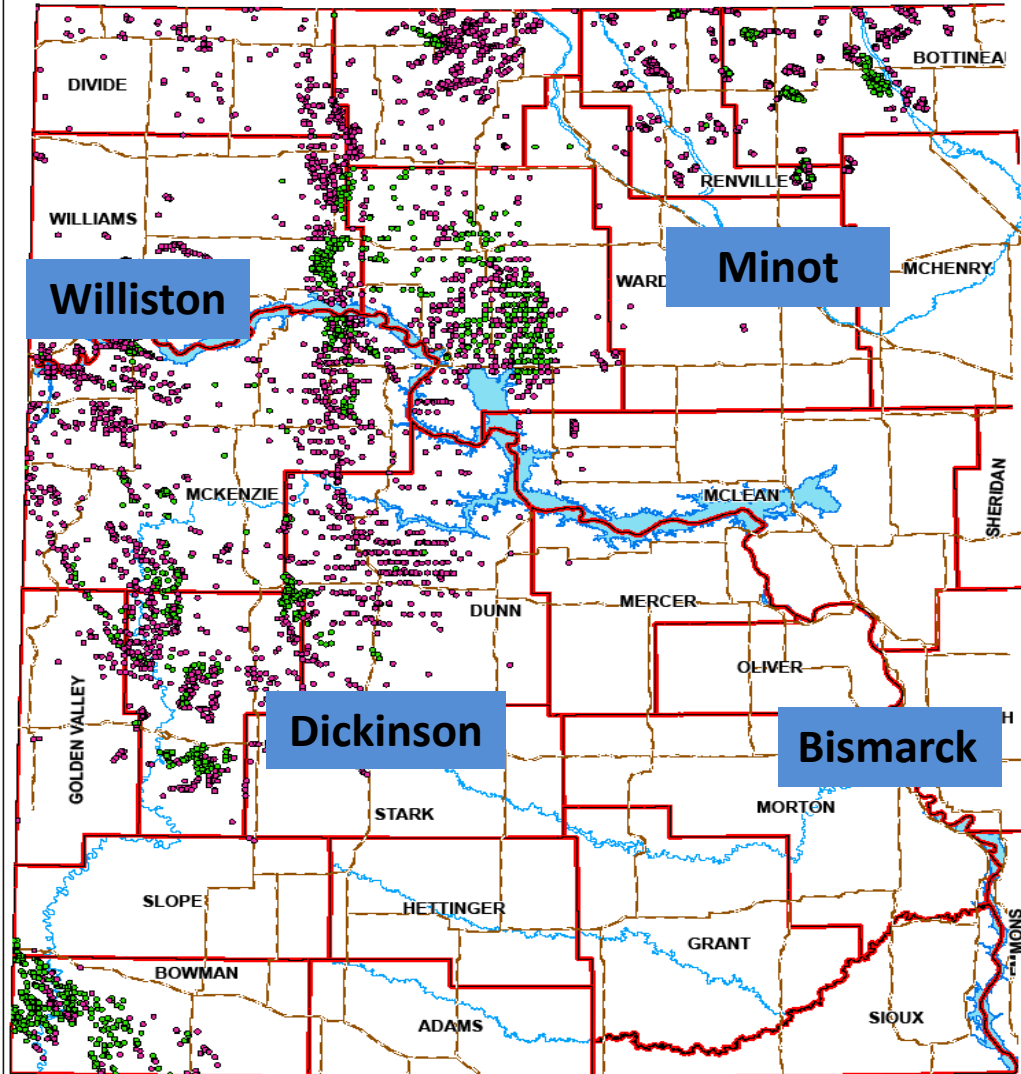
6 One Way Truckloads per well

Two Miles

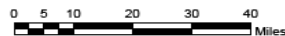
well



Active Oil Wells

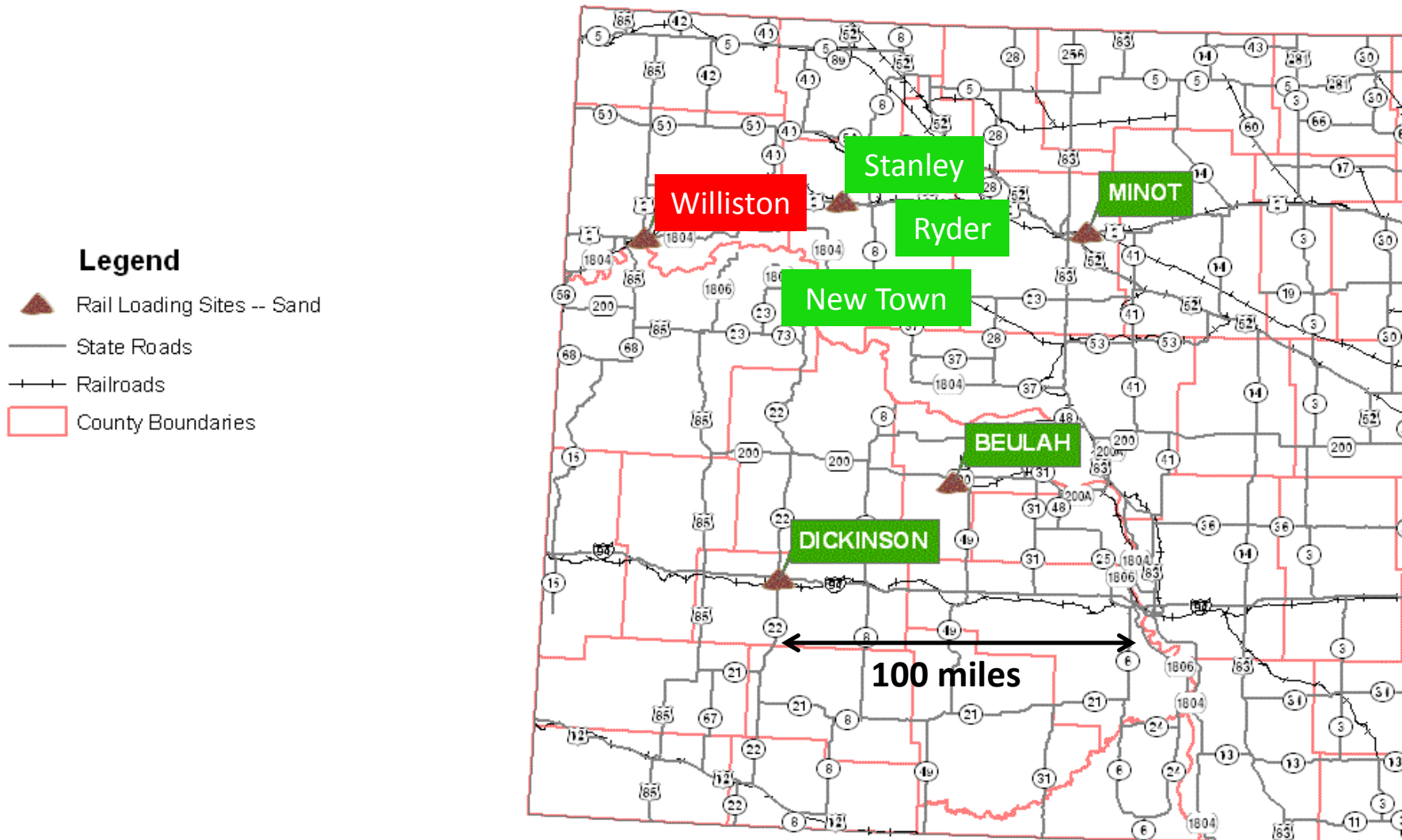


1:1,059,401

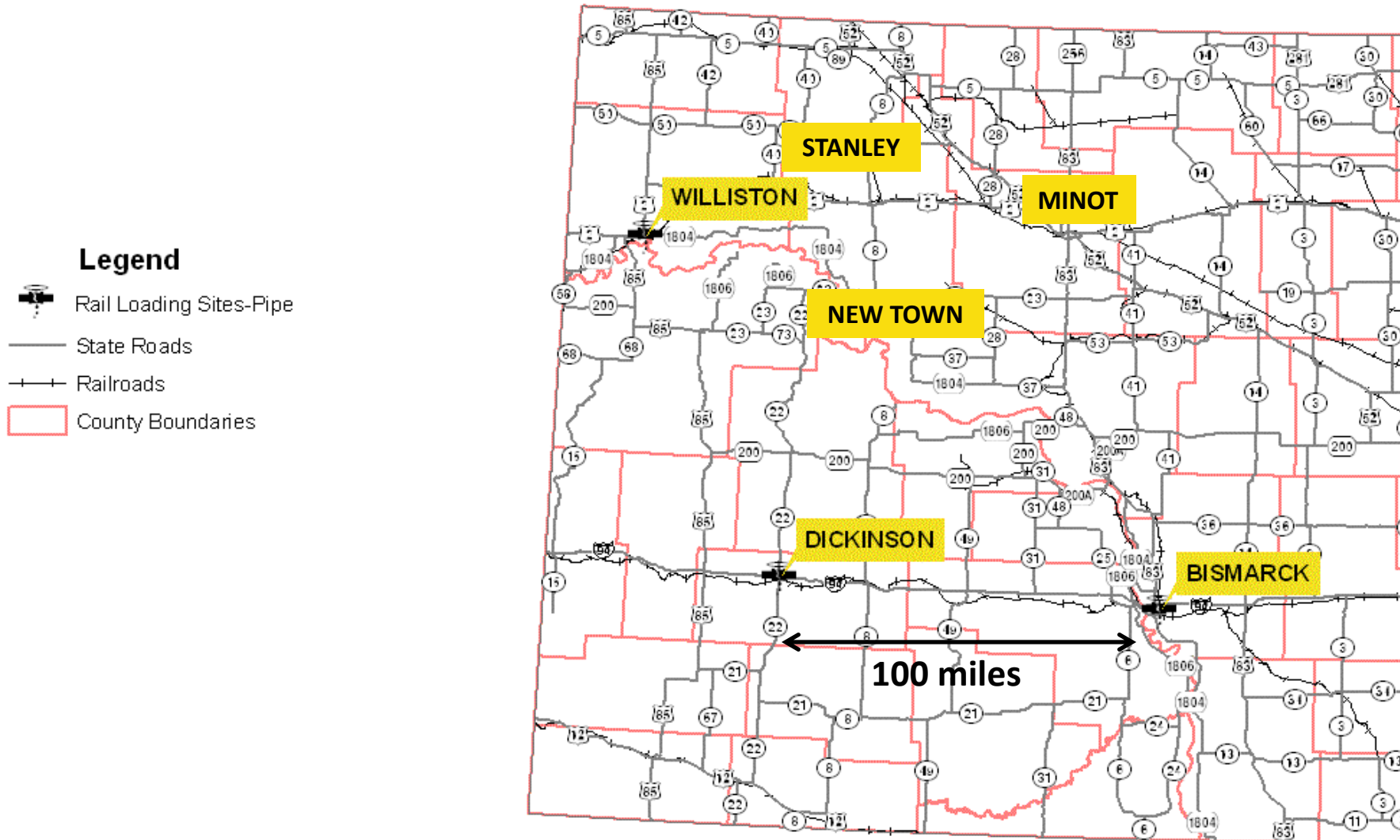




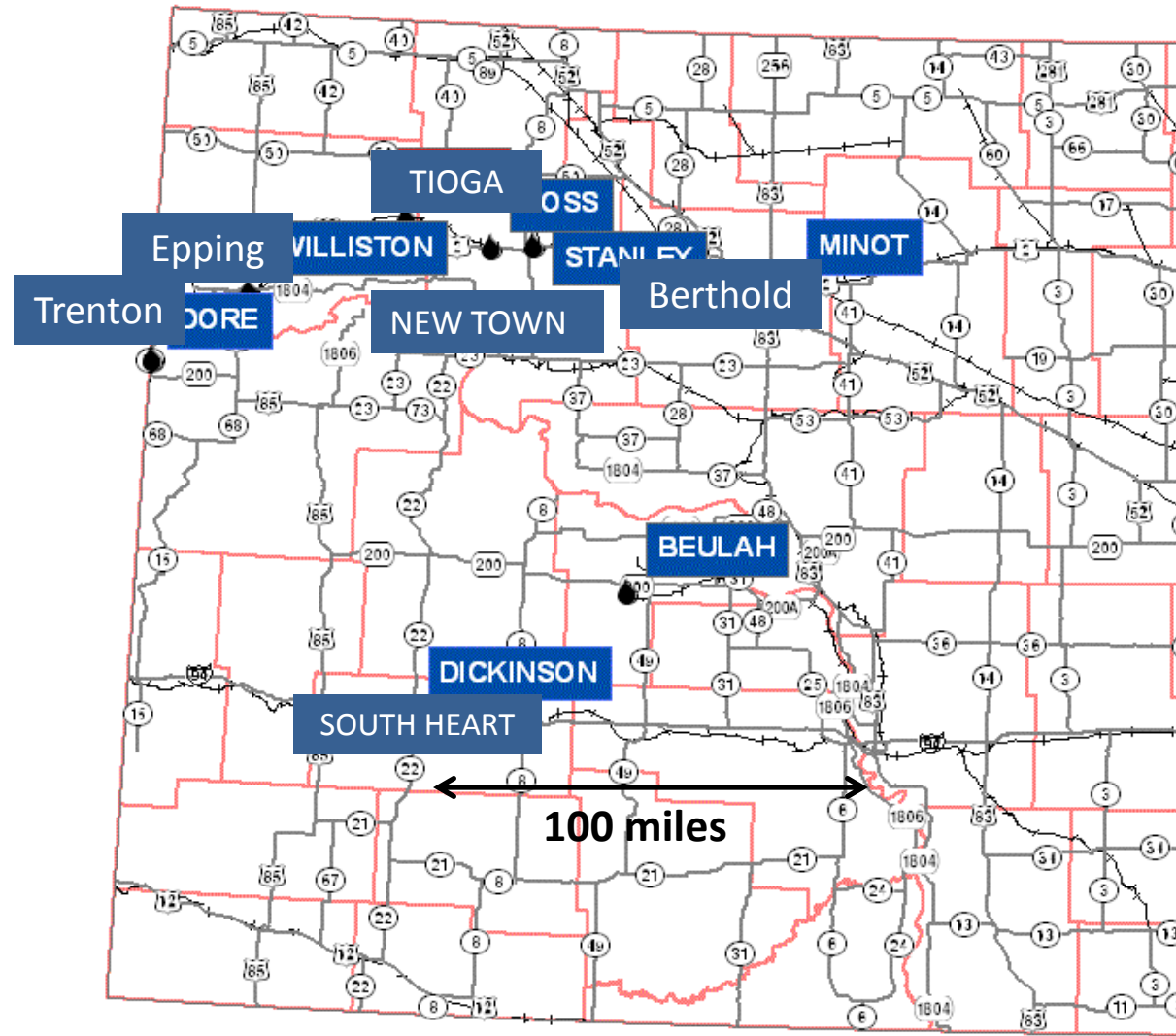
Sand/Proppant Rail Loading Facilities



Rail Loading Facilities -- Pipe



Rail Loading Facilities -- Oil



Legend

- Rail Loading Sites-Oil
- State Roads
- +— Railroads
- County Boundaries



J&M
SALT WATER
DISPOSAL



SafeRack
www.saferrack.com

SafeRack

Quantify Impacts On Flexible & Rigid Pavements

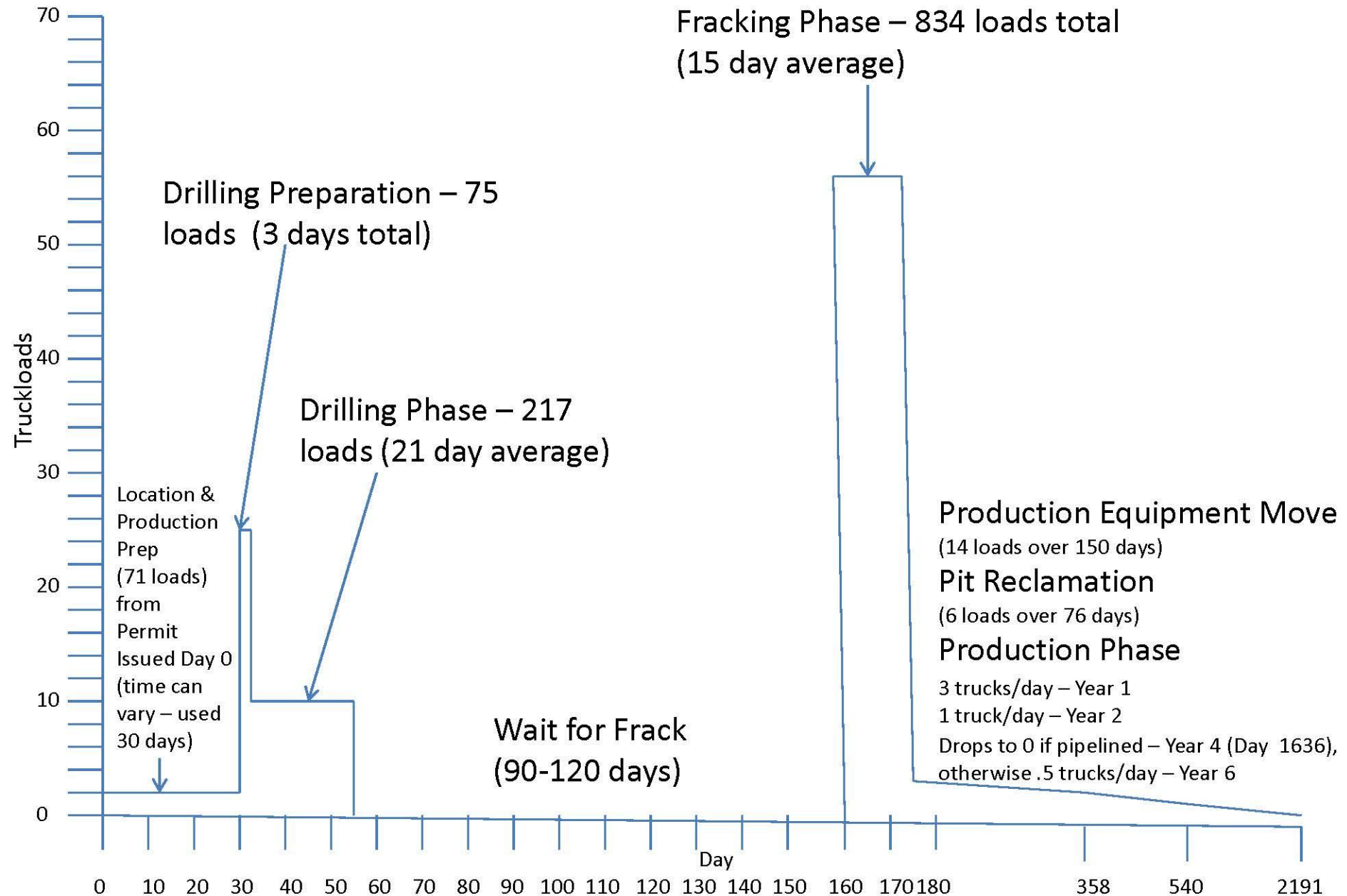


Oil Impact ESALs per Well (Drilling Phase)

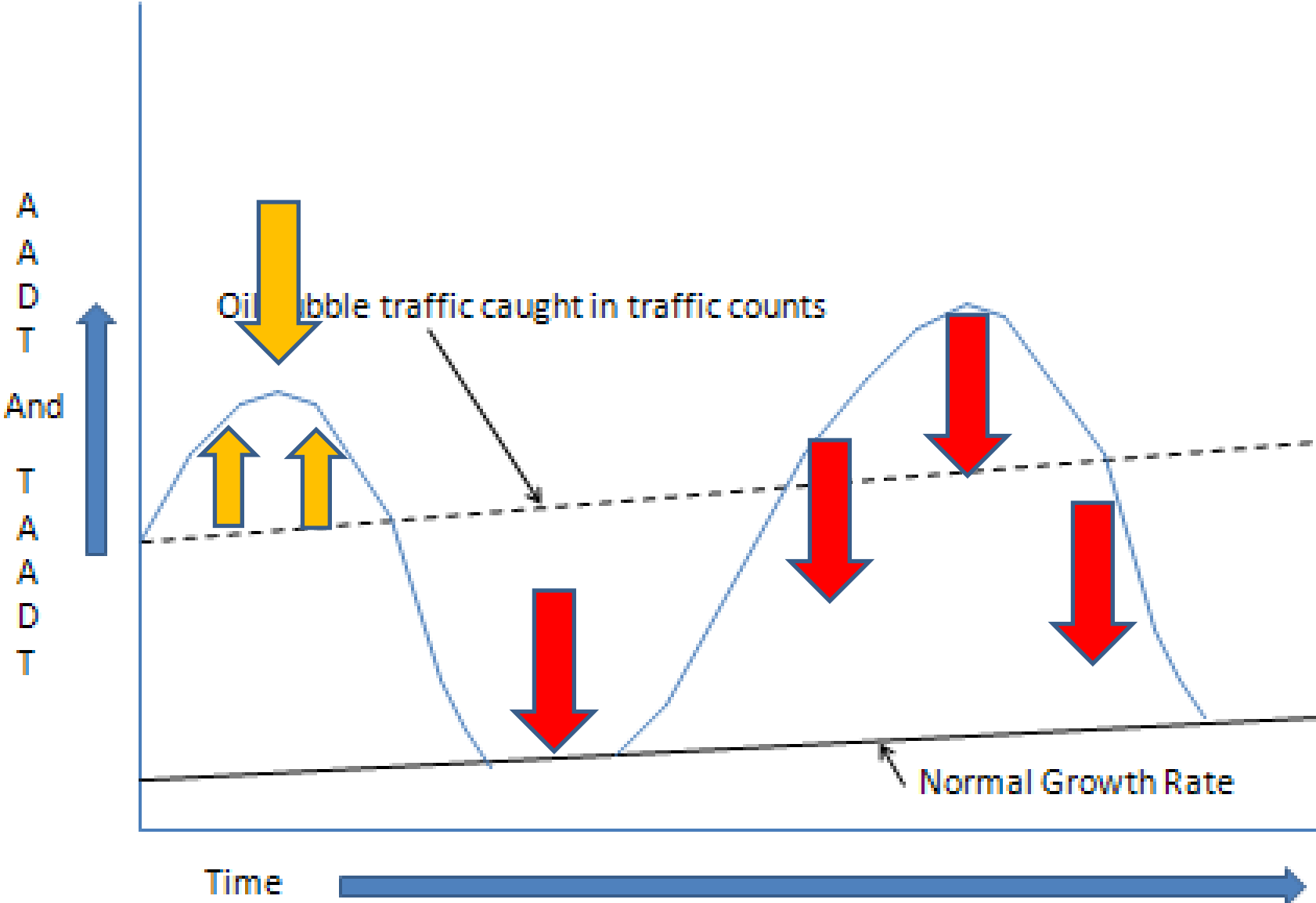
Mud Pump - 164,000 Pounds

Mud Pump - 164,000 Pounds																				
Load Type	Number of Loads per Well	Steer				Group #1				Group #2										
		# of Axels	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axels	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axels	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs							
Mud Pump	4	1	12.9	0.399	0.341	3	54.3	1.900	4.630	3	56.5	2.170	4.630							
Group #3				Group #4				Type Totals/Well												
# of Axles	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axles	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	Axles	Weight (kips)	Group Flex ESALs	Group Rigid ESALs									
2	37.2	1.690	3.030	1	5.0	0.017	0.010	40	663.6	24.7	50.6									
Fresh Water Unpermitted Overloads (25% of Divisibles @ 90k - legal is 80k)	187	1	14.0	0.399	0.341	3	38.0	0.4	Type Totals/Well <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <th>Axles</th> <th>Weight (kips)</th> <th>Group Flex ESALs</th> <th>Group Rigid ESALs</th> </tr> <tr> <td>16,181</td> <td>139,899.4</td> <td style="color: red; font-size: 24pt;">2,088.9</td> <td style="color: red; font-size: 24pt;">3,290.5</td> </tr> </table>				Axles	Weight (kips)	Group Flex ESALs	Group Rigid ESALs	16,181	139,899.4	2,088.9	3,290.5
Axles	Weight (kips)	Group Flex ESALs	Group Rigid ESALs																	
16,181	139,899.4	2,088.9	3,290.5																	
Fresh Water Legal Loads (76 kips) (75% of Divisibles)	562	1	10.0	0.118	0.082	3	33.0	0.3												
Fresh Water Empty Return Loads (38 kips)	748	1	6.0	0.017	0.010	3	14.0	0.0												
Sand Unpermitted Overloads (25% of Divisibles @ 90k - legal is 80k)	93	1	14.0	0.399	0.341	2	38.0	1.6												
Sand Legal Loads (76 kips) (75% of Divisibles)	281	1	10.0	0.017	0.082	2	33.0	1.110	1.920	2	35.0	1.110	1.920							
Sand Empty Return Loads (38 kips)	374	1	6.0	0.004	0.010	2	16.0	0.070	0.082	2	16.0	0.070	0.082							
Well Totals	2300																			
										2,088.9	3,290.5									

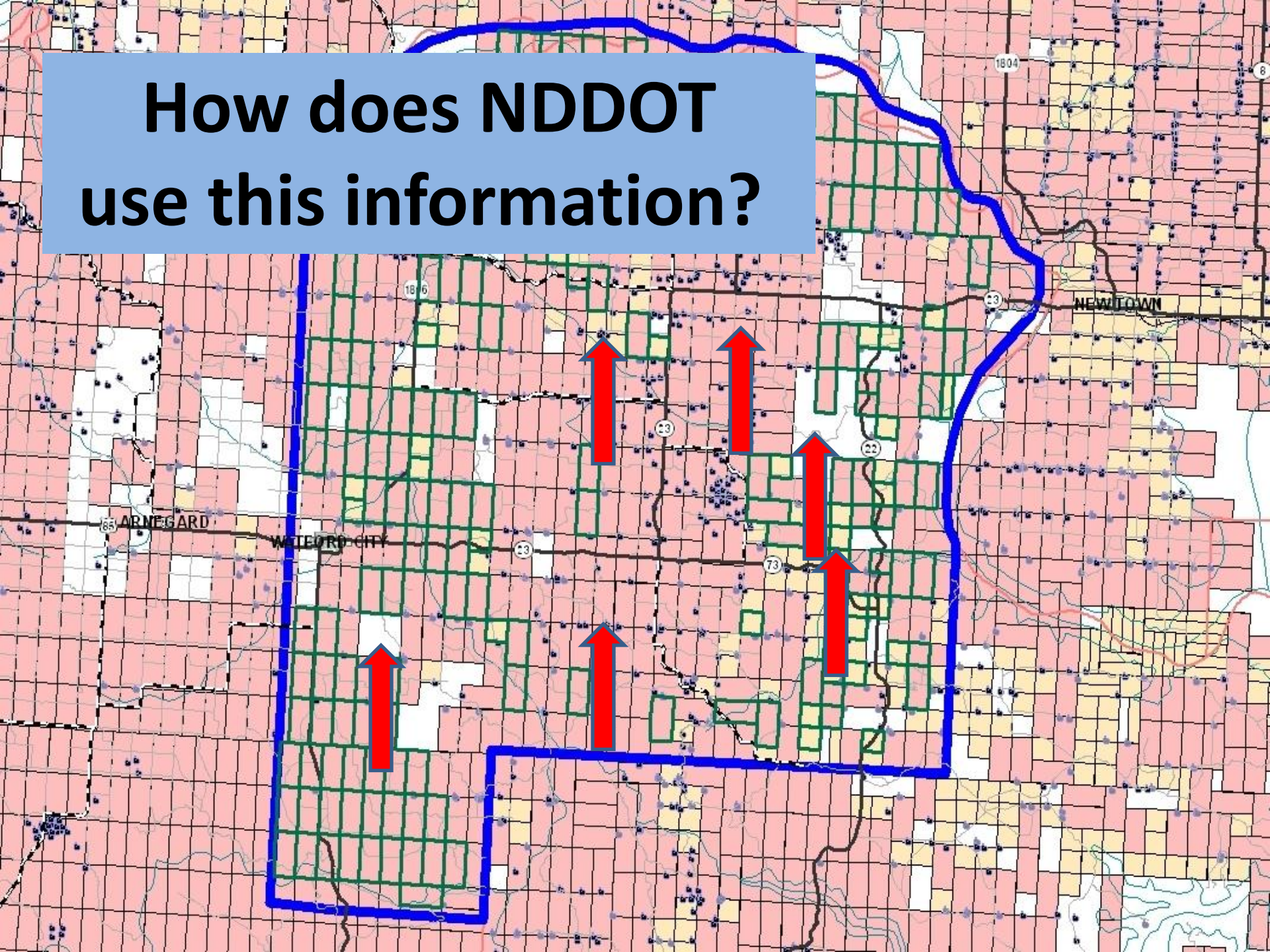
New Bakken Well – Truckload Timeline



Oil Bubble Impact on AADT/TAADT



**How does NDDOT
use this information?**



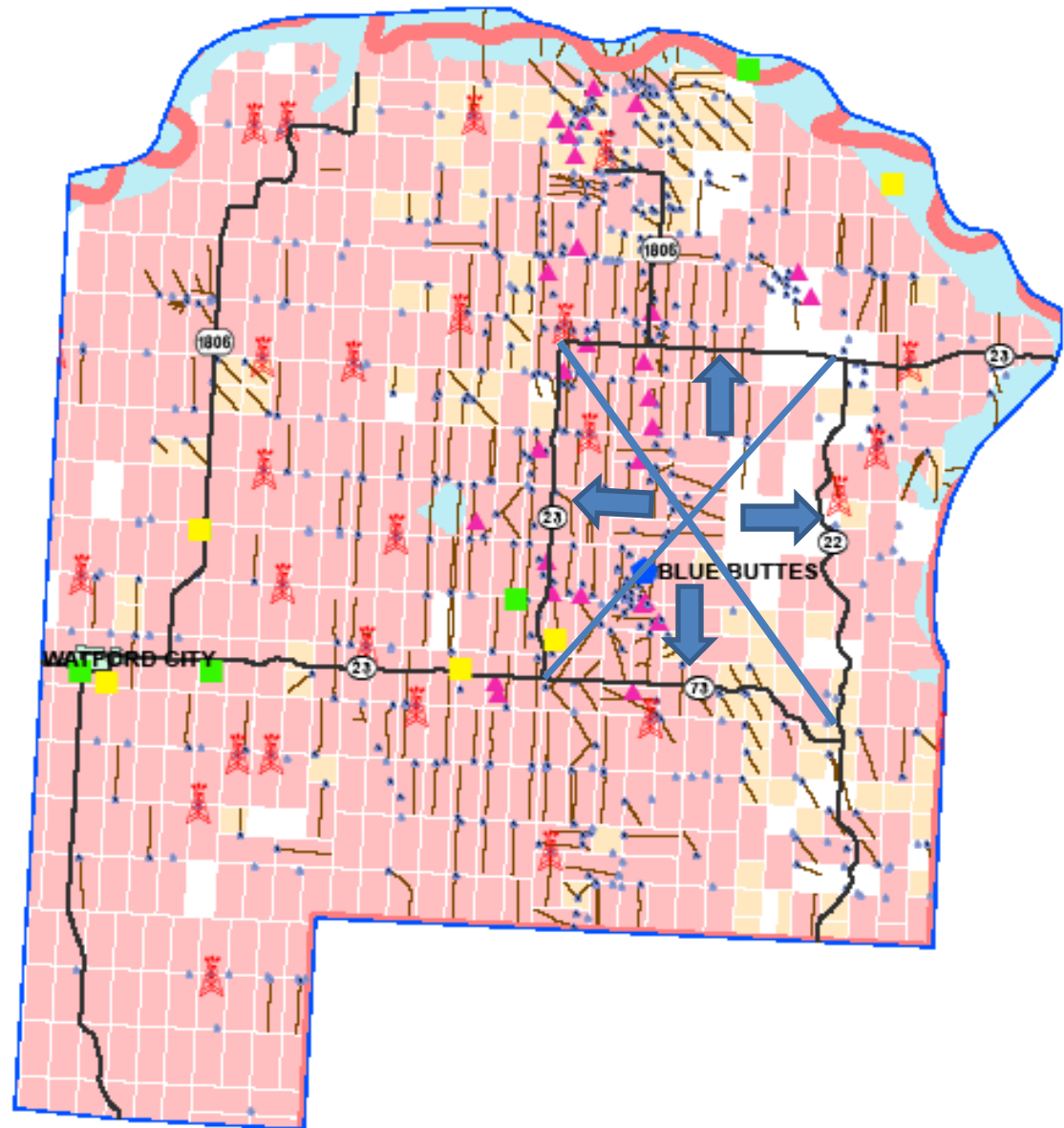
Watford City- Keene Zone

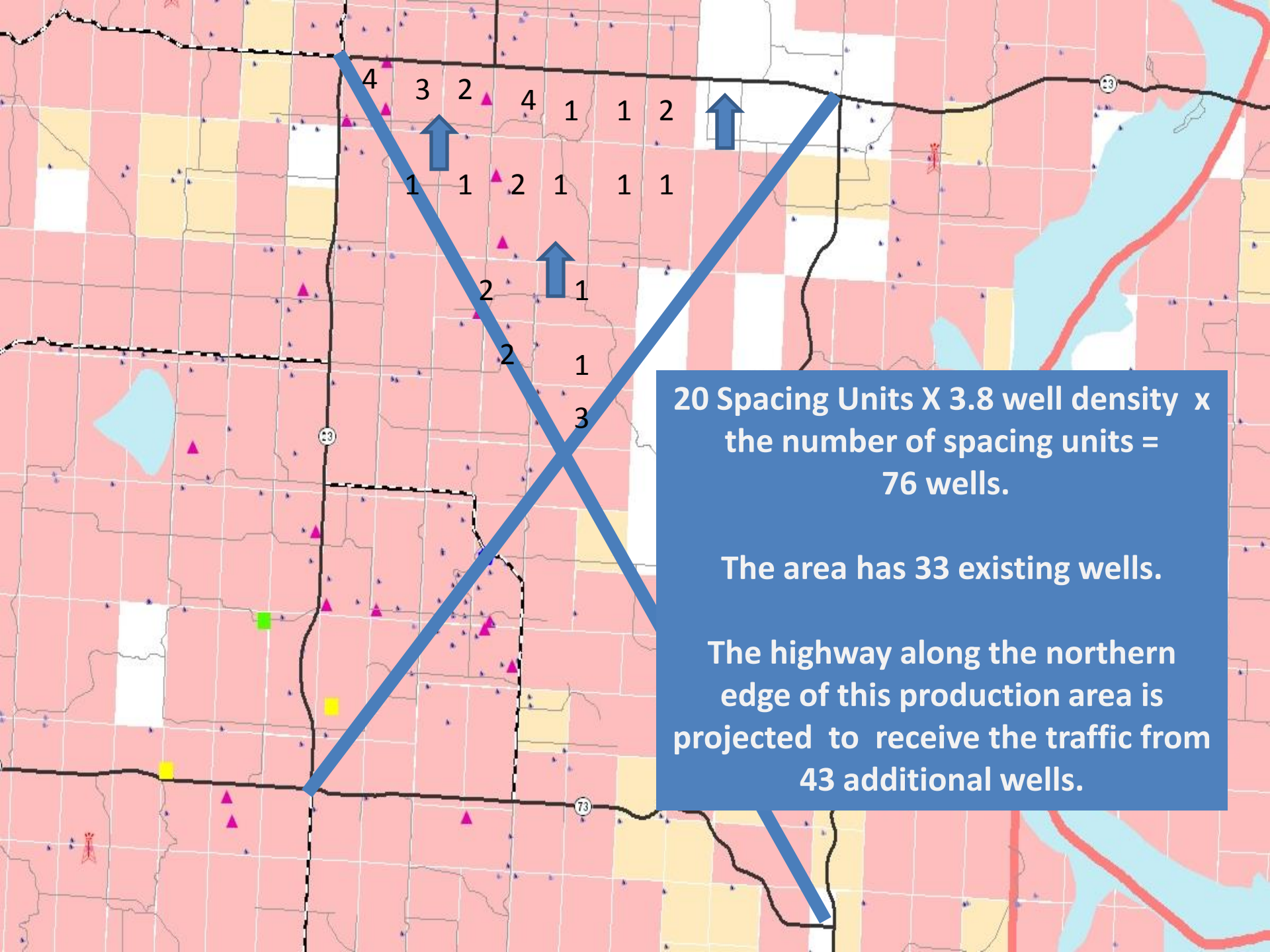
February 18, 2011

Legend

- State Roads
- Pipeline Collection Points**
- COMPANY**
- ◆ Belle Fourche
- ◆ Enbridge
- ◆ Tesoro
- ◆ Multiple Companies
- Water Depots**
- Application
- Permit
- ▲ Frac Sand Rail Locations
- Incorporated City
- +— Railroads
- ▲ 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





20 Spacing Units X 3.8 well density x
the number of spacing units =
76 wells.

The area has 33 existing wells.

The highway along the northern
edge of this production area is
projected to receive the traffic from
43 additional wells.



**Jack L. Olson, Assistant Director
Planning/Asset Management Division
North Dakota Department of Transportation
608 E Boulevard Avenue
Bismarck, ND 58505-0700
701-328-1029
jolson@nd.gov**