Frac Sand Mining:
Frac Sand 101 and DNR Regulations

WISCONSIN
DEPT. OF NATURAL RESOURCES

AWaRE TEAM MEETING
SEPTEMBER 12, 2012

SAND MINING IN WISCONSIN IS NOT NEW

- **Mining sand and nonmetallic minerals in Wisconsin for over 100 years**
- **All frac sand is quartz sand**

- **Foundry**
- **Glass**
- **Water Filtration**
- **Construction**
- **Sandblasting**
- **Road sand**

Nonmetallic mining – a widespread activity in WI

- Variety of geologic environments provides for a diverse industry. Currently there's an estimated **2,500 +** mines in the state. We have non metallic mines in every Wisconsin county.

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WHAT'S NEW AND DIFFERENT?

- **Footprint of the new mines and plants**
- **Geographical concentration of the new mines**
- **Rate of mineral withdrawal**
- **Number of new mining and processing plant proposals**


Map
Photos
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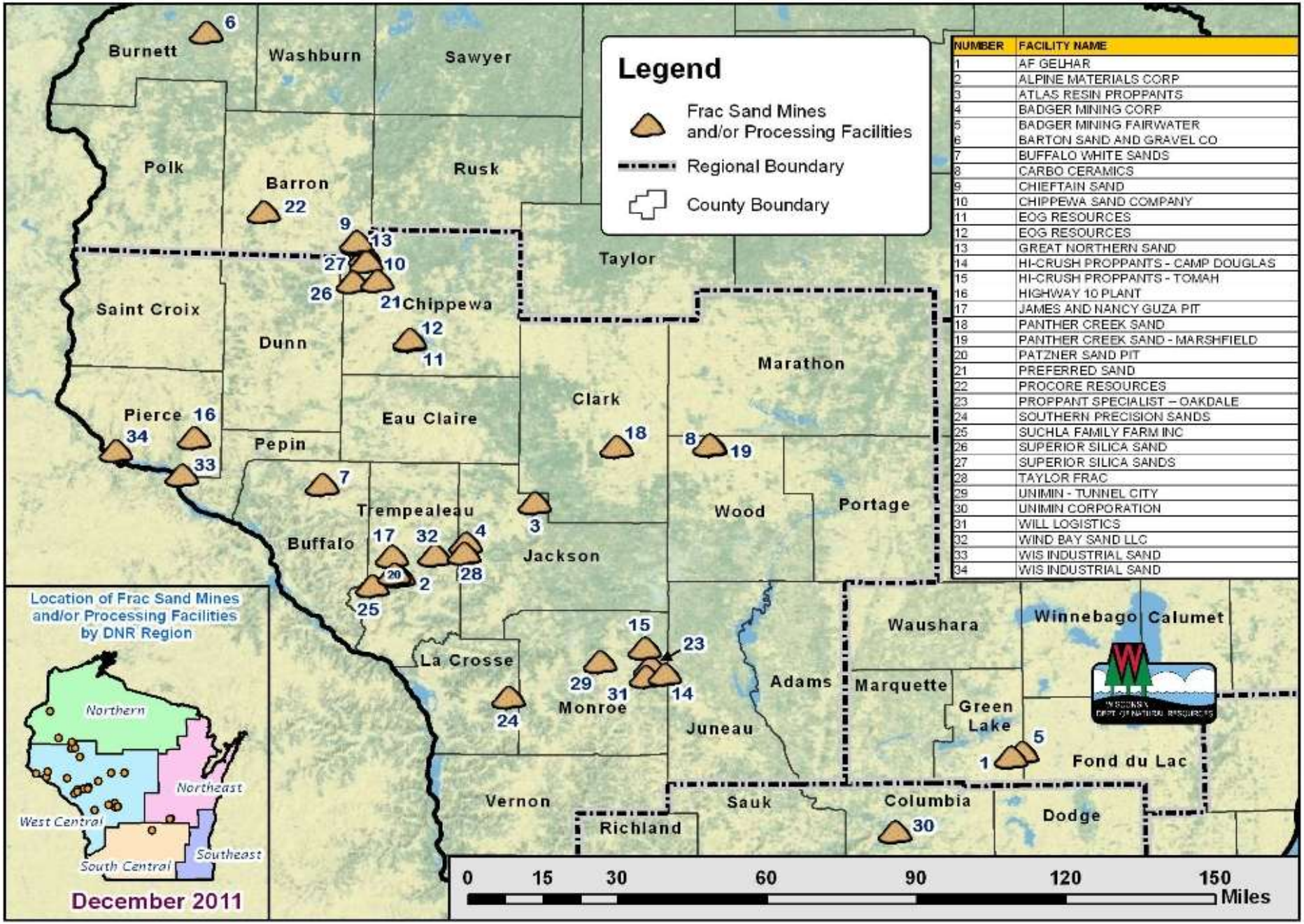
ALLUVIAL/BEDROCK-CRANSAND

Location of Frac Sand Mines and/or Processing Facilities in Wisconsin



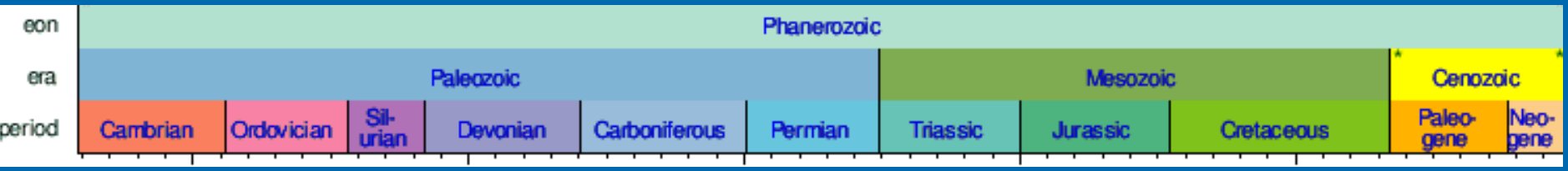
NUMBER	FACILITY NAME
1	AF GELHAR
2	ALPINE MATERIALS CORP
3	ATLAS RESIN PROPPANTS
4	BADGER MINING CORP
5	BADGER MINING FAIRWATER
6	BARTON SAND AND GRAVEL CO
7	BUFFALO WHITE SANDS
8	CARBO CERAMICS
9	CHIEFTAIN SAND
10	CHIPPEWA SAND COMPANY
11	EOG RESOURCES
12	EOG RESOURCES
13	GREAT NORTHERN SAND
14	HI-CRUSH PROPPANTS - CAMP DOUGLAS
15	HI-CRUSH PROPPANTS - TOMAH
16	HIGHWAY 10 PLANT
17	JAMES AND NANCY GUZA PIT
18	PANTHER CREEK SAND
19	PANTHER CREEK SAND - MARSHFIELD
20	PATZNER SAND PIT
21	PREFERRED SAND
22	PROCORE RESOURCES
23	PROPPANT SPECIALIST – OAKDALE
24	SOUTHERN PRECISION SANDS
25	SUCHLA FAMILY FARM INC
26	SUPERIOR SILICA SAND
27	SUPERIOR SILICA SANDS
28	TAYLOR FRAC
29	UNIMIN - TUNNEL CITY
30	UNIMIN CORPORATION
31	WILL LOGISTICS
32	WIND BAY SAND LLC
33	WIS INDUSTRIAL SAND
34	WIS INDUSTRIAL SAND

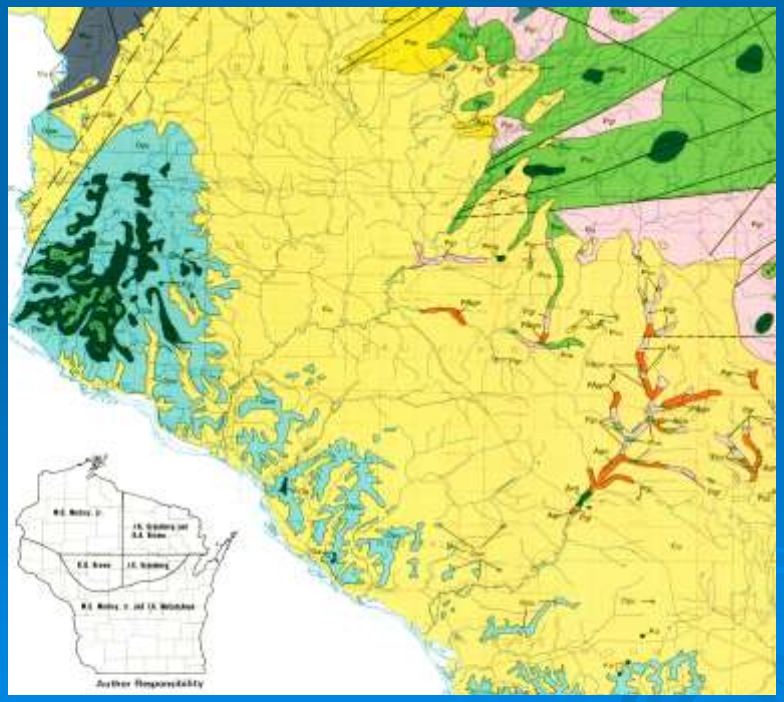
WHY HERE?

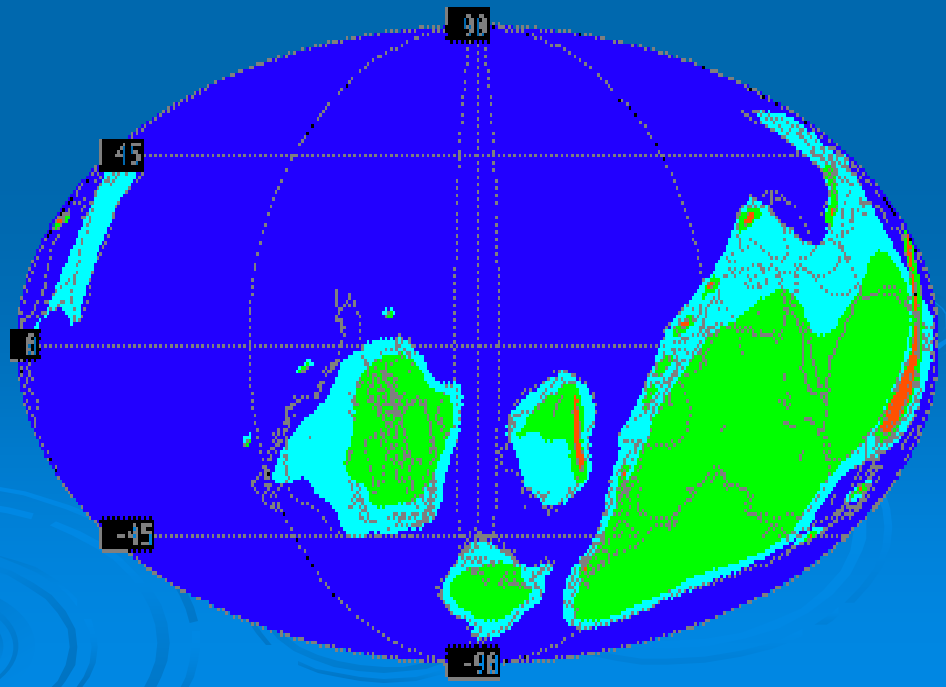
Wisconsin has sandstone deposits that are:

- **Clean, crystalline, almost pure silica sand**
- **Spheroid shape**
- **Desirable size gradations and consistency**
- **High crush resistance**
- **Usually close to the surface and easy to mine**

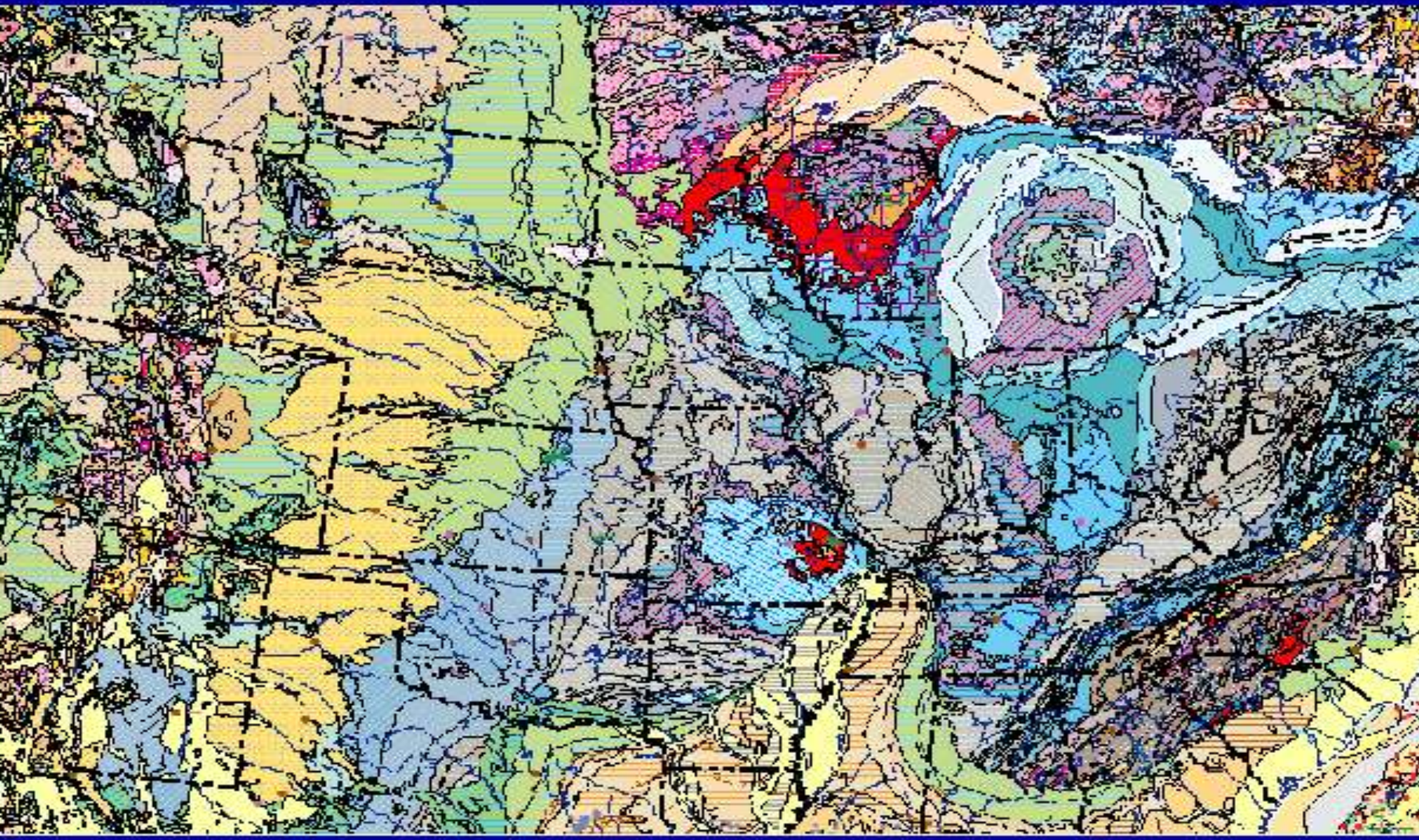
THE GEOLOGIC STORY BEHIND THE WI SANDSTONE FORMATIONS







WHERE THE BEST FRAC SAND IS (RED)



THE BEST FRAC SAND IS WELL ROUNDED AND NEARLY PURE QUARTZ

Many younger sands are too angular or contain other minerals or rock fragments

FRAC SAND "BOOM" WHY NOW?

- **Technological advances**
- **Maximizes oil and gas yields**
- **Increasing worldwide demand for petroleum products and gas**

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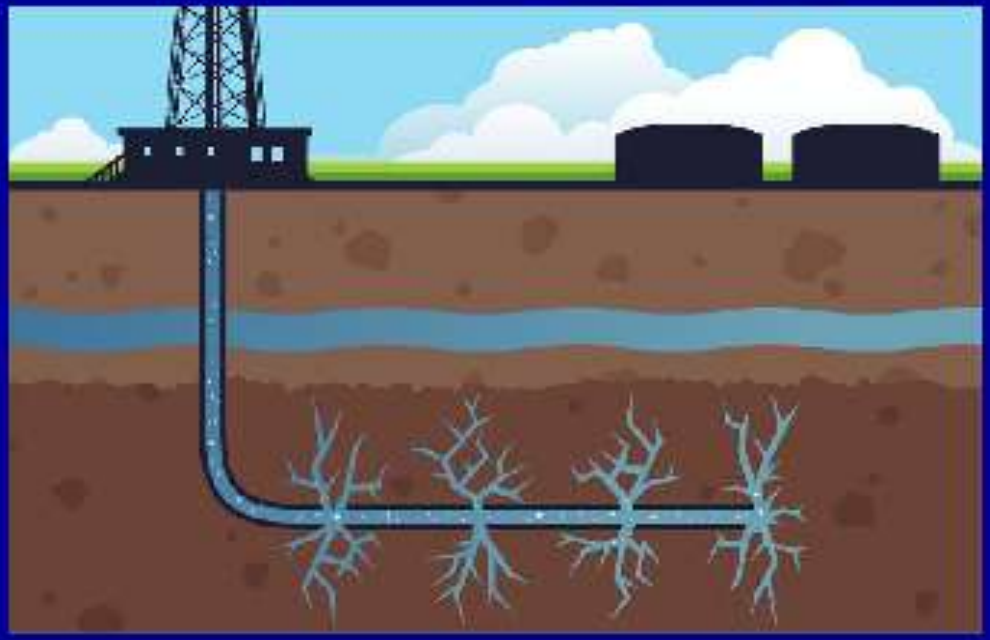
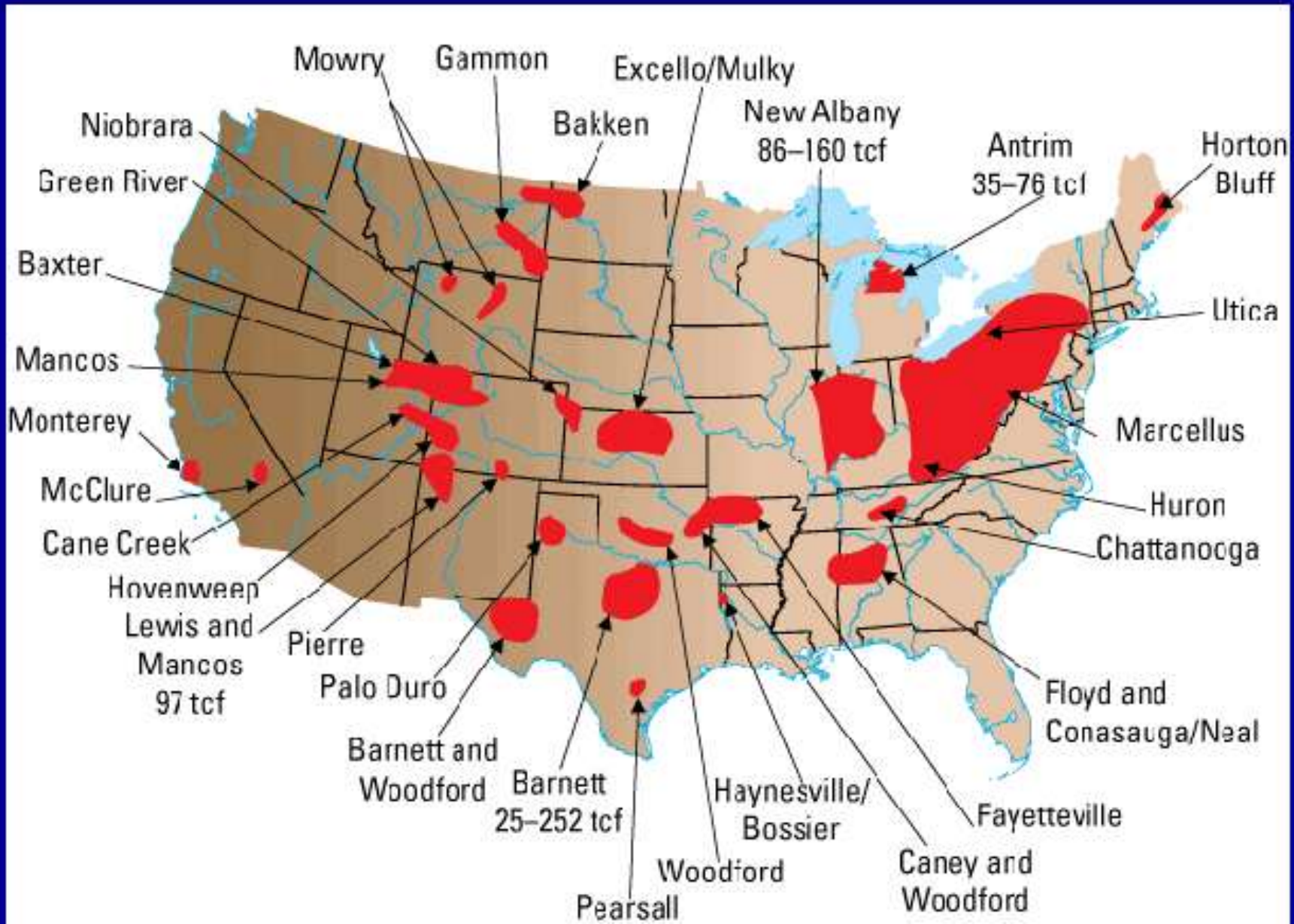
HYDROFRACKING A WELL

Fluid pressure fractures the rock, sand grains keep the fractures open



WHERE THE GAS IS




I-94
Bakken!
Minneapolis
Bismarck
Sioux Falls

TYPICAL MINE TYPES

- SURFACE
- DREDGING
- UNDERGROUND (MAIDEN ROCK AND BAY CITY)

Mining Operations

- **Remove topsoil and stockpile for reclamation**
- **Mine sand (blasting or dredging)**
- **Rough screening**
- **Washing sand to remove fines**
- **Sand then goes to drying or a stock pile**
- **Further screening**
- **Possible resin coating**
- **Transport (typically by rail)**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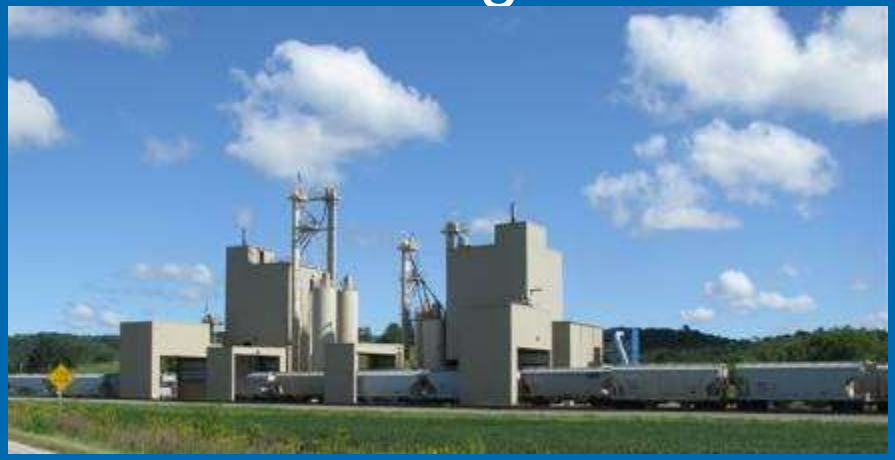
RAILROAD

BADGER MINING TAYLOR

- Processing facilities (physical processes incl. washing &

- Resin coating



Resin plant–coating of sand to add strength

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WISCONSIN DNR REGULATIONS

- **Air permits**
- **Stormwater permits**
- **High capacity well permits**
- **Wetland and waterway permits**
- **Endangered and threatened species and archeological review**

AIR PERMITS

- REQUIRE APPLICANT TO QUANTIFY ALL AIR EMISSION SOURCES AT THE FACILITY
- DNR WILL REVIEW APPLICATION AND DETERMINE IF AMBIENT AIR QUALITY STANDARDS WILL BE MET.
- AIR PERMIT WILL CONTAIN OPERATIONAL AND TESTING REQUIREMENTS TO ASSURE COMPLIANCE WITH THE PERMIT.
- AMBIENT PARTICULATE MONITORS WILL BE REQUIRED UNLESS A WAIVER IS GRANTED.
- A FUGITIVE DUST PLAN IS REQUIRED BY THE AIR PERMIT.

WPDES GENERAL NON METALLIC STORMWATER PERMIT

- REGULATES DISCHARGE OF STORMWATER AND PROCESS WASTEWATERS TO THE GROUND WATER OR SURFACE WATERS OF THE STATE.
- WASTEWATER INCLUDES PROCESS WASH WATERS, NON CONTACT COOLING WATERS, VEHICLE WASH WATERS AND MINE DEWATERING.

HIGH CAPACITY WELL PERMITS OR DEWATERING

- A HIGH CAPACITY WELL OR DEWATERING PERMIT IS REQUIRED IF TOTAL GROUNDWATER WITHDRAWEL CAPACITY EXCEEDS 70 GALLONS PER MINUTE.
- DNR REVIEW INCLUDES ANALYSIS OF THE WITHDRAWEL IMPACTS ON SPRINGS, TROUT STREAMS, OUTSTANDING AND EXCEPTIONAL RESOURCE WATERS AND PUBLIC WATER SUPPPLY WELLS.
- ALSO HAVE BEGUN ANALYZING POTENTIAL IMPACTS ON NEARBY PRIVATE WELLS.