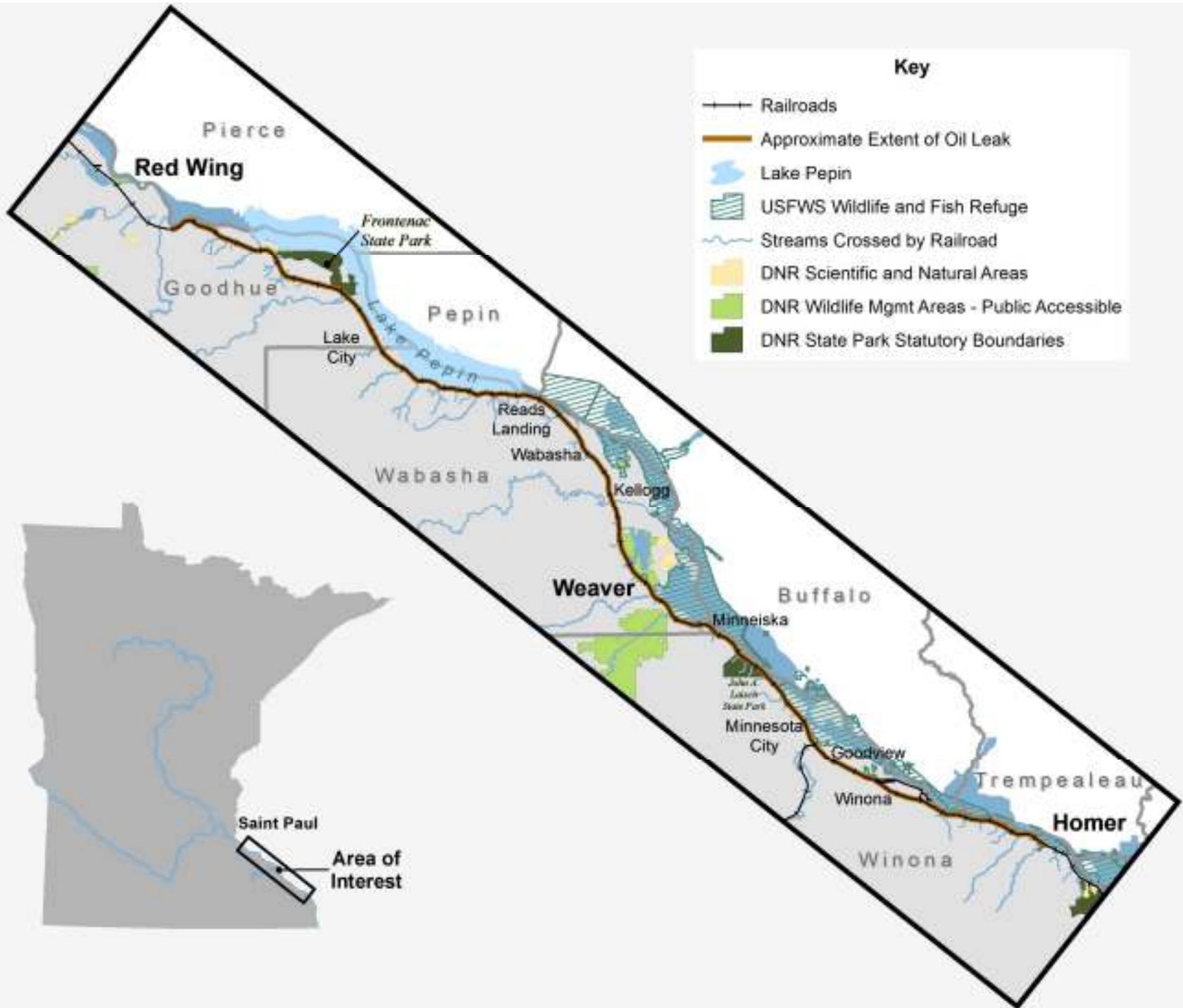


Canadian Pacific Railway, Bakken Crude Oil leak
Red Wing – Homer *February 3, 2014*





Key

- +— Railroads
- Approximate Extent of Oil Leak
- Lake Pepin
- USFWS Wildlife and Fish Refuge
- Streams Crossed by Railroad
- DNR Scientific and Natural Areas
- DNR Wildlife Mgmt Areas - Public Accessible
- DNR State Park Statutory Boundaries

Pierce

Red Wing

Goodhue

Frontenac
State Park

Lake
City

Pepin

Wabasha

Reads
Landing

Kellogg

Weaver

Buffalo

Minneiska

John A.
Laker
State Park

Minnesota
City

Goodview

Winona

Trempealeau

Homer

Winona

Saint Paul

Area of
Interest



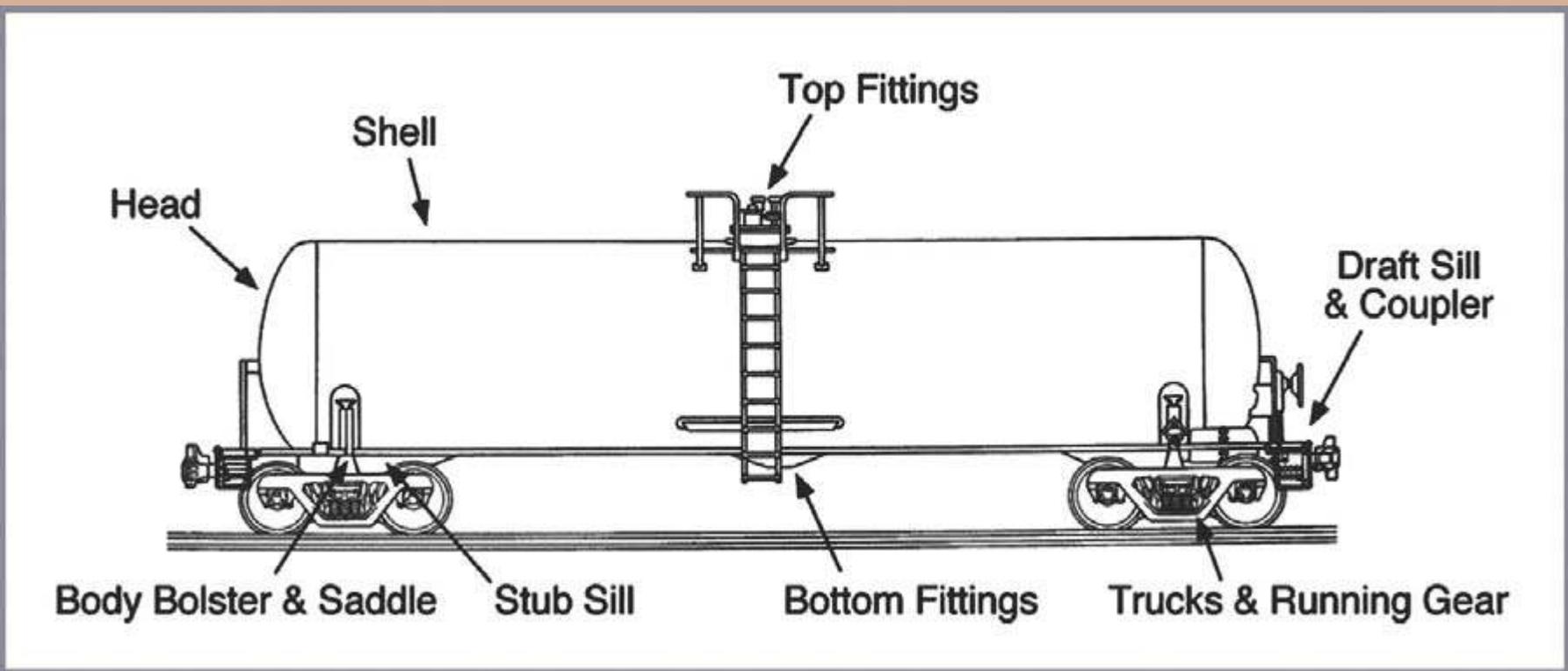
The cause of the incident was a malfunctioning bottom outlet valve (BOV) on a tank car.

The leak was reported in Winona, the crew then stopped the train in Homer, MN to inspect.

CP personnel found the 101st car to be leaking, 102 cars total.

Train over 7,000 feet long. Total estimated loss by weight, 12,000 gallons over 68 miles.

Train stopped in Weaver Bottoms for 45 minutes for a crew change.



South of Red Wing



Homer, South of Winona



Weaver Stop





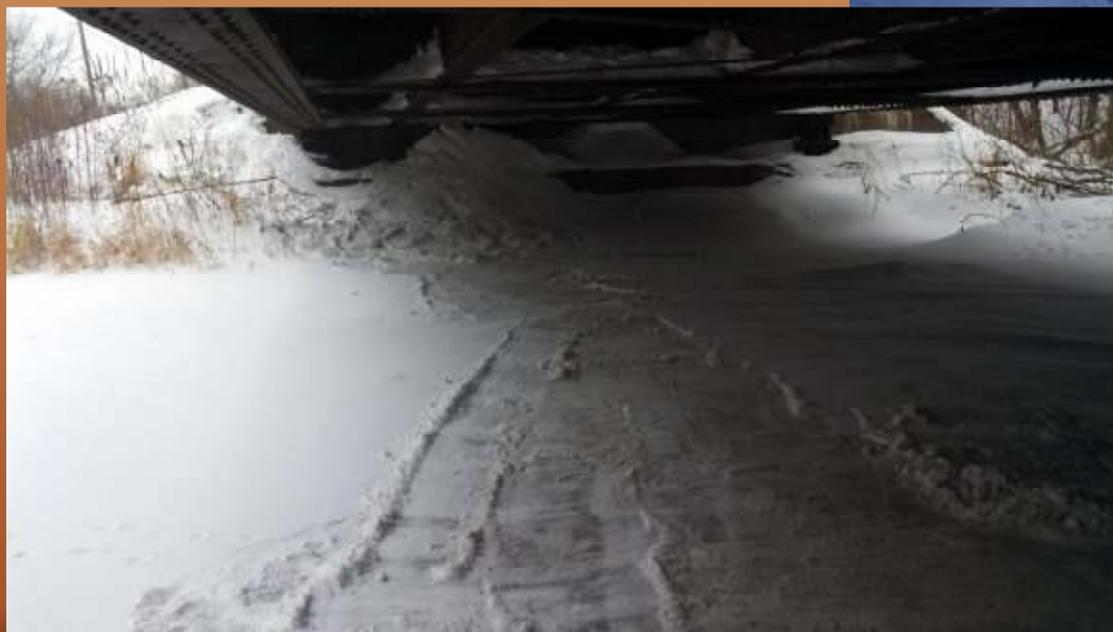
Intermittent Burping, alternating light oiling locations.
Wells Creek Crossing



Water Crossings, Oil Spray



Oil cleanup at open bridges.





Heavy Oiling and Snow in Winona





More Winona



Cleanup Crews in Winona.



Initial Response Actions:

- **Reconnaissance and monitoring**
- **Recovery of any pooled product (no significant pools were found).**
- **A cleanup plan for Winona Area.**
 - **disposal options for oil contaminated snow (some were approved, some were not)**
- **Develop a warm weather runoff plan.**
- **Oil ballast runoff evaluation, a rock-sheen test “bucket” was.**
- **Remedial oiled-snow harvesting and snow scraping at water crossings, critical drainage areas.**
- **Evaluating feasibility of remedial technologies**
- **Start the Natural Resources Damage Assessment (NRDA) process.**

Review and comment on Environmental Response Work Plan

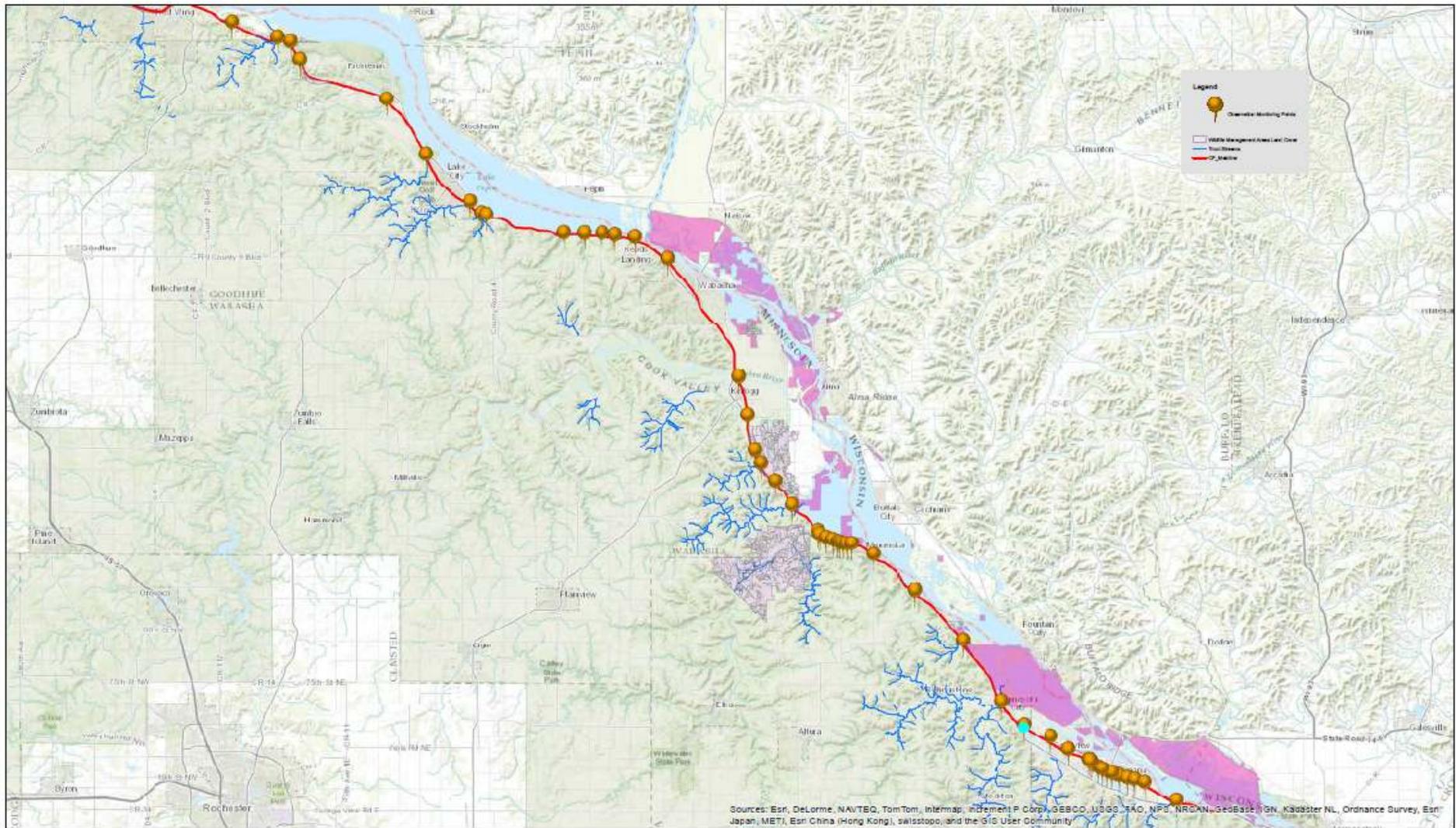
Runoff sheen monitoring and response actions:

- Heavily oiled areas could have upwards of 5.9 gallons for every 10-feet of track.
- The degree of oiling on the tracks should target visual monitoring and follow-up efforts. ***Weather-driven inspection plan.***
- Immediate intervention methods must be employed if runoff is encountered.
 - the application of physical binding or solidifying agents to prevent further oil movement.
 - the installation of absorbent boom, the application of sheen-boom, peat-moss absorbent product application, sandbagging, diking.

Identifying Critical Areas:

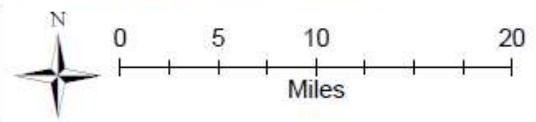
The MN DNR and USFWS identified many critical habitat areas.

- Any area along the Weaver bottoms where there is riparian vegetation within 30 feet of the tracks.
- The specific spot where the train stopped for a crew change at Weaver.
- McCarthy Lake State Wildlife Management Area (WMA) located along the east side of the tracks both north and south of Snake Creek (designated trout stream) for a total of three miles.
- The Perched Valley WMA area that is next to the NW corner of Frontenac State Park (also referred to as Grottes Pond).
- South of Grottes Pond is another unit of the Perched Valley WMA. This wetland area contains high quality wetland types including a calcareous fen.
- Pleasant Valley Creek area.
- Downstream of John A Latsch State Park on the river side of the tracks is Thorpe WMA, which is a floodplain forest type habitat.
- Wetlands behind the Winona Airport , habitat area for an endangered species of amphibian (northern Cricket Frog).
- Sensitivity Atlas review, LiDar depression review, 55 stream or water body crossings.



11541 95th Ave. N., Maple Grove, MN 55369
 Rochester, MN - Wilton, ND - Omaha, NE
 Phone: 763-315-4501 Fax: 763-315-4507

Observation Locations Maps:
 CP Main line
 Red Wing to Homer, MN
 Canadian Pacific Railway



Remedial Concerns:

Crude oil contains many components which behave differently in the environment.

- The volatile compounds will evaporate soon after the spill.
- Many components will not readily degrade, especially in the cold .
- Salts and dissolvable constituents will further cause movement of contaminants into the subsurface.
- Resins & waxes, heavy paraffins, asphaltenes, and lubricating oil components will also make the ballast and shallow soils water repellent.

Warm Weather Remedial Actions:

The MPCA requested that a series of remedial technologies be applied to test stretches of more heavily oiled track (products to stabilize, solidify, absorb, or enhance biodegradation).

Compound application considerations: This incident site has no hydraulic controls so surfactant enhanced bioremediation, cosolvents, biological agents, etc. may not be able to be used as they may cause additional environmental harm or stress if they run-off or bleed-through the petroleum impacted areas.

Preferential flow on applications must be monitored with dye tracing.

Long Term Monitoring:

Crude Oil contains persistent pollutants.

- Some constituents like ethylbenzene, naphthalene, and PAHs, are less soluble and degrade very slowly.
- sampling needs to document contaminant concentrations and fate in the environment.
- Consultant is to submit proposed soil/water sampling sites and methodologies, (in test reaches, and overall at sensitive sites)
 - proposed analytes (BTEX, Naphthalene, PAHs, other) as indicators of recent spill.
- Long term vegetative or habitat stress inspection protocols,
 - documenting risks to species and habitats.
- differentiation of “typical” rail bed historic contamination. Background comparison testing.
- sulfur and salts, documenting risks and contaminant movement.
- documenting impacts or lack of impacts to sediments and substrates nearby (runoff or subsurface bleeding).

Worst case spot(s) should have a soil sample taken

NOAA, Technical assistance:

Product is getting "waxier" and more difficult to address as it weathers.

Main concerns are runoff on the first warm rainy days (sheen) or infiltration into the ballast with bleeding out later.

Oil that gets into the ballast will be stuck there until he thaw. Unless there's a way to remove all that ballast without disturbing the tracks, it will be exceedingly difficult to remove the product. Bakken has a lot of light ends in it, so the "waxiness" is the weathering of the oil.

Cleanup is a tough call. Looking at vulnerable sensitive areas. Maine has used hand work and vacuum truck on accessible more heavily impacted areas.

Monitored natural attenuation will have to suffice. Seems unreasonable to require further physical removal. Most unaware of any liquid products that could be sprayed on to improve breakdown without adverse impacts to surface water.

Natural attenuation is likely your best and perhaps only decent option.

EPA Technical Assistance

Federal Region V Regional Response Team
Oil Spill Solidifier Preapproval- Contained within socks, booms, pillows

Under the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300) the Regional Response Team (RRT) may authorize the use of oil spill control agents that are on the National Product Schedule. Pursuant to various presentations on the products, and the additional written materials that the Science and Technology Sub-Committee of the RRT has reviewed, the Region V RRT will allow the use of the following products under limited approval and specific conditions explained below:

ALSOCUP
Aqua N-CAP Polymer
CIAgent
WASTE-SET #3200
WASTE-SET #3400

The Region V RRT has approved the use, in Region V, of socks, booms, pads, pillows or other device which completely surrounds and contains one of the solidifier products listed above subject to the following conditions:

Application of the solidifier product must be done in a manner that does not allow the solidifier product to be released from the sock, boom, pad, or pillow; and

The sock, boom, pad, or pillow is not left in the environment for more than one week after contact with oil; and

The sock, boom, or pillow must be recovered from the water within one week of contact with oil or depletion of solidifying capacity and properly disposed of.

This preapproval does not include preapproved use in tribal or Department of Interior managed lands.

Crude Oil SDS and Toxicity

- Many Components are:
- poisonous (have established LC50/LD50),
- Confirmed Human and Animal Carcinogens,
- Have known Aquatic Toxicity (LC50-EC50).

WARNING! This product contains a chemical known to the state of California to cause cancer. **WARNING!** This product contains a chemical known to the state of California to cause reproductive/developmental effects.

CAS #	Component	Percent
Not Available	C10 to C49+ isoparaffins	32.5
Not Available	C10 to C49+ cyclic paraffins	19.8
Not Available	C12+ mono-aromatics	8.5
Not Available	Poly aromatic hydrocarbons	4.9
Not Available	C10 to C49+ n paraffins	3.7
Not Available	C16+ di-aromatics	2.8
Not Available	C7 cyclic paraffins	2.6
Not Available	C8 cyclic paraffins	2.3
Not Available	Trimethyl benzenes	2.3
Not Available	Dimethyl naphthalene	1.5
142-82-5	n-Heptane	1
96-37-7	Methylcyclopentane	0.9
111-84-2	Nonane	0.9
Not Available	Dimethyl benzenes	0.9
75-28-5	Isobutane	0.9
111-65-9	Octane	0.9
Not Available	Trimethyl naphthalene	0.9
110-54-3	Hexane	0.9
96-14-0	3-Methylpentane	0.8
592-27-8	2-Methylheptane	0.8
591-76-4	2-Methylhexane	0.8
109-66-0	Pentane	0.8
108-88-3	Toluene	0.8
124-18-5	Decane	0.7
Not Available	Tetramethyl benzenes	0.7
Not Available	Pentamethyl benzenes	0.6
78-78-4	Isopentane	0.6
Not Available	Low level and unidentified hydrocarbons	0.5
107-83-5	2-Methylpentane	0.5
589-34-4	3-Methylhexane	0.5
Not Available	C10 cyclic paraffins	0.5
106-42-3	p-Xylene	0.4
108-38-3	m-Xylene	0.4
589-81-1	Heptane, 3-methyl-	0.4
Not Available	C9 cyclic paraffins	0.4
90-12-0	1-Methylnaphthalene	0.3
Not Available	Decane isomers	0.3
589-53-7	4-Methylheptane	0.2
91-57-6	2-Methylnaphthalene	0.2
74-98-6	Propane	0.2
95-47-6	o-Xylene	0.1
91-20-3	Naphthalene	0.1
100-41-4	Ethylbenzene	0.1
79-29-8	2,3-Dimethylbutane	0.1
71-43-2	Benzene	0.1
584-94-1	2,3-Dimethylhexane	0.1
583-48-2	Hexane, 3,4-dimethyl-	0.1
Not Available	Nonane isomers	0.1

Examples of Component Ecotoxicity

n-Heptane (142-82-5) Test & Species Conditions

96 Hr LC50 Cichlid fish 375.0 mg/L

24 Hr EC50 Daphnia magna >10 mg/L

Octane (111-65-9) Test & Species Conditions

48 Hr EC50 water flea 0.38 mg/L

Toluene (108-88-3) Test & Species Conditions

96 Hr LC50 Pimephales promelas 15.22-19.05 mg/L [flow-through] 1 day old

96 Hr LC50 Pimephales promelas 12.6 mg/L [static]

96 Hr LC50 Oncorhynchus mykiss 5.89-7.81 mg/L [flow-through]

96 Hr LC50 Oncorhynchus mykiss 14.1-17.16 mg/L [static]

96 Hr LC50 Oncorhynchus mykiss 5.8 mg/L [semi-static]

96 Hr LC50 Lepomis macrochirus 11.0-15.0 mg/L [static]

96 Hr LC50 Oryzias latipes 54 mg/L [static]

96 Hr LC50 Poecilia reticulata 28.2 mg/L [semi-static]

96 Hr LC50 Poecilia reticulata 50.87-70.34 mg/L [static]

96 Hr EC50 Pseudokirchneriella subcapitata >433 mg/L

72 Hr EC50 Pseudokirchneriella subcapitata 12.5 mg/L [static]

48 Hr EC50 Daphnia magna 5.46 - 9.83 mg/L [Static]

48 Hr EC50 Daphnia magna 11.5 mg/L



Reconnaissance on March 19,
First extended warm day





Weaver Bottoms weeping, March 13.



Recovery trench and sandbag dike along west side of tracks.



Sandbag diking and absorbents at East embankment, Weaver Stop.

Biological agent test site along rail ballast.



April 14. Frost leaving, River Rising !

Cont. booms, absorbent booms,
Pom poms, pads, sandbags,
solidifying agent booms,
Vacuum pump staging,
Biological agents at source/ballast.



Multiple weep areas from ballast
and toe of slope.



Green Weathered Oil Upwelling from springs, following roots ?



Two months later... still a benzene issue ?

Late April, in open air, wafts of benzene still between 0.05 and 1 ppm, even up to 5 ppm.
Level C PPE used to change out pads.



NRDA

An NRDA is being considered by the trustees which are the USFWS, MNDNR and the MPCA. No decisions have been made at this time.

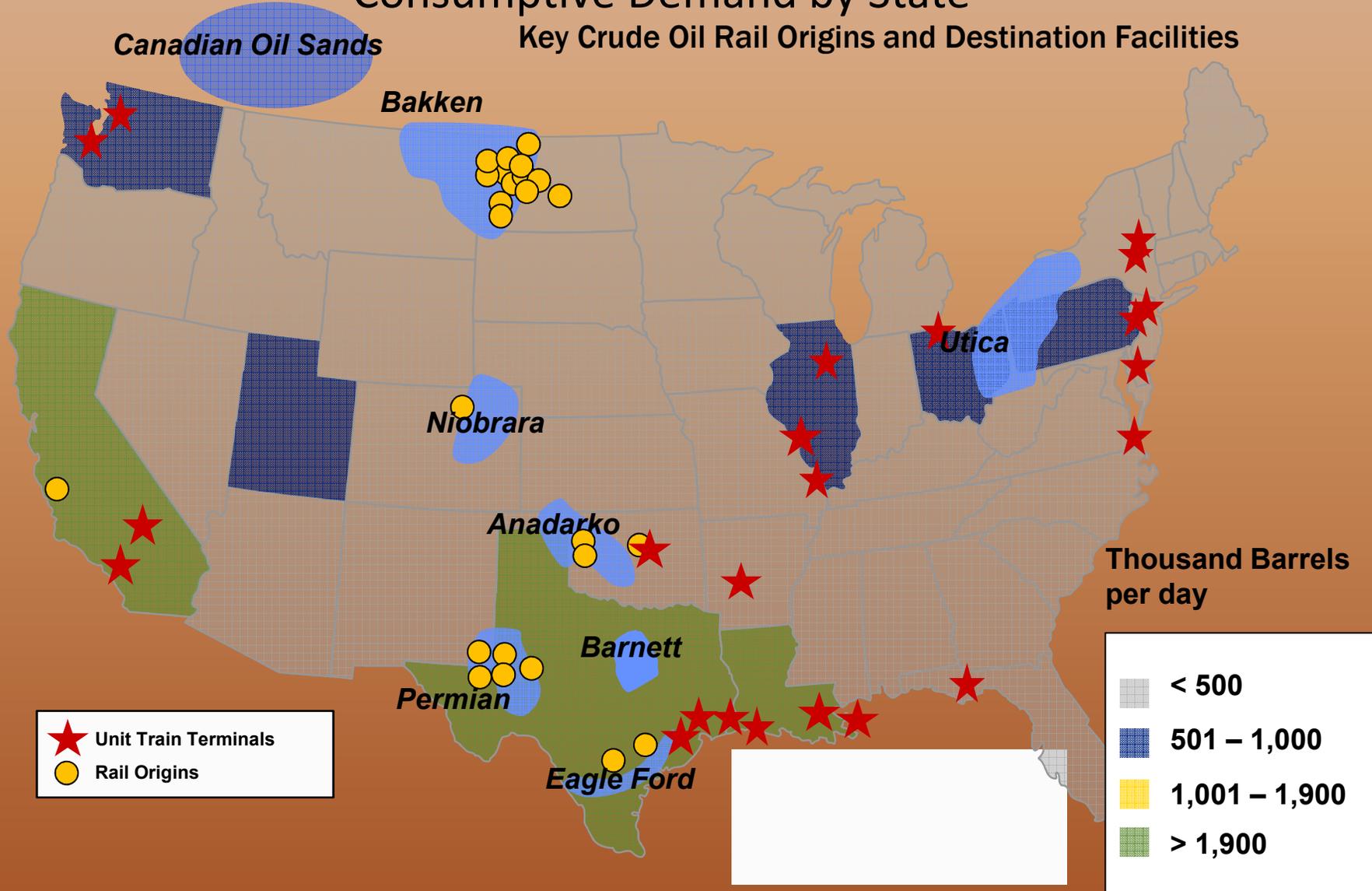
For Questions:

Dave Warburton, FWS (725-3548 ext. 2203) or
Marilyn Danks DNR (651-259-507) or
Kevin Faus (651-757-2162.)

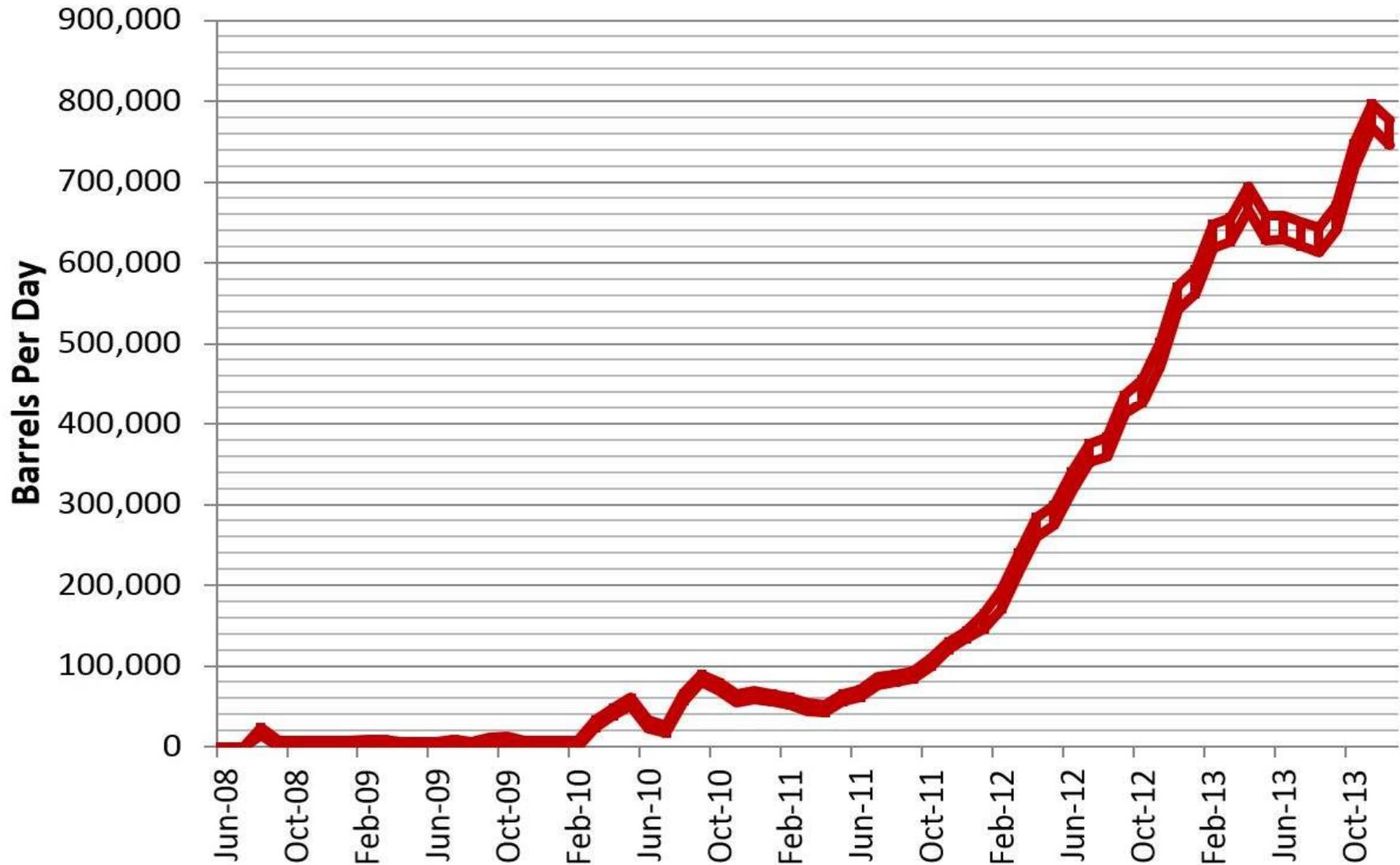
CRUDE OIL BACKGROUND ISSUES:

Consumptive Demand by State

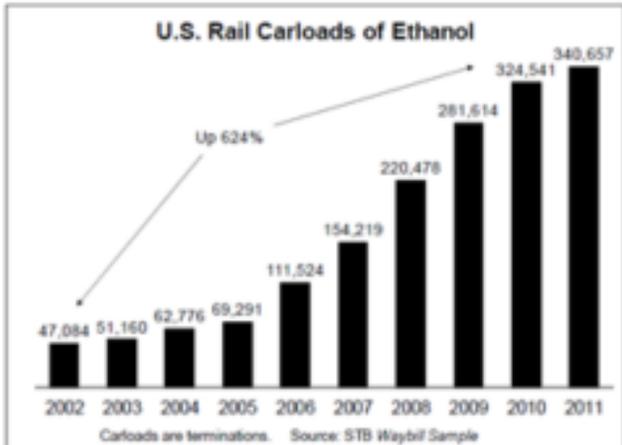
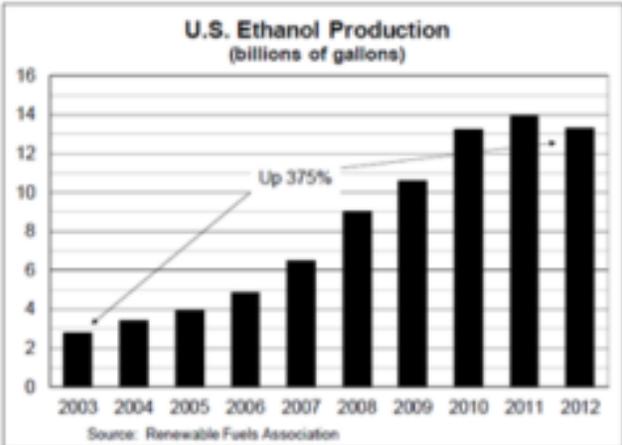
Key Crude Oil Rail Origins and Destination Facilities



Estimated North Dakota Rail Export Volumes



Source: North Dakota Pipeline Authority, December 2013, Update,



Bakken Crude Oil Safety Concerns



Lac-Mégantic: At least 60 of the 63 derailed DOT-111 tank cars released about 1.6 million gallons of crude oil. Some of the spilled oil ignited immediately. The fire engulfed the derailed cars and the surrounding area. Forty-seven people died as a result of the fire, and nearby structures were destroyed or extensively damaged.



Casselton, ND

Alabama

