

Understanding & Calculating the Impact of Oil-Related Traffic



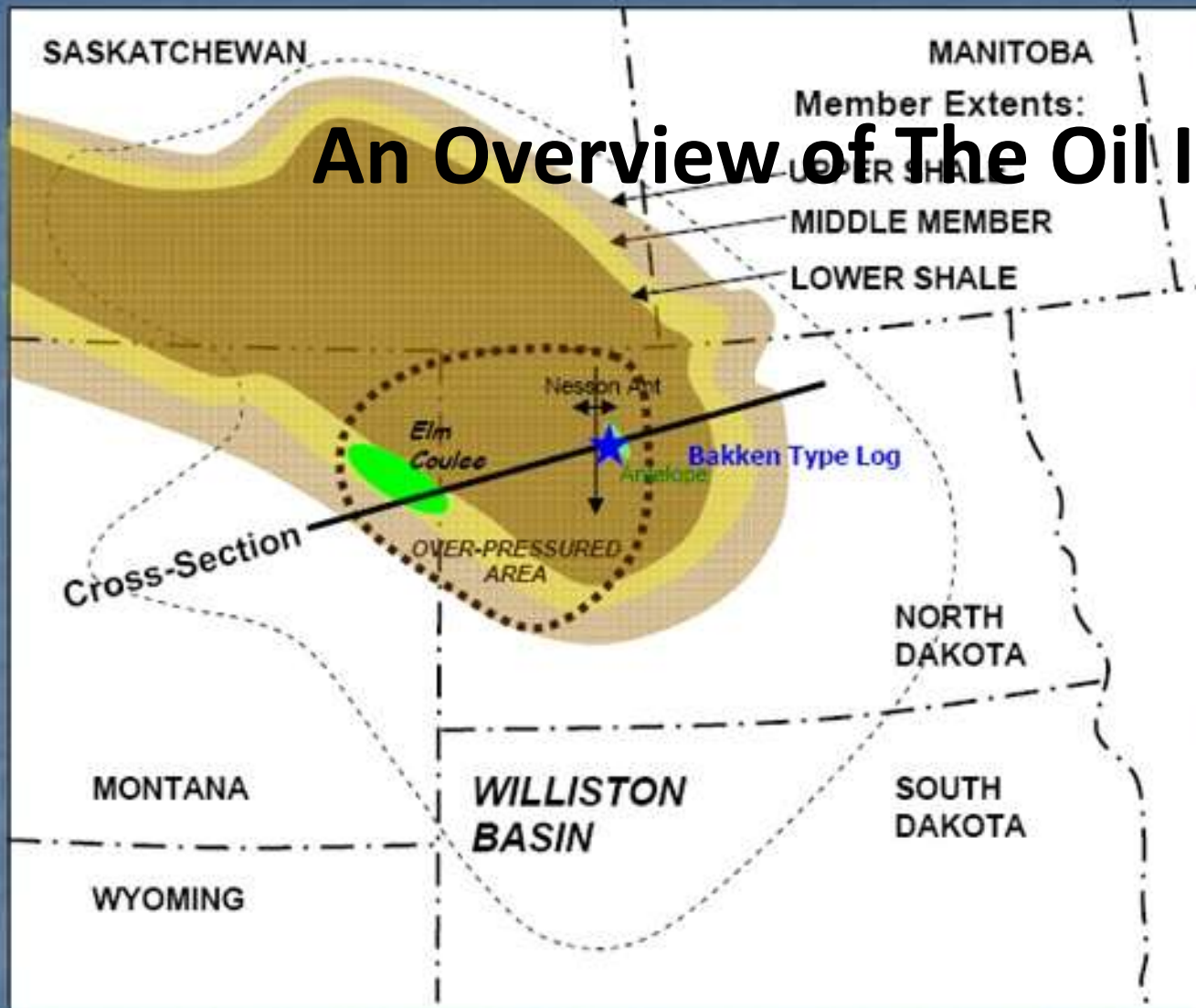
**Jack Olson, Asst. Director
Planning/Asset Management Division
ND Department of Transportation
Bismarck, ND**

October 26, 2011

- 1. An overview of the oil industry**
- 2. Composition and volume of oil traffic**
- 3. Quantify impacts (flexible/rigid pavements)**
- 4. How information is used by NDDOT**



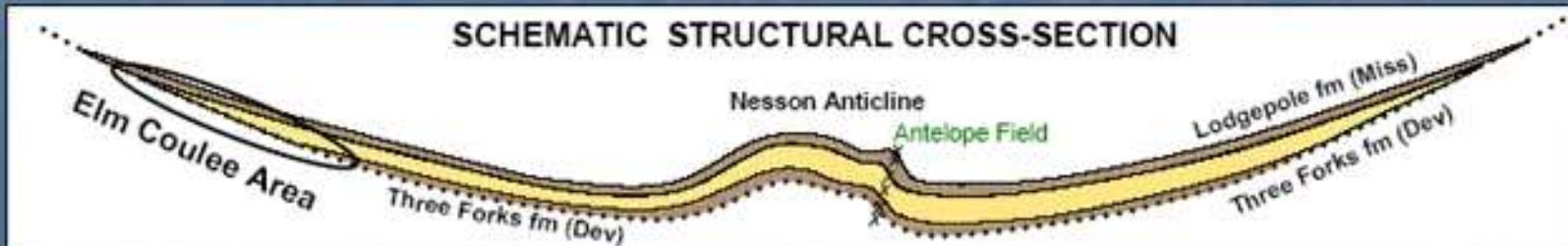
An Overview of The Oil Industry



WEST

SCHEMATIC STRUCTURAL CROSS-SECTION

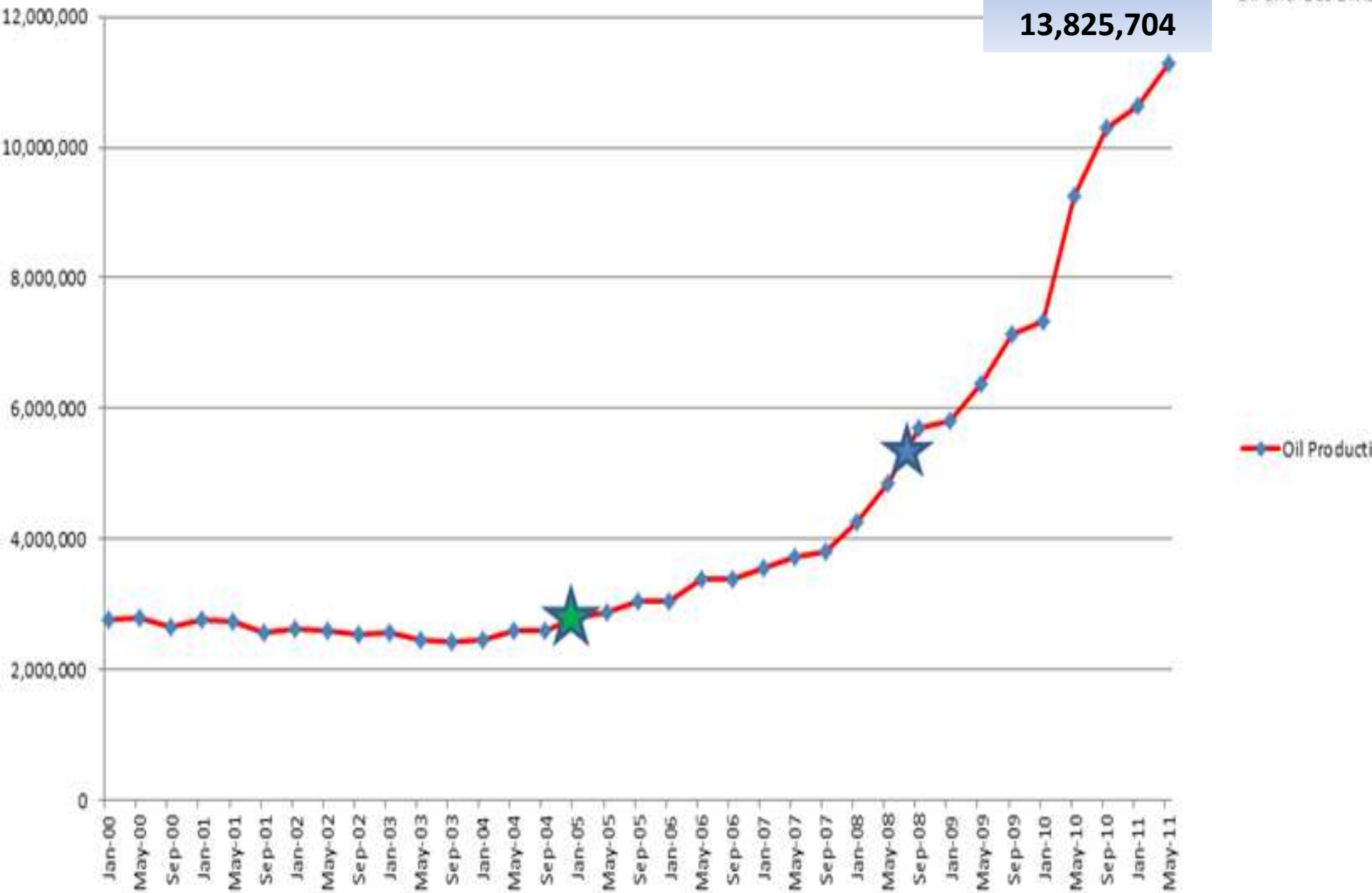
EAST



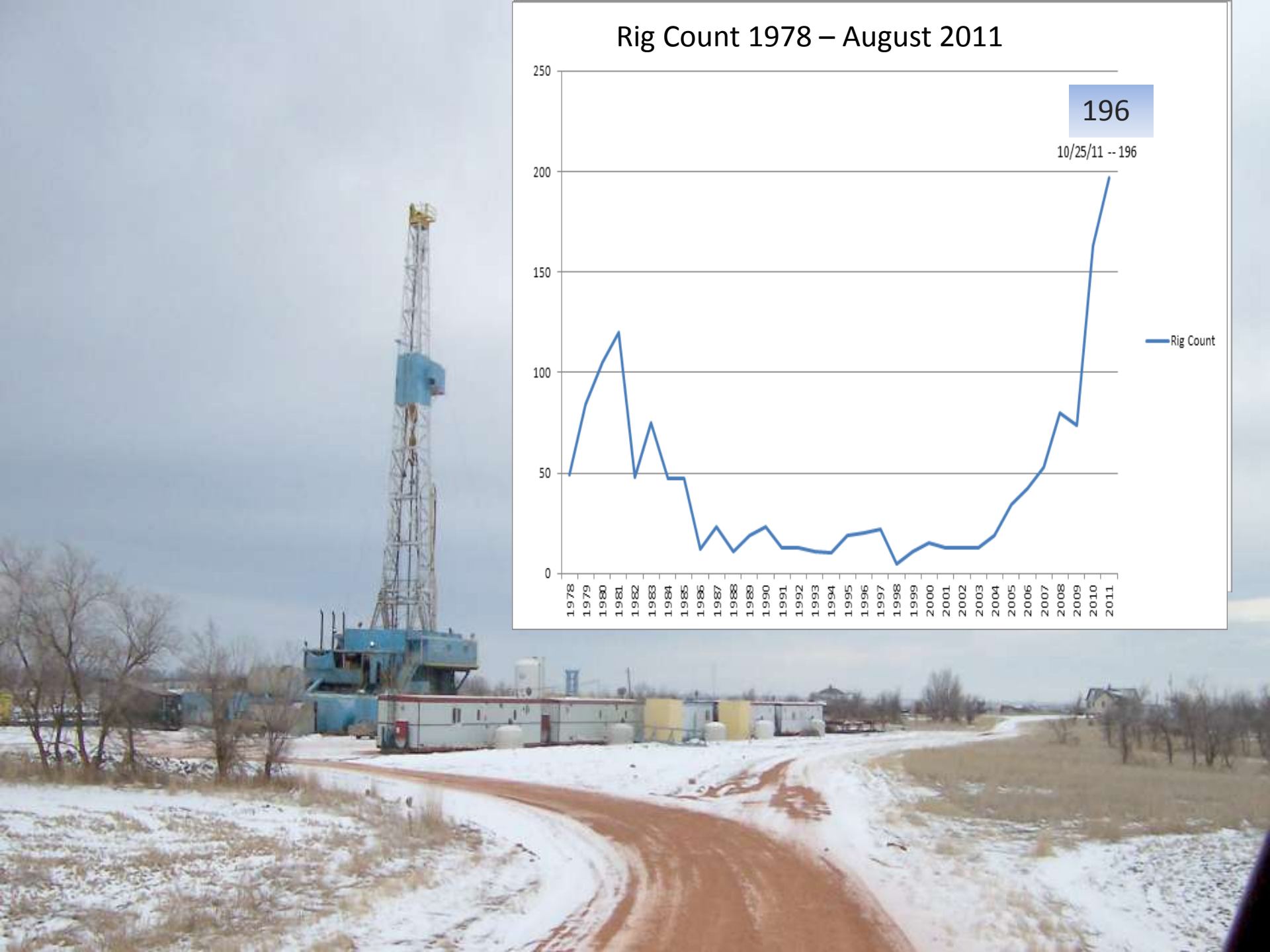
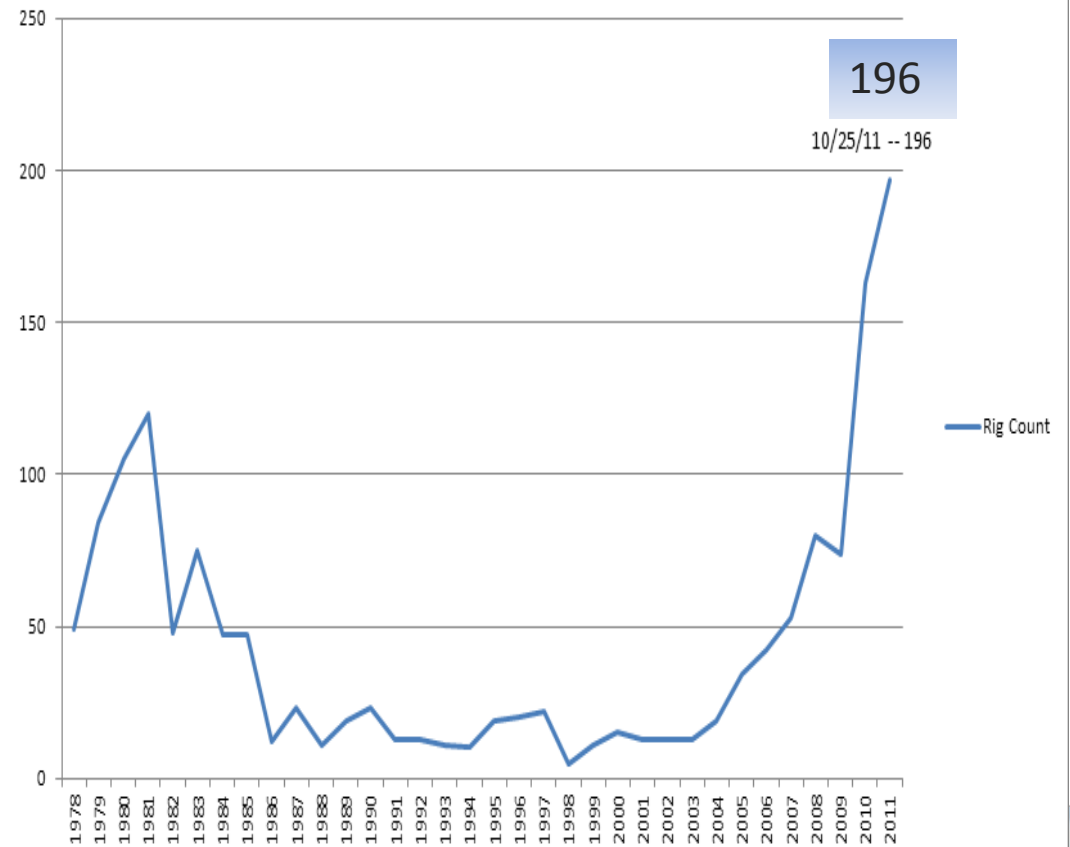
Monthly Oil Production (in BBLs)

August 2011
13,825,704

Data: North Dakota
Oil and Gas Division



Rig Count 1978 – August 2011



August 2011

County	Aug 2011 Ranking	Aug 2011 (bbls)	Wells	Avg Prod/Well
Mountrail	1	4,494,644	1,019	4,410
McKenzie	2	2,922,918	1,311	2,229
Dunn	3	2,000,640	622	3,216
Williams	4	1,919,304	780	2,460

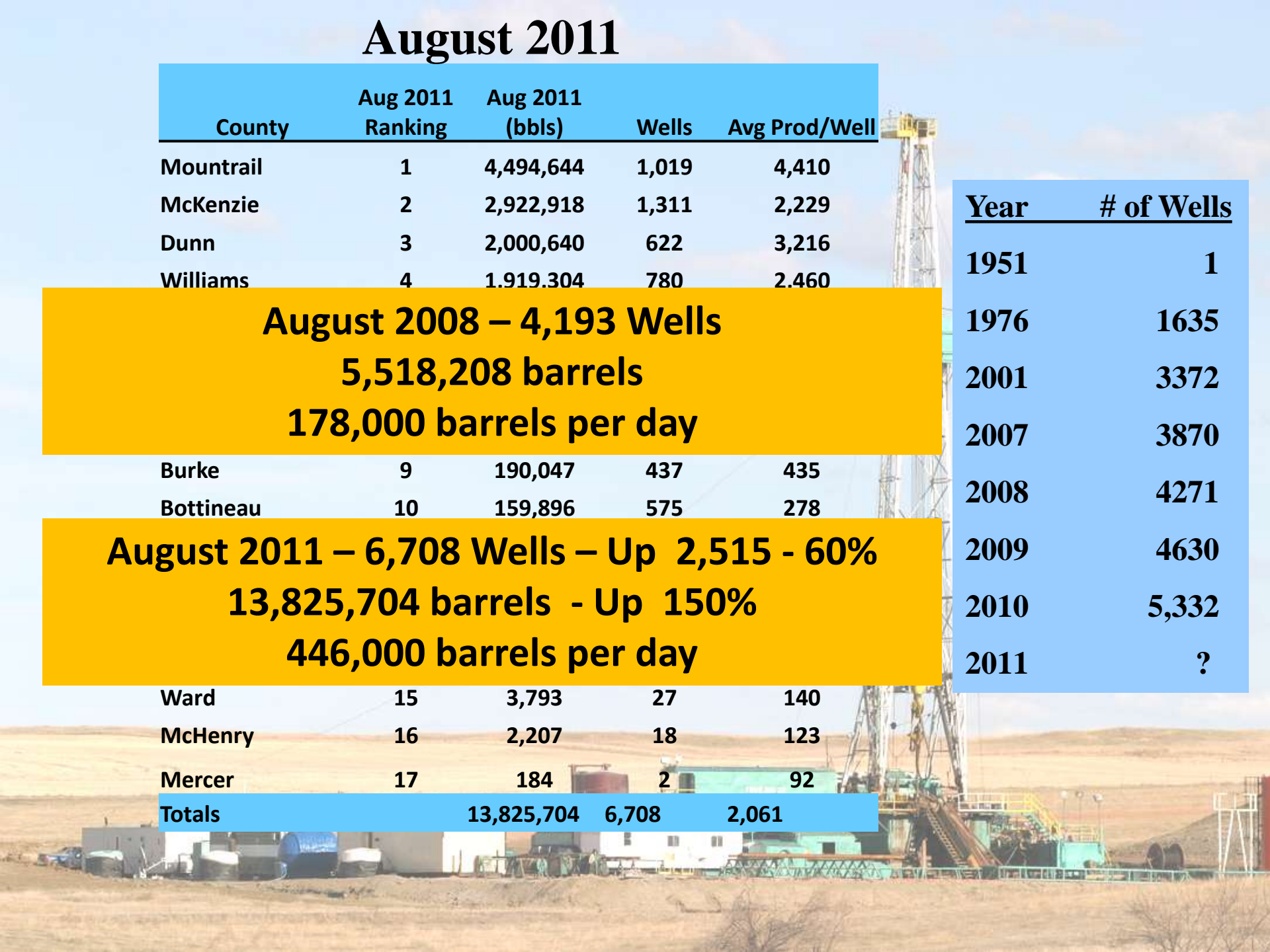
August 2008 – 4,193 Wells
5,518,208 barrels
178,000 barrels per day

Burke	9	190,047	437	435
Bottineau	10	159,896	575	278

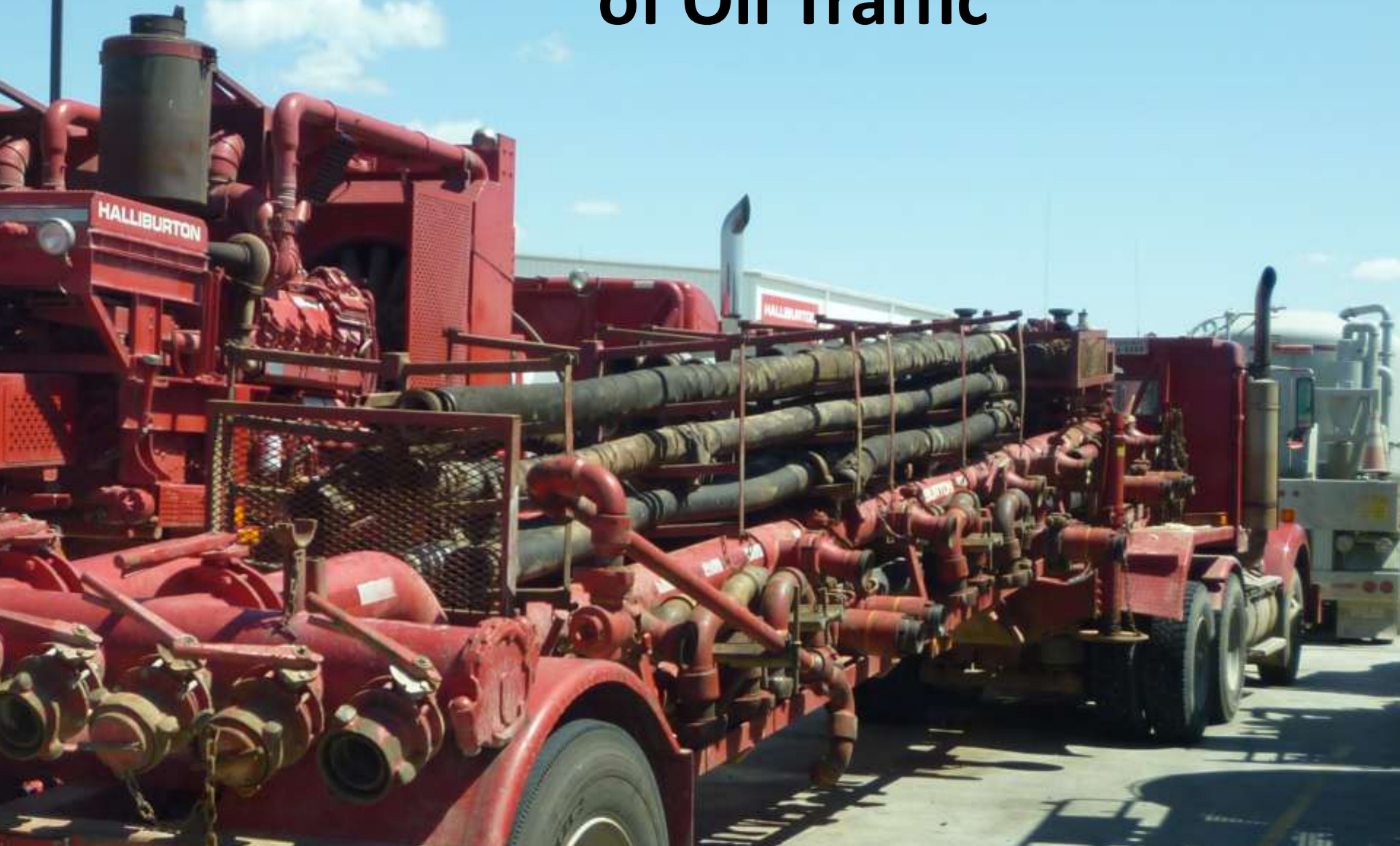
August 2011 – 6,708 Wells – Up 2,515 - 60%
13,825,704 barrels - Up 150%
446,000 barrels per day

Ward	15	3,793	27	140
McHenry	16	2,207	18	123
Mercer	17	184	2	92
Totals		13,825,704	6,708	2,061

Year	# of Wells
1951	1
1976	1635
2001	3372
2007	3870
2008	4271
2009	4630
2010	5,332
2011	?

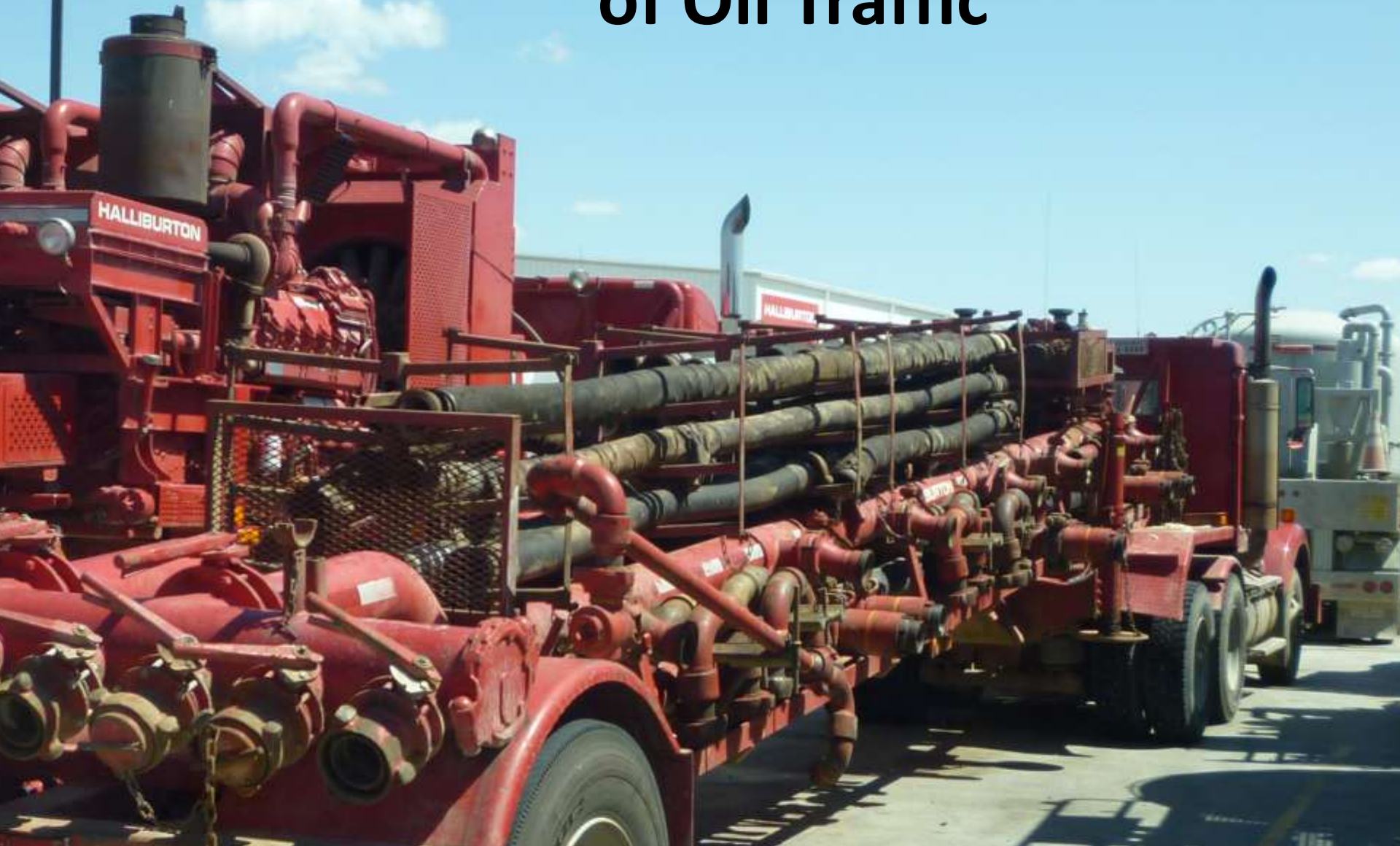


Composition and Volume of Oil Traffic





Composition and Volume of Oil Traffic







**Early 1990's
90,000 Pounds**

**2011
110,000 Pounds**



Choke Manifold

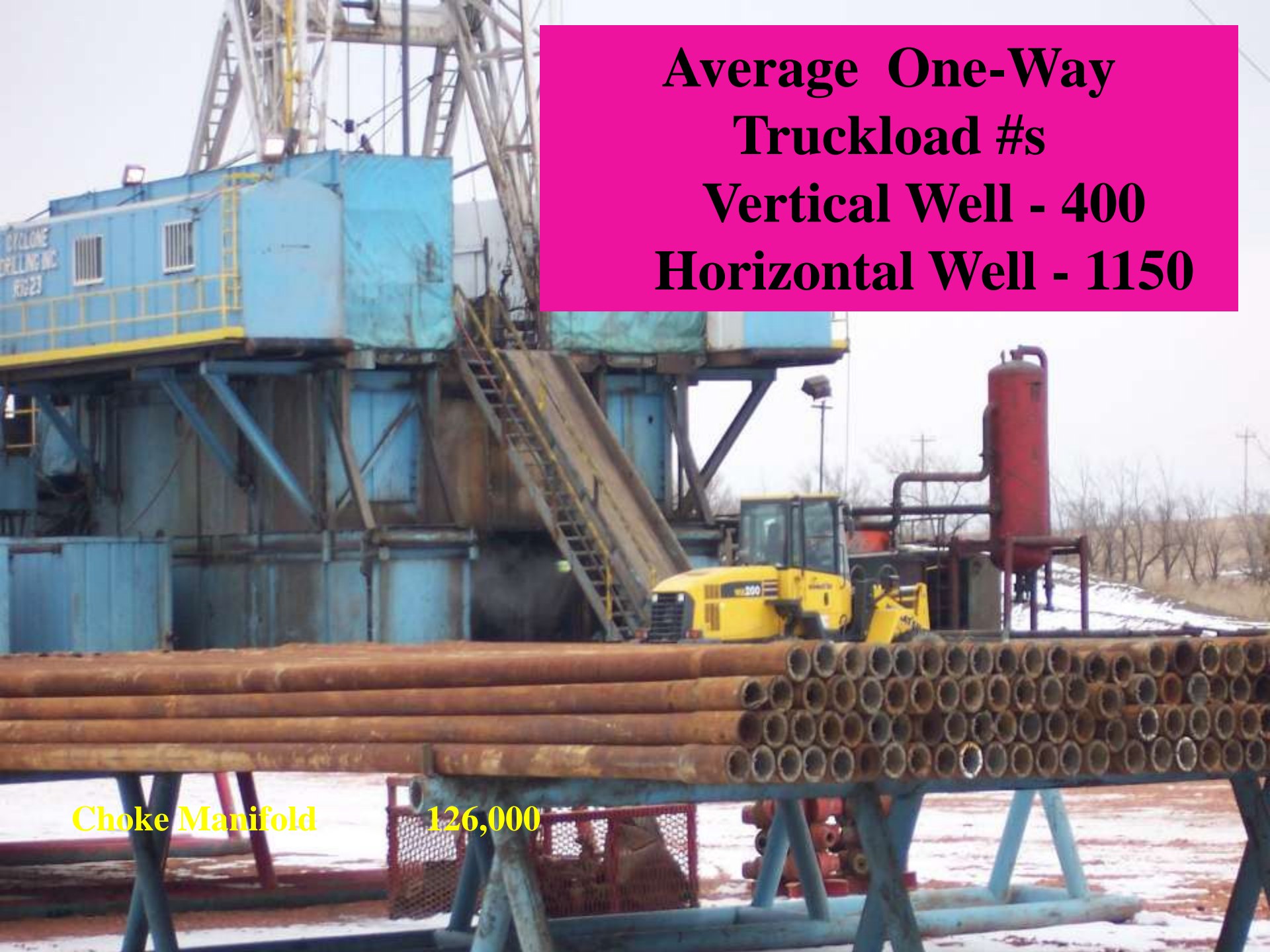
126,000



Gravel Trucks, Transports, Scrapers, Motor Graders, Dozers, Blades, Bed Trucks, Hauling Trucks, Cement Trucks, Wireline Trucks, Coil Tubing Units, Tankers (fresh water, salt water, acid, hot oil, propane, drilling fluids, fracturing fluids, etc.), Backhoes, Cherry Pickers, Cement Transports, Sand Trucks, Pump Trucks, Roustabouts, Utility Vehicles, Cranes, Fracturing Rigs, Low Boy Trailers, etc.

Choke Manifold


126,000



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

Choke Manifold

126,000



**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		



Water

3,000,000 gallons

446 One-Way Truckloads per well

Sand

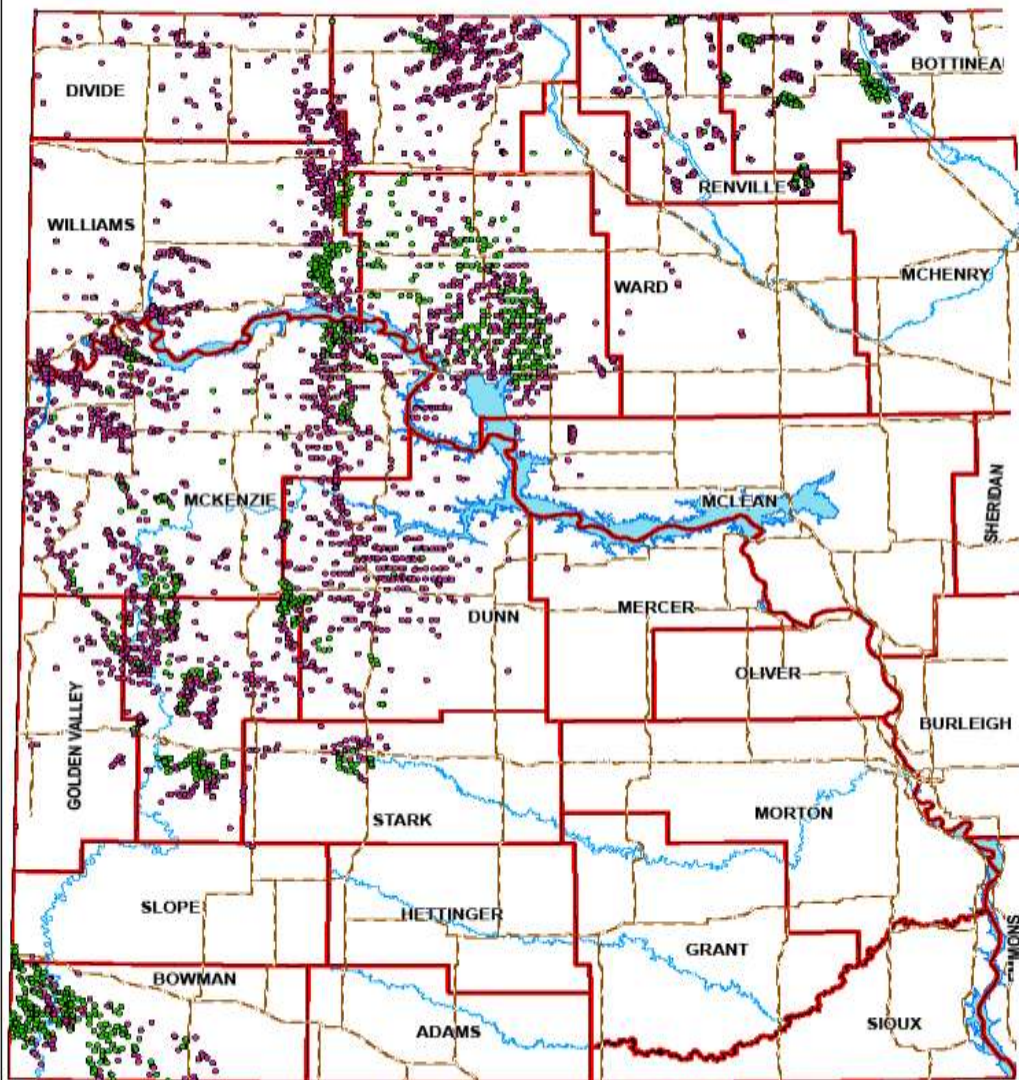
4,000,000M pounds

96 One-Way Truckloads per well





Active Oil Wells






1:1,059,401

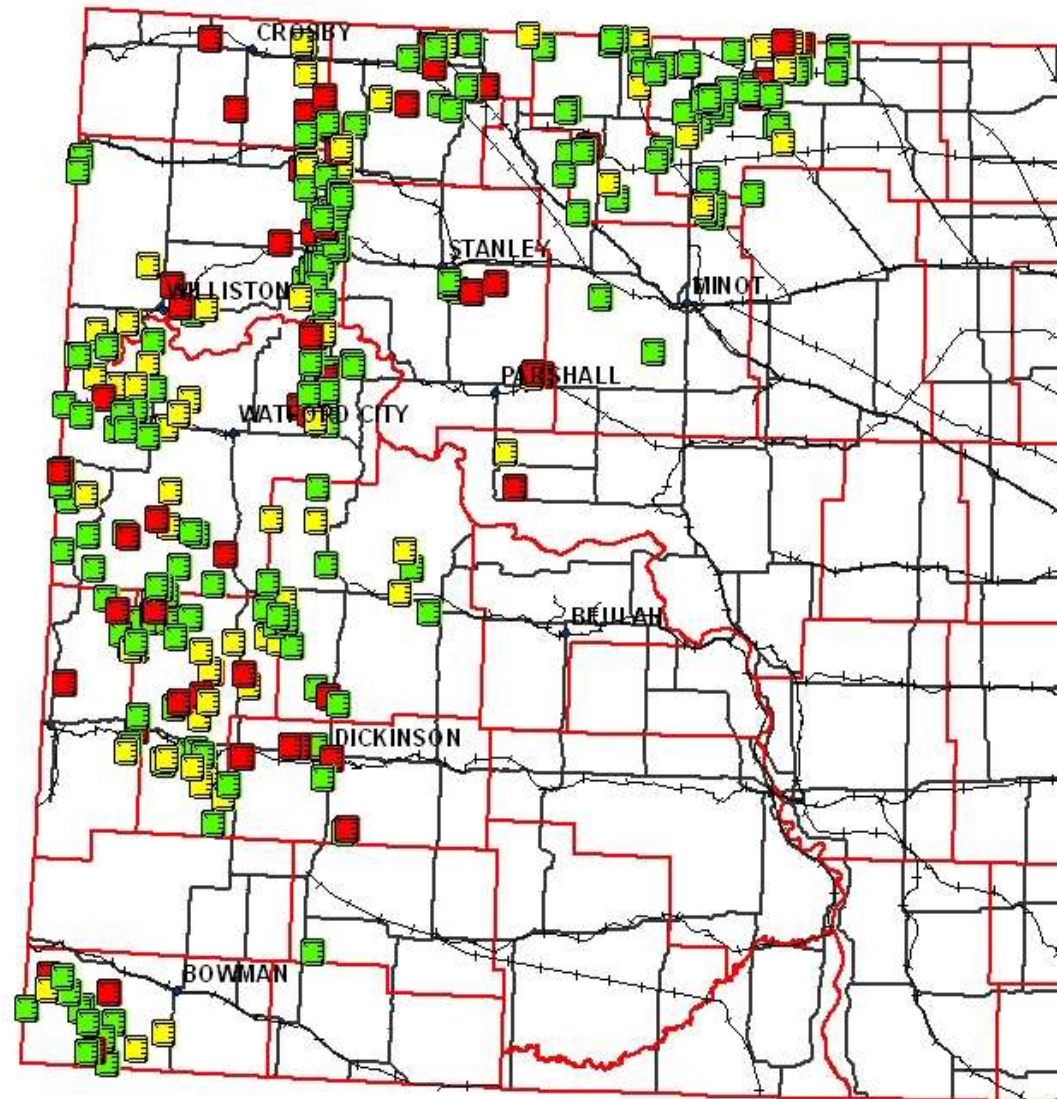


2008 Actual

Salt Water Disposal Site Transportation

Legend

-  100% by Pipeline
-  Mix of Truck and Pipeline
-  100% by Truck



2008 Actual

Salt Water Disposal Site Transportation

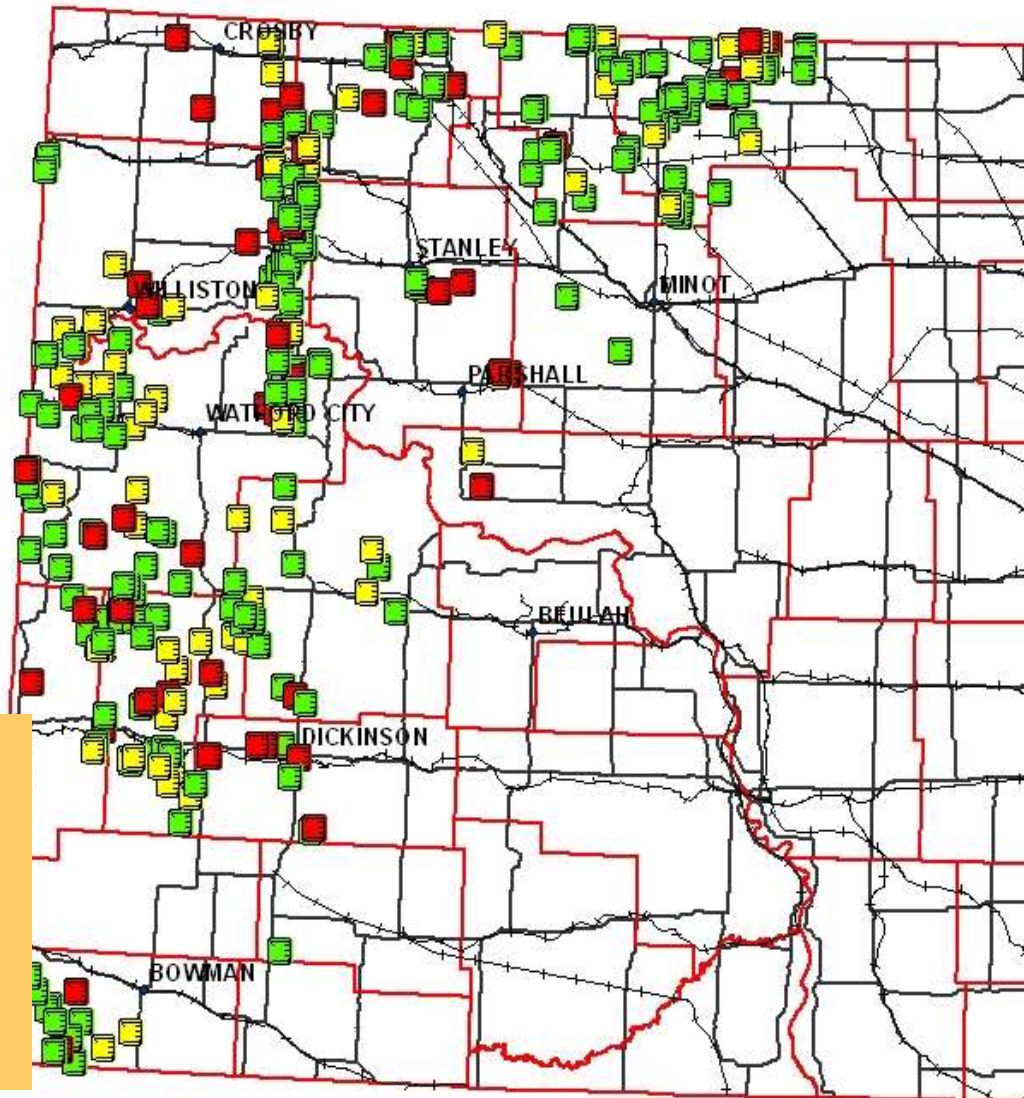
4,266,792 barrels of oil
7,798,967 barrels of salt water
2,408,100 barrels trucked
18,525 truckloads

Legend

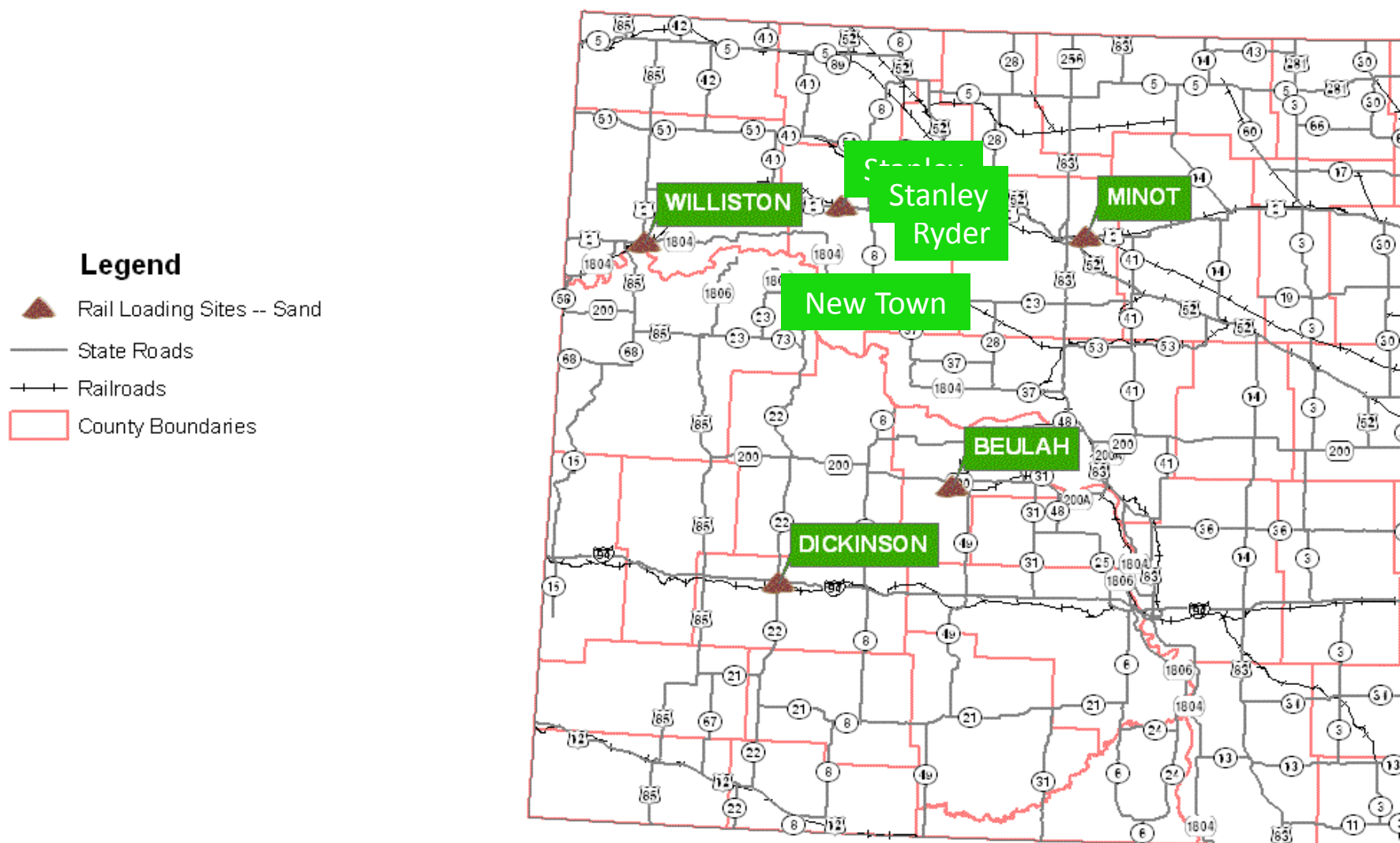
- 100% by Pipeline
- Mix of Truck and Pipeline
- 100% by Truck

August 2011

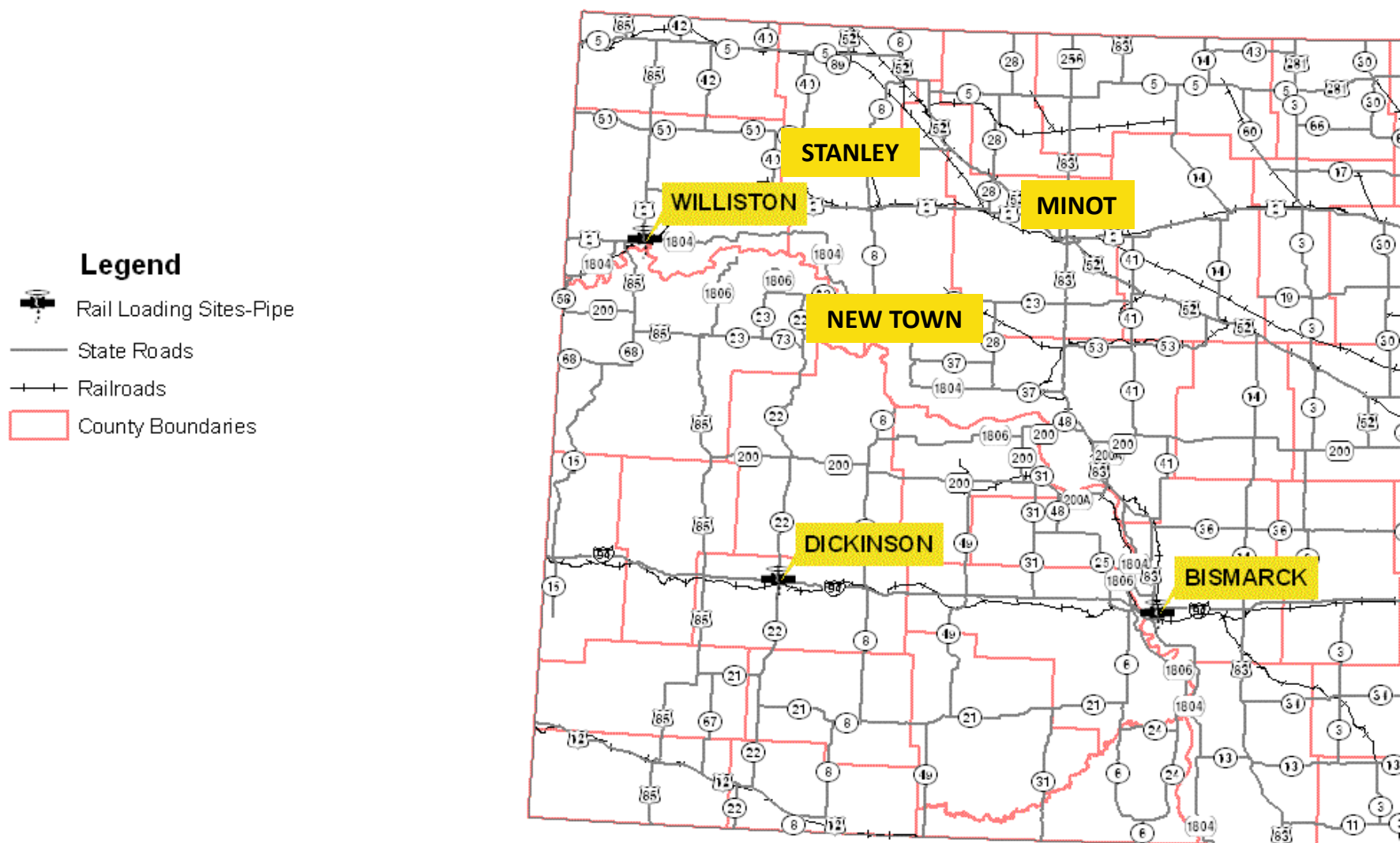
13,825,704 barrels of oil	Up 224%
12,867,229 barrels of salt water	Up 65%
5,184,553 barrels trucked	Up 115%
40 % by truck	
39,880 truckloads	Up 115%



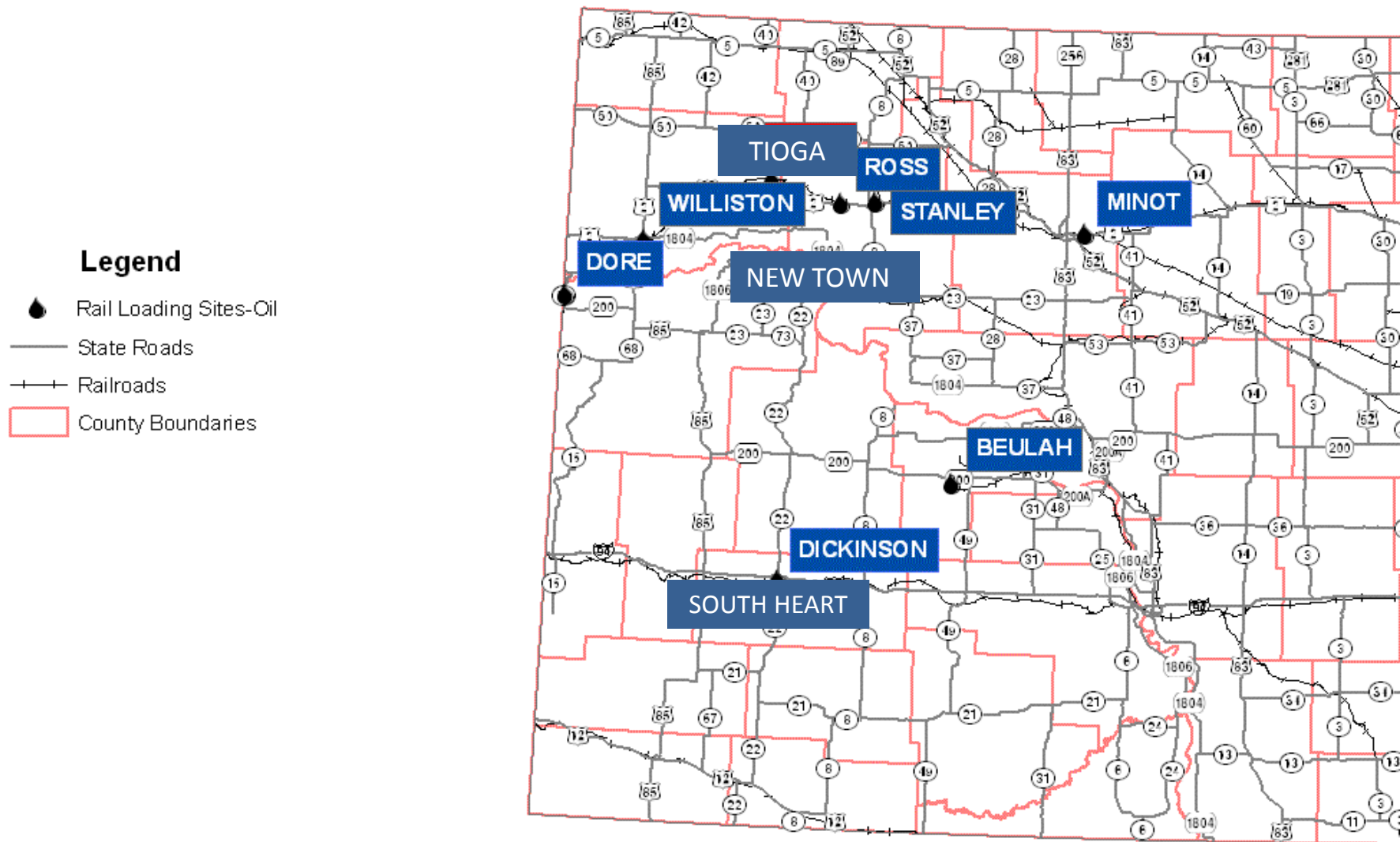
Rail Loading Facilities -- Sand



Rail Loading Facilities -- Pipe



Rail Loading Facilities -- Oil







SafeRack

EXIT

Quantify Impacts On Flexible & Rigid Pavements



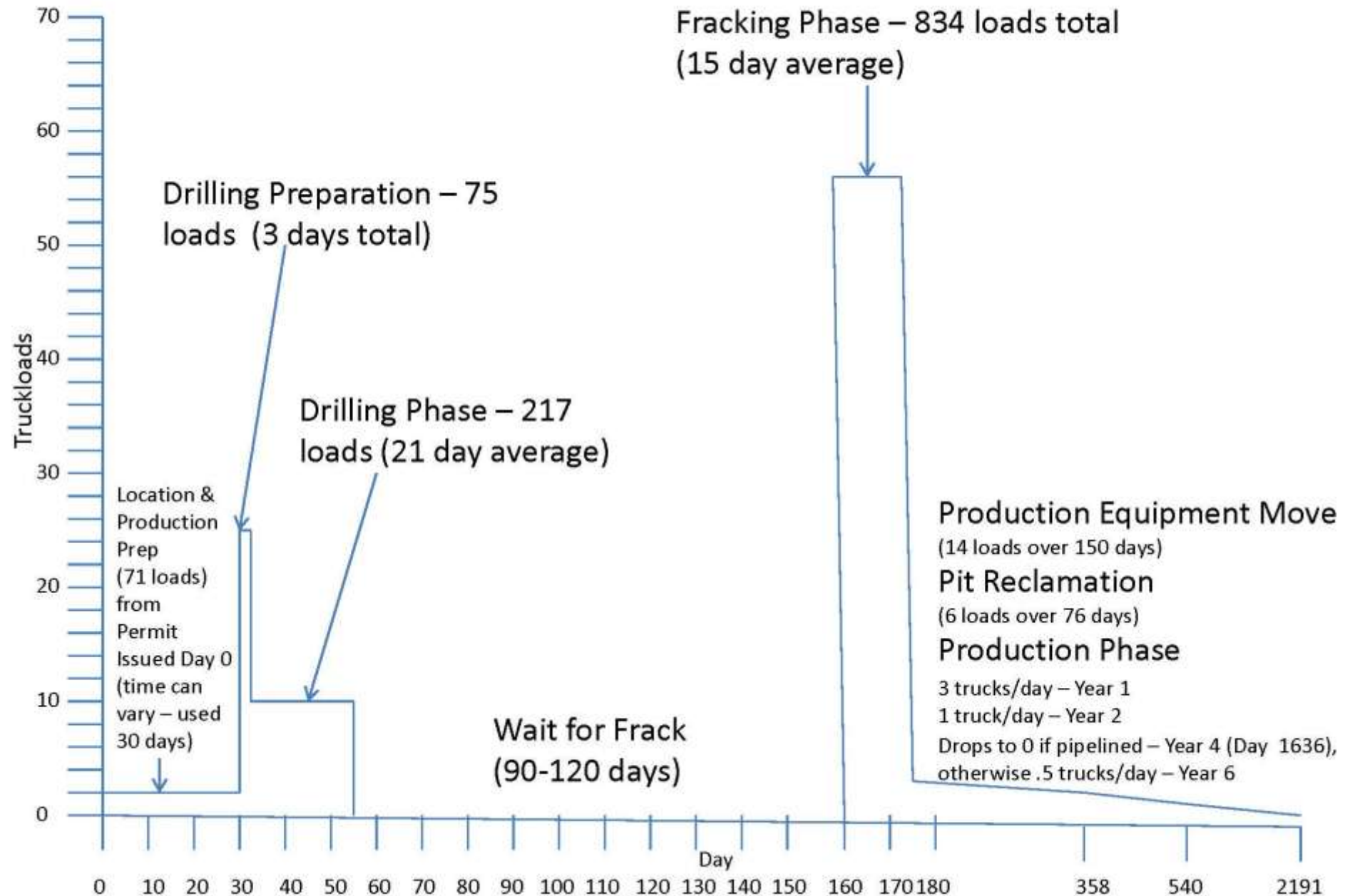
Job Description	Number Of Trucks	Trucks Axles	Tires
Truck in equipment to build location & road including scoria or gravel	20	Tandem w/ tandem & triple axle trailers	18 up to 32
Pipeline materials trucked to location to be installed	25	Tandem w/ tandem axle trailers	18
Crane to unload pipe for pipe line	1	Double front & triple rear axle	16
Roustabouts to help unload pipe	1	Tandem w/ tandem axle trailers	18
Trucks to move in & move out equipment for pipelines	8	Tandem w/ tandem & triple axle trailers	18 up to 32
Trucks deliver culverts	1	Tandem w/ tandem axle trailers	18
Truck equipment to install pit liner In pit & under rig	2	Tandem w/ tandem axle trailers	18
Trucks for Drilling rat & mouse hole, install conductor pipe	4	Tandem w/ tandem axle trailers	18

Generator House - 111,180 Pounds

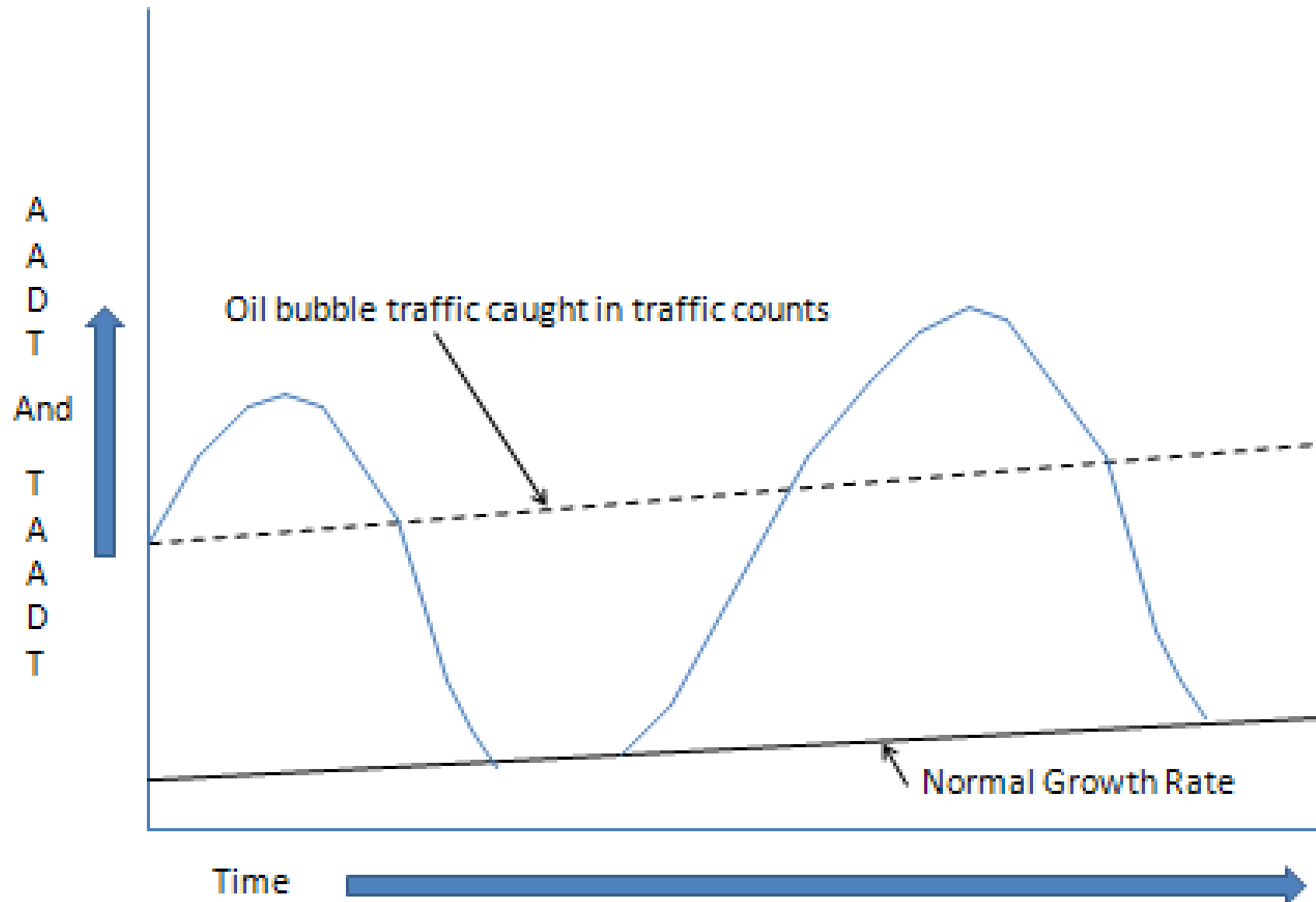
Load Type	Number of Loads per Well	Steer				Group #1				Group #2			
		# of Axels	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axels	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axels	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs
Generator House	6	1	12.7	0.399	0.341	3	54.7	1.900	4.630	4	59.4	6.080	2.510

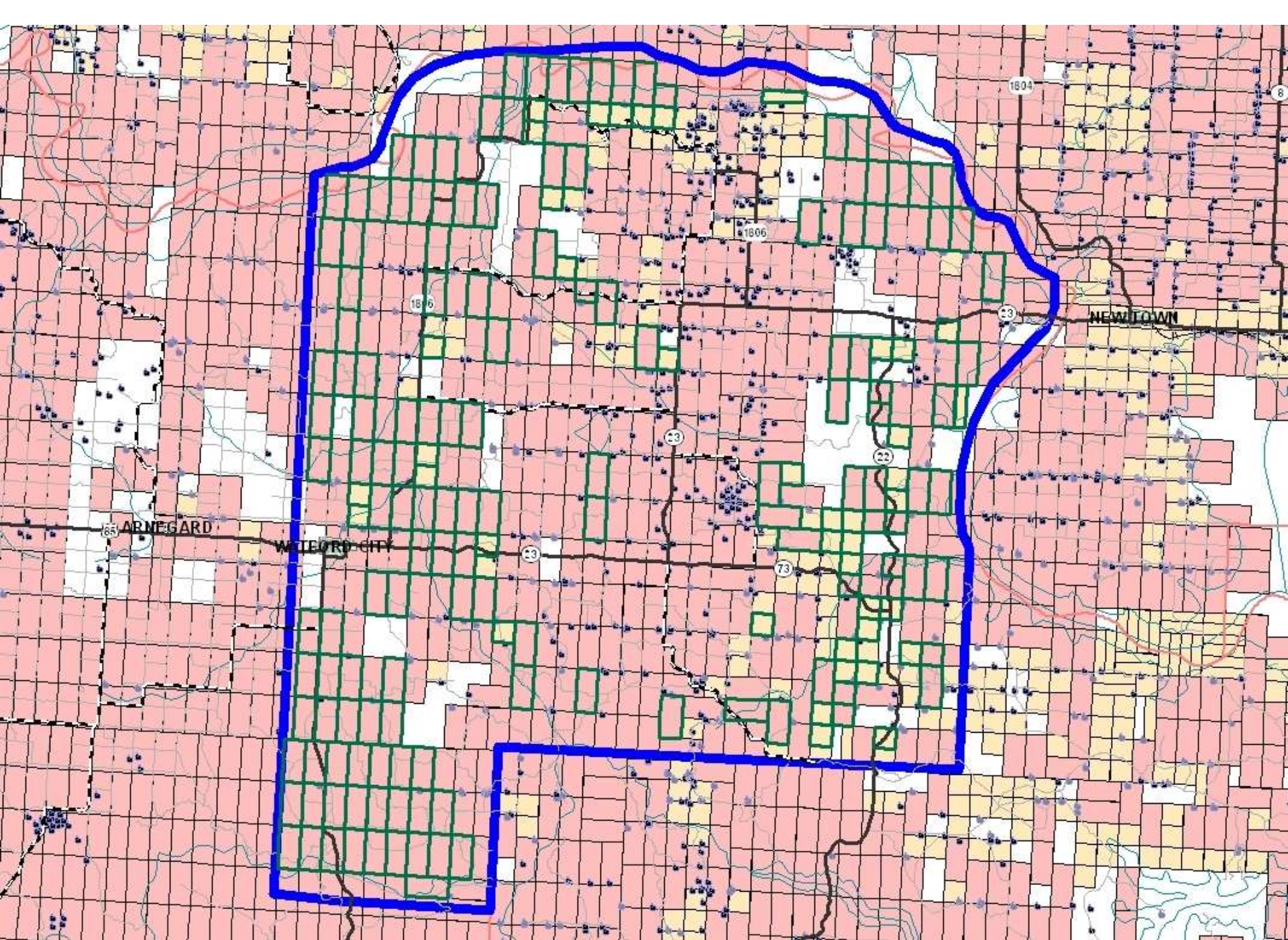
Group #3				Group #4				Type Totals/Well			
# of Axles	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	# of Axles	Group Wt. (kips)	Group Flex ESALs	Group Rigid ESALs	Axles	Weight (kips)	Group Flex ESALs	Group Rigid ESALs
2	33.4	1.110	1.920	0	0.0			60	961.2	56.9	56.4

New Bakken Well – Truckload Timeline



Oil Bubble Impact on AADT/TAADT





Watford City- Keene Zone

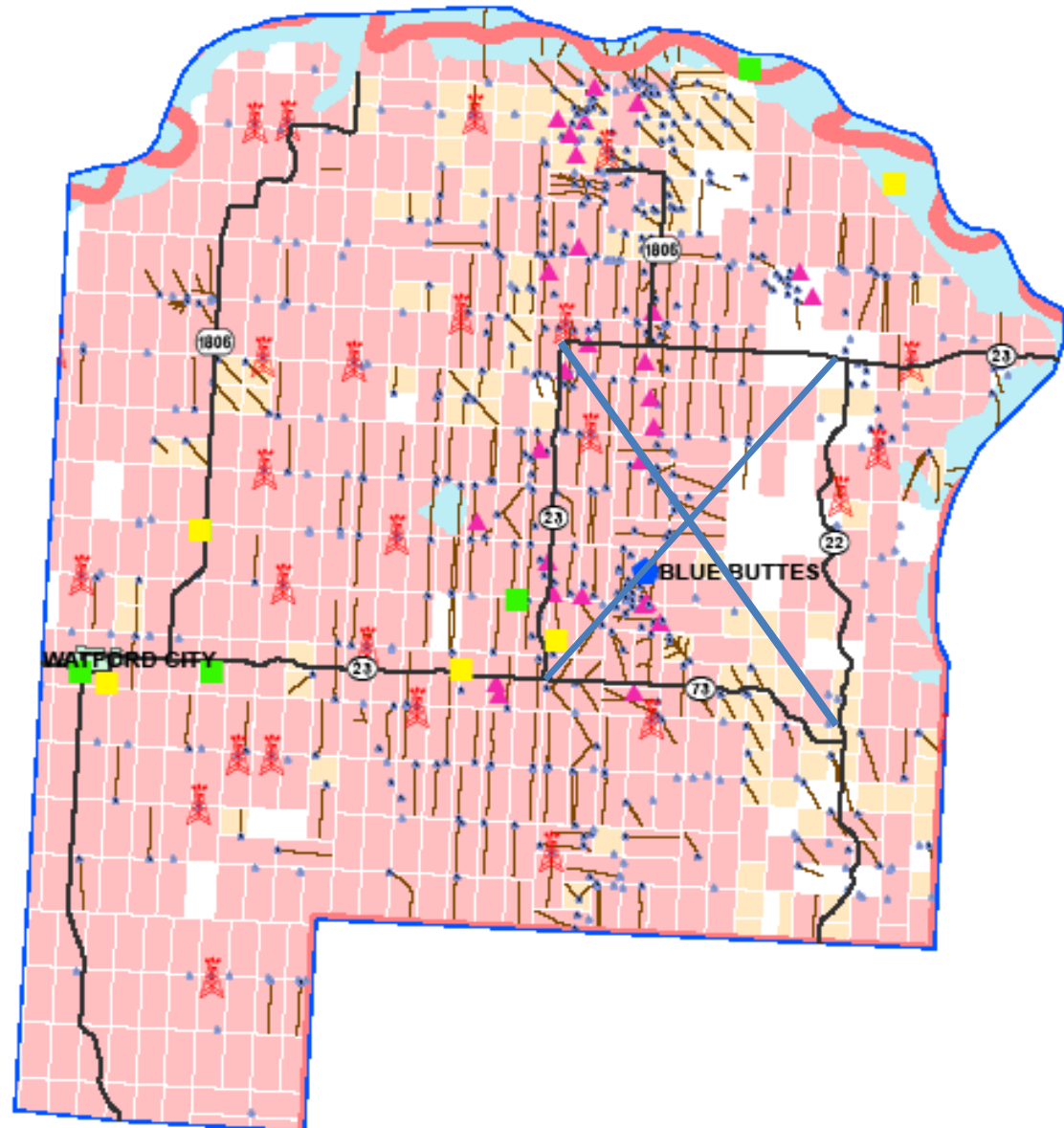
February 18, 2011

Legend

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



Watford City- Keene Zone

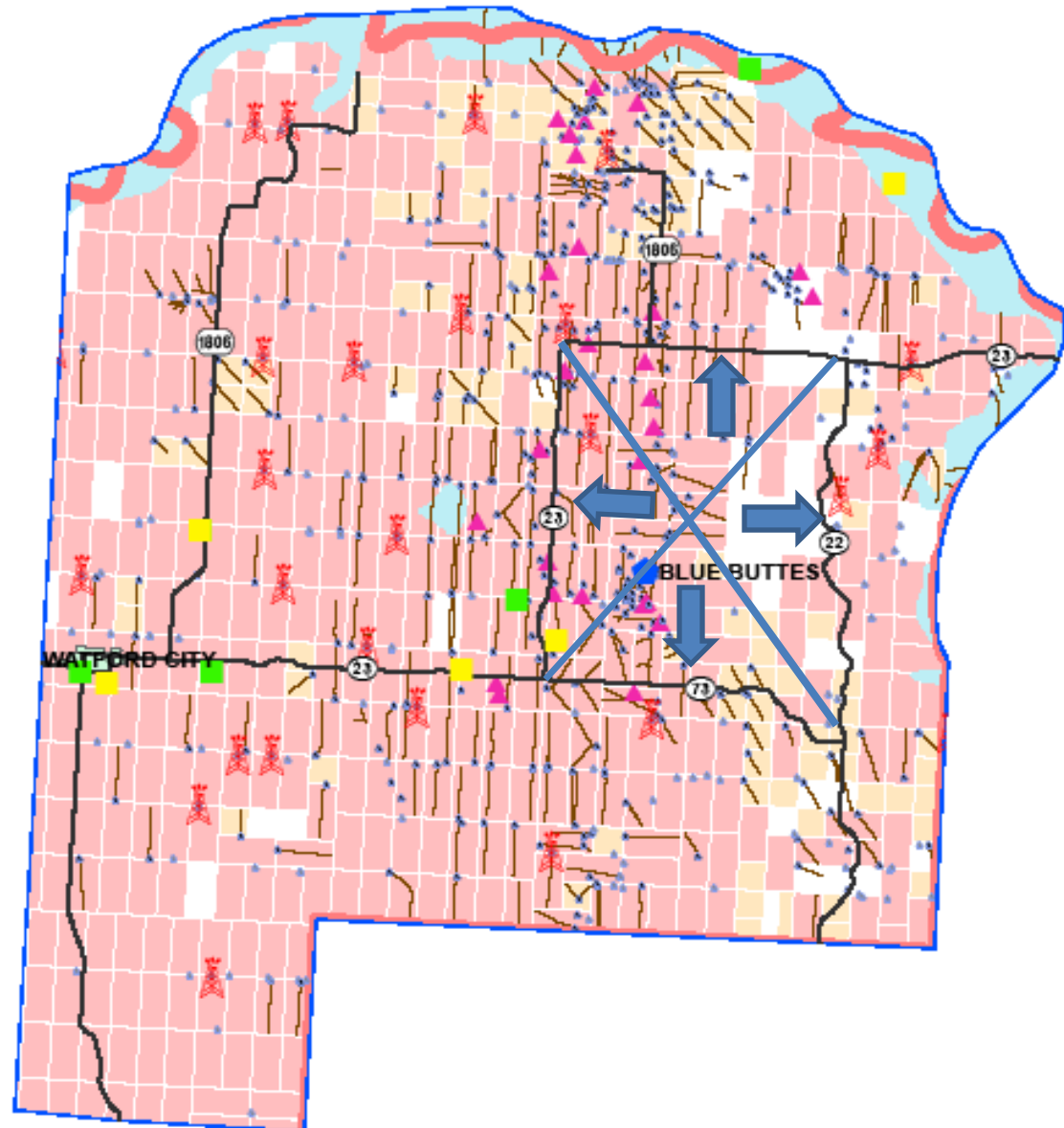
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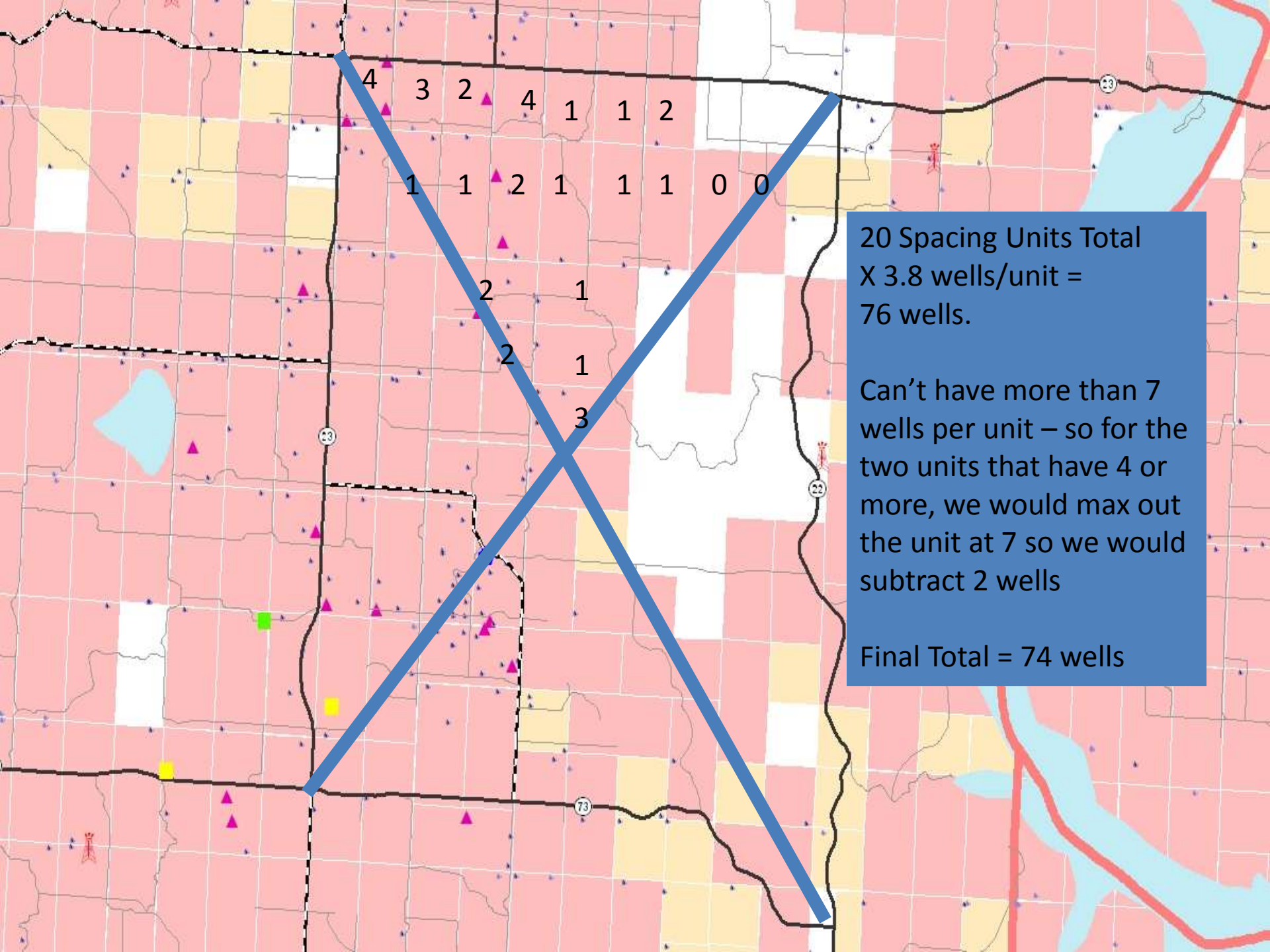
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20 Spacing Units Total
X 3.8 wells/unit =
76 wells.

Can't have more than 7
wells per unit – so for the
two units that have 4 or
more, we would max out
the unit at 7 so we would
subtract 2 wells

Final Total = 74 wells

Questions?

