

# AVL/GPS/MDSS for Improving Winter Operations

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**Justin Droste P.E.**

Michigan Department of Transportation (USA)

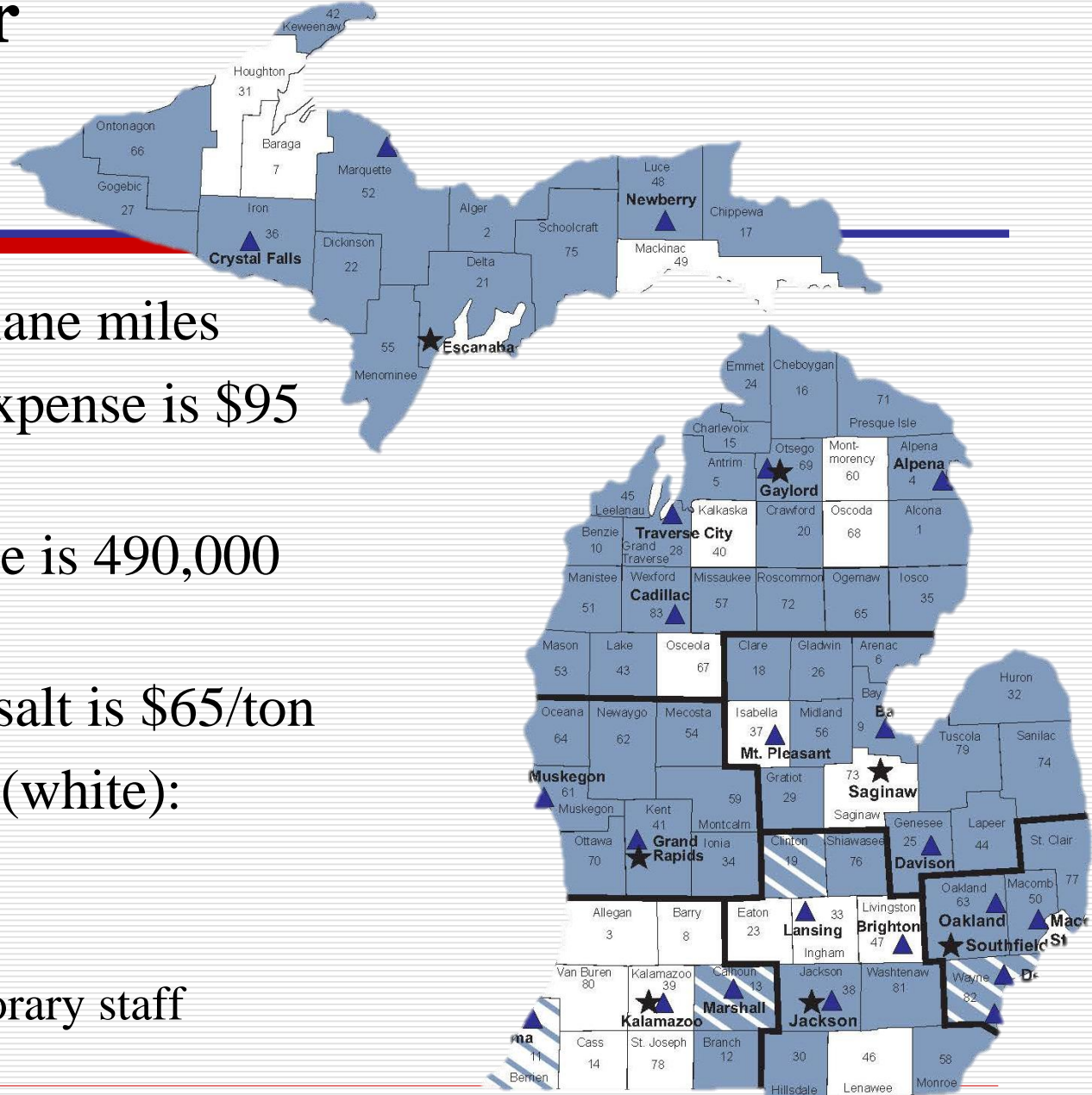


August 3, 2015



*ISSAEST, Fairbanks, AK, USA, August 2-5, 2015*

# MDOT Winter Statistics



- 32,000 trunkline lane miles
- Average winter expense is \$95 Million
- Average salt usage is 490,000 Tons
- Average price of salt is \$65/ton
- MDOT Facilities (white):
  - 300 snowplows
  - 380 operators
  - Over 100 temporary staff



# AVL/MDSS Contract Overview

- Awarded Contract to Delcan Technologies September 15<sup>th</sup>, 2013



- Contract is for 3 years with options for 2 additional years.
- Initial priority is Winter Maintenance Trucks
  - Permanent assigned truck
  - 2000 model year or newer
  - Dickey John Control Point spreader controller
- Vendor is responsible for providing weather forecast and treatment recommendations



# Vendor's Role

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- Provide working AVL equipment and sensors
- Secure and manage cellular communications for AVL devices
- Ensure necessary information is available to users for both AVL and MDSS websites
- Provide customer support to all users
- Provide training and training materials as needed
- Project management and weekly calls with MDOT



# MDOT's Role

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## **Equipment Installation by Region Mechanics**

- MDOT Mechanic installations with vendor support
- Installation inspection and sign off

## **Project Management**

- Weekly conference calls with vendor
- Ensure contract and Department goals are being met

## **Support**

- Provide support to region and garage employees
- Schedule trainings and provide classroom facilities



# Data Transmission

- Air and pavement temps
- Plow position
- Camera images
- Spreader information
  - material type
  - application rate
- Engine data
- Location
- Weather information
- Maintenance treatment recommendations



**WMTs**

**AVL  
Provider  
(Delcan)**

**MDSS  
Provider  
(Iteris)**

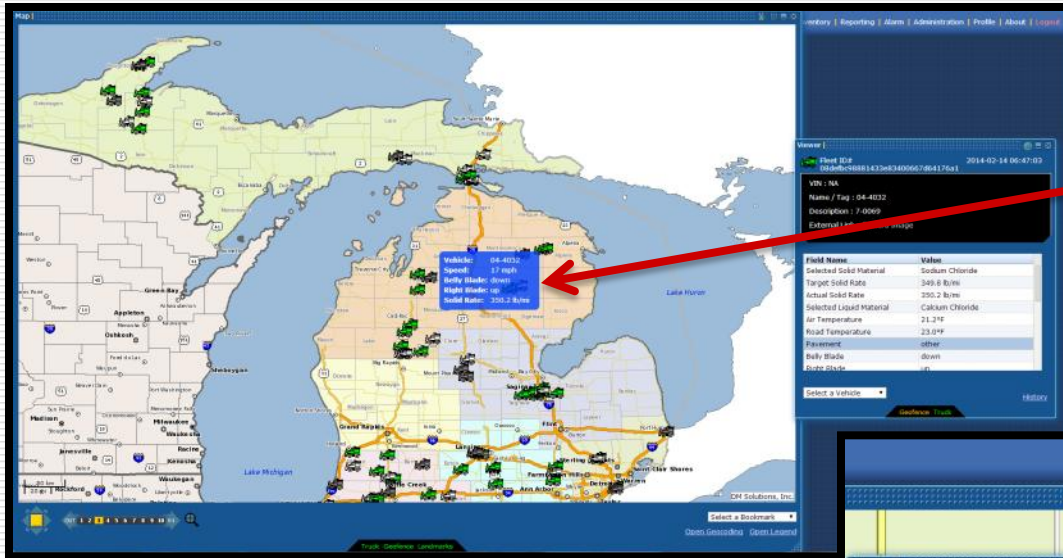


**Authorized Users**





# AVL Website



**Vehicle:** 04-4032  
**Speed:** 17 mph  
**Belly Blade:** down  
**Right Blade:** up  
**Solid Rate:** 350.2 lb/mi

## Real-time Data

- Operational
- Engine
- Camera Images

Status	Name	Region	Garage	Timestamp	Belly Blade	Solid Rate	Road Te
	04-4001	University	Saginaw Eastside				
	04-4006	SW Region	Coloma	2014-02-05 22:25:25	up	0 lb/mi	
	04-4007	Bay	Saginaw Eastside	2014-02-05 09:11:50	down	0 lb/mi	

**Viewer** | Fleet ID# 0566cfe95b9a4c6fb24aa13e3a2f74ae | 2014-02-05 09:11:50

VIN : NA  
 Name / Tag : 04-4007  
 Description : 7-0001  
 External Link : Camera Image

Field Name	Value
Selected Solid Material	Sodium Chloride
Target Solid Rate	300.2 lb/mi
Actual Solid Rate	0.0 lb/mi
Selected Liquid Material	Calcium Chloride
Air Temperature	21.2°F
Road Temperature	23.0°F
Pavement	other
Belly Blade	down
Right Blade	down
Actual Liquid Rate	0.0 gal/mi
Speed	8 mph

Select a Vehicle

**Camera Image** | Wed Feb 05 2014 07:44:51



ISSAEST, Fairbanks, AK, USA, August 2-5, 2015

# AVL Data Reports

## Primary Data Reports

- Salting Speed Compliance
- Material Usage
- Blade usage
- Engine Idle & Diagnostics
- Geofence Data

**Salting Speeds Compliance By Garage- Daily Custom Enhanced**

Garage: Adrian  
Date: 04-3040; 04-

**Material Usage - Daily**

Region: North  
Garage: Atlanta; Kalkaska  
Date: 3/1/2014 to 3/8/2014

**Blade Usage Summary (Region)**

Region: Geofence Summary (Garage)  
Garage: Dates: 2/10/2015 to 2/17/2015  
Minimum Blading Speed: 3  
Garage: Adrian

Name	First Timestamp	Last
Vehicle: 04-1475	Tuesday, Febru	
Vehicle: 04-1475	Wednesday, Febru	
Vehicle: 04-1475	Thursday, Febru	
Vehicle: 04-1475	Friday, Febru	
Vehicle: 04-1475	Saturday, Febru	
Vehicle: 04-1475	Monday, Febru	
Vehicle: 04-1491	Tuesday, Febru	
Vehicle: 04-1491	Wednesday, Febru	
Vehicle: 04-1491	Thursday, Febru	
Vehicle: 04-1491	Friday, Febru	
Vehicle: 04-1491	Saturday, Febru	
Vehicle: 04-1491	Monday, Febru	
Vehicle: 04-1648	Tuesday, Febru	
Vehicle: 04-1648	Wednesday, Febru	
Vehicle: 04-1648	Thursday, Febru	
Vehicle: 04-1648	Friday, Febru	
Vehicle: 04-1648	Saturday, Febru	
Vehicle: 04-1648	Sunday, Febru	
Vehicle: 04-1669	Wednesday, Febru	
Vehicle: 04-1669	Thursday, Febru	
Vehicle: 04-1669	Friday, Febru	
Vehicle: 04-1669	Saturday, Febru	
Vehicle: 04-1669	Sunday, Febru	

**Engine Diagnostics**

Region: (select all)  
Garage: (select all)  
Dates: 7/20/2015 to 7/27/2015

Name	Date	SA	SPN	FMI	Source	SPN Description	FMI Description
<b>Region: Bay</b>							
<b>Garage: Mt. Pleasant</b>							
<b>Vehicle: 04-1616</b>							
04-1616	7/21/2015	11	798	5	Brakes - System Controller	Pressure Modulation Valve ABS Axle 2 Right	Current Below Normal, or Open Circuit
04-1616	7/23/2015	11	798	5	Brakes - System Controller	Pressure Modulation Valve ABS Axle 2 Right	Current Below Normal, or Open Circuit
<b>Vehicle: 04-1622</b>							
04-1622	7/22/2015	11	792	4	Brakes - System Controller	Wheel Sensor ABS Axle 2 Right	Voltage Below Normal, or Shorted to High Source
<b>Garage: Saginaw Eastside</b>							
<b>Vehicle: 04-4007</b>							
04-4007	7/23/2015	3	5232	31	Transmission #1	Manufacturer Assignable SPN	Condition Exists
<b>Region: Superior</b>							
<b>Garage: St. Ignace</b>							
<b>Vehicle: 04-3042</b>							
04-3042	7/23/2015	3	177	15	Transmission #1	Transmission Oil Temperature 1	Data Valid but Above Normal Range : Least Severe Level
<b>Region: University</b>							
<b>Garage: Brighton</b>							

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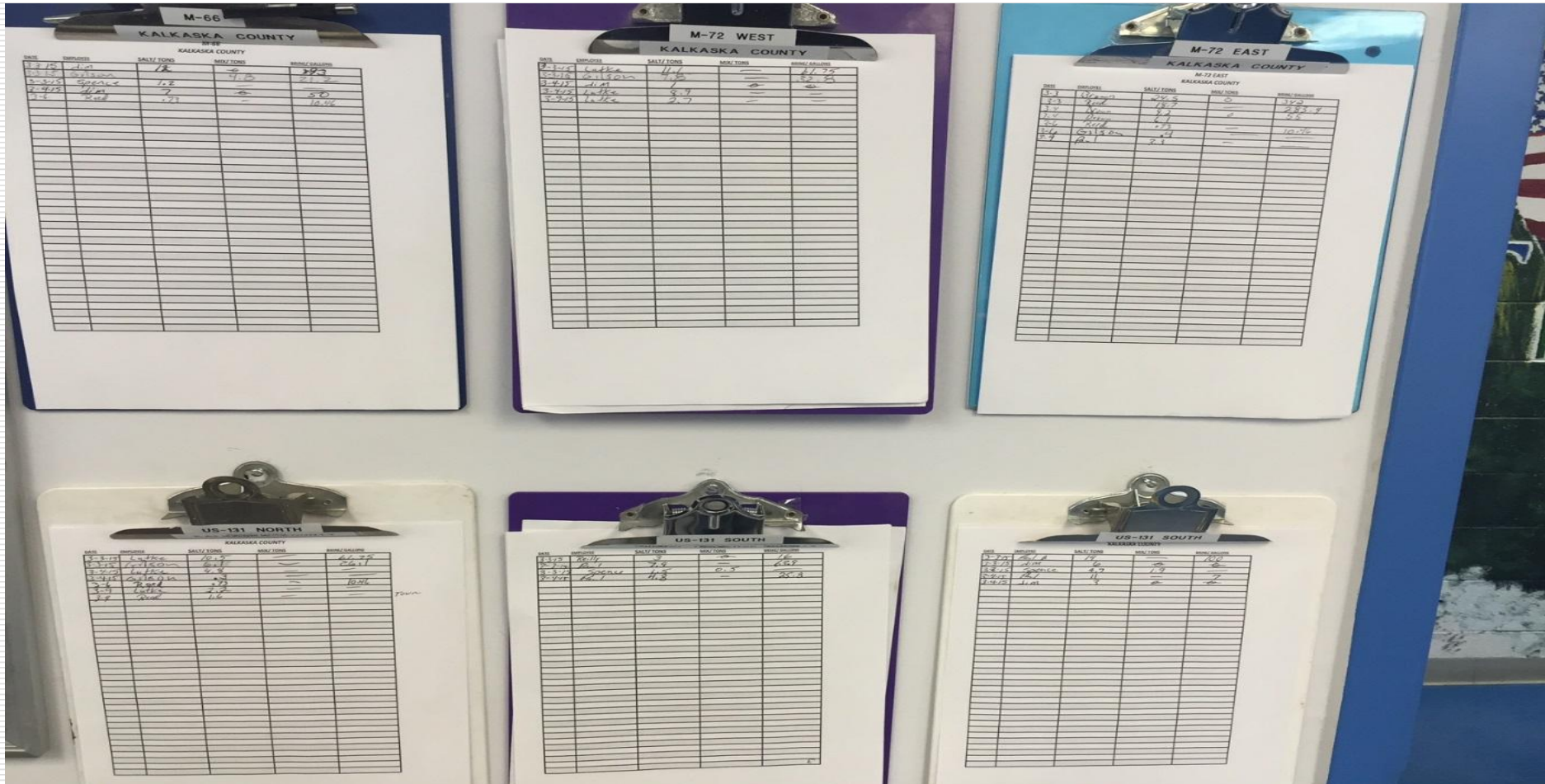
7/29/2015 11:29:02 AM





# Material Usage Reporting

(Traditionally done by manual logging of estimated use per shift/route)



# AVL Data Reports

## Material Usage Report

### Material Usage

- Data from Spreader Controller
- Consistent Naming is critical

Solid Material	Solid Code
Prewet Salt with Calcium Chloride (8 gal per ton)	WSalCa
Prewet Salt with Salt Brine (8 gal per ton)	WSalBr
Dry Salt for spreader prewet	DSalt
Sand only (dry)	Sand
Salt/Sand Blend	SalSan

#### Material Usage - Daily

Region: North

Garage: Atlanta; Kalkaska

Date: 3/1/2014 to 3/8/2014

Vehicles: 04-1556; 04-1558; 04-1653; 04-1685; 04-3016; 04-3027; 04-3035; 04-3040; 04-4029; 04-4032; 04-4035

Date	Material	Solids Spread	Season Total
<b>Material: DSALT</b>		<b>533.2 ton</b>	
<b>Region North</b>			
<b>Garage: Atlanta</b>		<b>430.2 ton</b>	
<b>Vehicle: 04-3027</b>		<b>3.4 ton</b>	<b>232.1 ton</b>
3/4/2014	DSALT	3.4 ton	232.1 ton
<b>Vehicle: 04-4032</b>		<b>426.8 ton</b>	<b>451.9 ton</b>
3/1/2014	DSALT	11.4 ton	439.3 ton
3/4/2014	DSALT	414.8 ton	450.6 ton
3/5/2014	DSALT	0.6 ton	451.9 ton
<b>Garage: Kalkaska</b>		<b>103.0 ton</b>	
<b>Vehicle: 04-1556</b>		<b>33.6 ton</b>	<b>501.5 ton</b>
3/1/2014	DSALT	15.9 ton	483.8 ton
3/4/2014	DSALT	17.7 ton	501.5 ton
<b>Vehicle: 04-1558</b>		<b>23.0 ton</b>	<b>323.7 ton</b>
3/1/2014	DSALT	16.6 ton	317.3 ton
3/4/2014	DSALT	6.4 ton	323.7 ton
<b>Vehicle: 04-4029</b>		<b>46.4 ton</b>	<b>538.4 ton</b>
3/1/2014	DSALT	26.2 ton	518.2 ton
3/4/2014	DSALT	20.2 ton	538.4 ton
<b>Material: SALSAN</b>		<b>8.7 ton</b>	
<b>Region North</b>			
<b>Garage: Kalkaska</b>		<b>8.7 ton</b>	
<b>Vehicle: 04-1558</b>		<b>6.8 ton</b>	<b>111.7 ton</b>
3/1/2014	SALSAN	6.8 ton	111.7 ton
<b>Vehicle: 04-4029</b>		<b>1.7 ton</b>	<b>164.7 ton</b>
3/4/2014	SALSAN	1.7 ton	164.7 ton
<b>Vehicle: 04-4035</b>		<b>0.2 ton</b>	<b>366.1 ton</b>
3/4/2014	SALSAN	0.2 ton	366.1 ton

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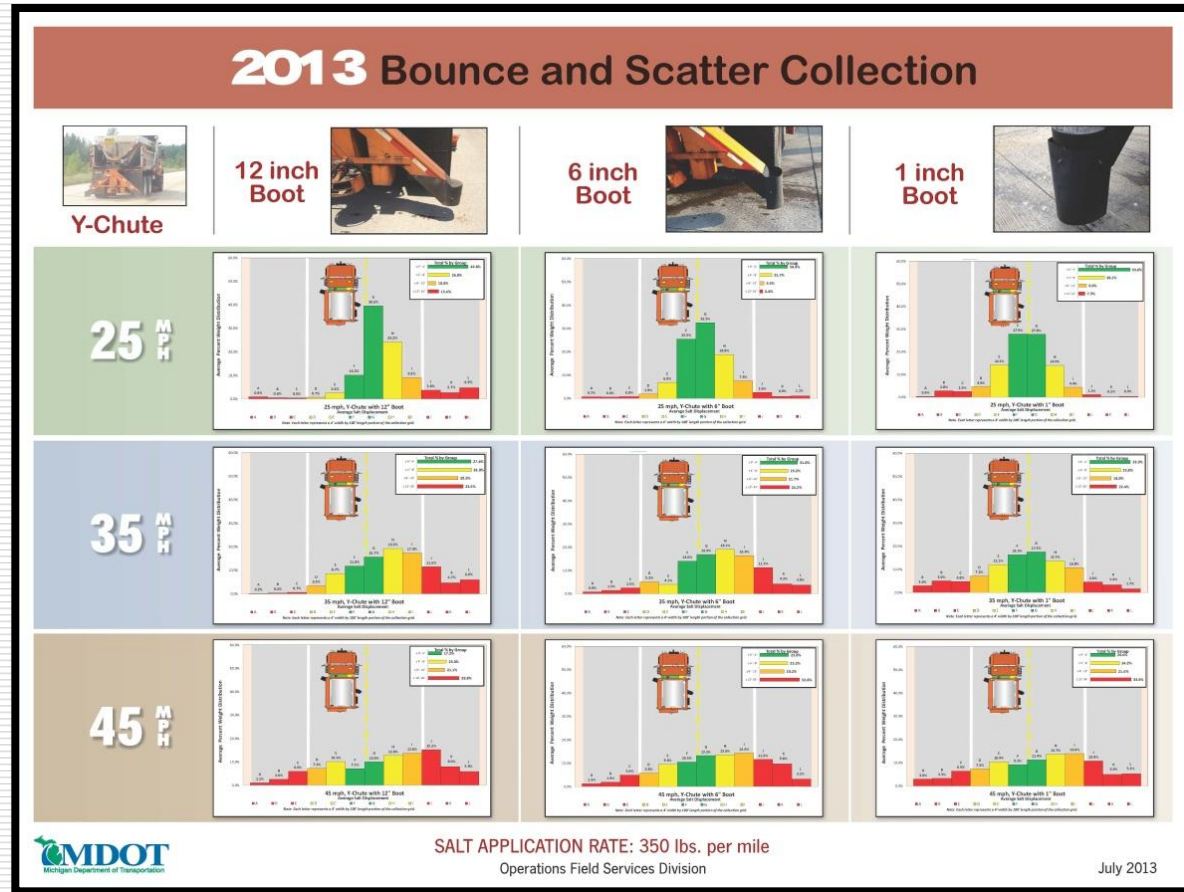
10/20/2014 10:48:25 PM



# Truck Speed and Effect on Salt Bounce and Scatter

(Michigan DOT 2012 and 2013 studies)

- Truck speed has most influence on salt B&S
- Slower salting speeds reduce costs and benefit the environment
- MDOT Movement to reduce salting speeds to 25mph or less





# AVL Data Reports

## Speed Compliance Report

### Salting Speeds Compliance By Garage- Daily Custom Enhanced

Garage: Adrian

Dates: 3/1/2014 to 3/15/2014

Date	First Timestamp	Last Timestamp	25mph Compliance	(Data Points)	35mph Compliance	(Data Points)	Total Data Points	Solids Spread (ton)
<b>Name: 04-1475</b>			<b>22.46 %</b>	<b>227</b>	<b>75.81 %</b>	<b>581</b>	<b>776</b>	<b>15.2</b>
3/2/2014	7:39 AM	12:33 PM	40.28 %	143	100.00 %	355	355	8.0
3/5/2014	7:52 AM	8:50 AM	26.92 %	35	78.46 %	102	130	2.1
3/12/2014	6:41 AM	7:04 AM	18.75 %	18	69.79 %	67	96	2.7
3/13/2014	5:24 AM	6:38 AM	15.90 %	31	29.23 %	57	195	2.4
<b>Name: 04-1626</b>			<b>25.17 %</b>	<b>608</b>	<b>95.70 %</b>	<b>2171</b>	<b>2264</b>	<b>60.5</b>
3/1/2014	8:56 PM	11:59 PM	25.19 %	97	100.00 %	385	385	10.1
3/2/2014	12:00 AM	12:00 PM	33.03 %	433	98.40 %	1290	1311	21.2
3/3/2014	5:31 AM	10:48 AM	75.00 %	9	100.00 %	12	12	0.5
3/12/2014	6:01 AM	10:04 PM	12.41 %	69	87.05 %	484	556	28.7
<b>Name: 04-1648</b>			<b>30.12 %</b>	<b>1242</b>	<b>87.00 %</b>	<b>3633</b>	<b>4162</b>	<b>55.6</b>
3/1/2014	8:36 PM	9:13 PM	16.27 %	27	100.00 %	166	166	3.1
3/2/2014	1:38 AM	6:42 AM	50.23 %	429	100.00 %	854	854	9.2
3/3/2014	3:03 AM	10:49 AM	40.68 %	24	91.53 %	54	59	1.1
3/8/2014	9:59 AM	12:54 PM	4.07 %	22	56.19 %	304	541	4.8
3/10/2014	12:19 AM	12:28 AM	25.64 %	10	69.23 %	27	39	0.1
3/12/2014	8:26 AM	11:27 PM	29.17 %	730	89.01 %	2228	2503	37.3
<b>Name: 04-1669</b>			<b>20.14 %</b>	<b>1218</b>	<b>94.88 %</b>	<b>5815</b>	<b>6122</b>	<b>75.3</b>

# FY 2015 Salt Speed Compliance and Efficiency\*

2/1 to 2/16/15

## Salt Usage and Effectiveness

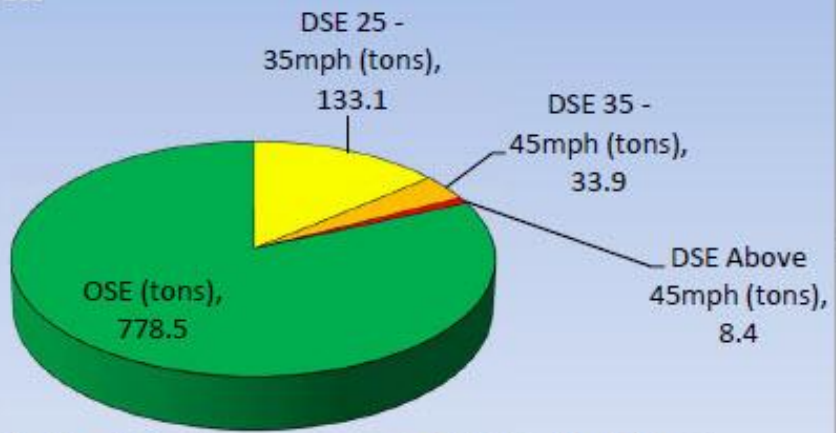
Region: North

Date Range: 2/1/2015 to 2/16/2015

Total Salt Spread (tons)  
953.8

DSE (tons)\*\*  
175.3

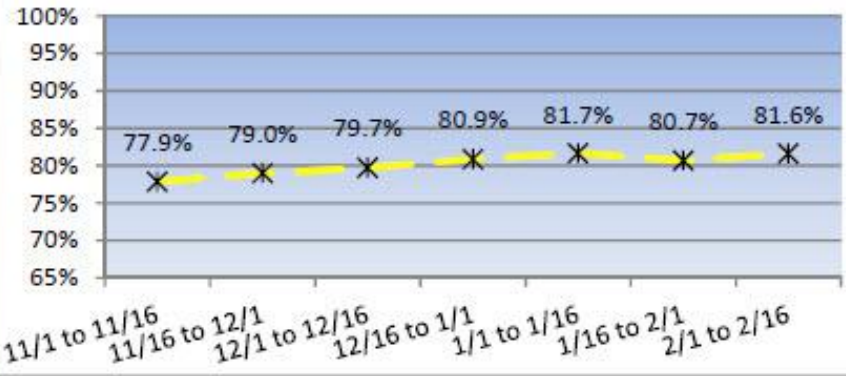
Salting Efficiency  
81.62%



- DSE 25 - 35mph (tons)
- DSE 35 - 45mph (tons)
- DSE Above 45mph (tons)
- OSE (tons)

*Diminished Salt Efficiency (DSE) \*\**  
*Optimized Salt Efficiency (OSE)*

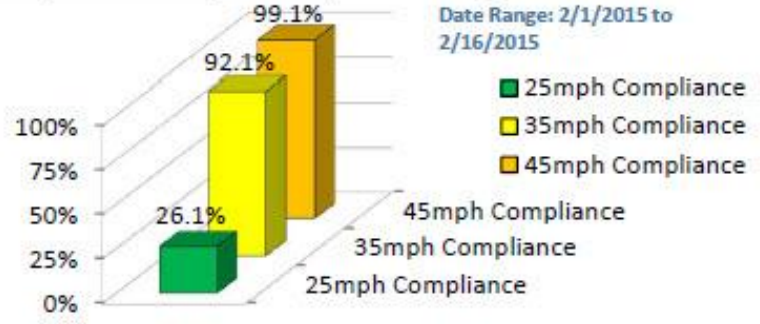
## Winter 2014/2015 Salt Efficiency: North



## Salt Speed Compliance

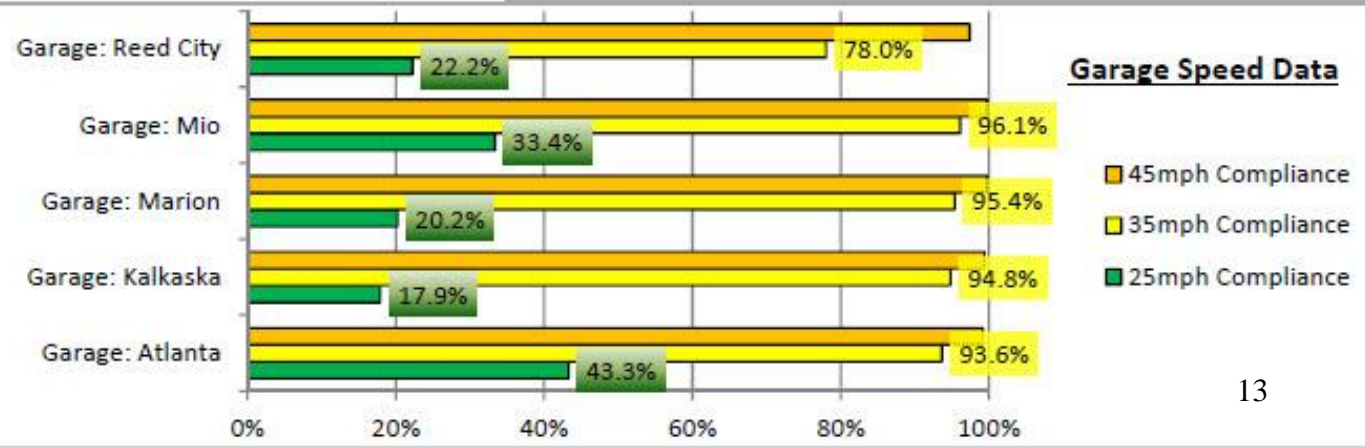
Region: North

Date Range: 2/1/2015 to 2/16/2015



\* Efficiency based on AVL salt speed compliance data and empirical data from the MDOT Salt Bounce and Scatter Studies. Data assumes standard spreaders used.

\*\* Salt applied at speeds faster than 25 mph can still benefit the traveled roadway. Increased bounce and scatter at faster speeds diminishes salting efficiency.



## Garage Speed Data

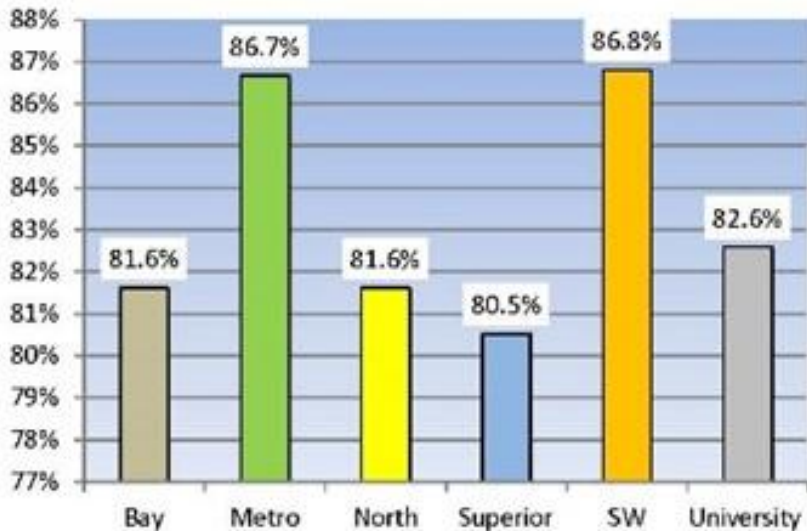
- 45mph Compliance
- 35mph Compliance
- 25mph Compliance



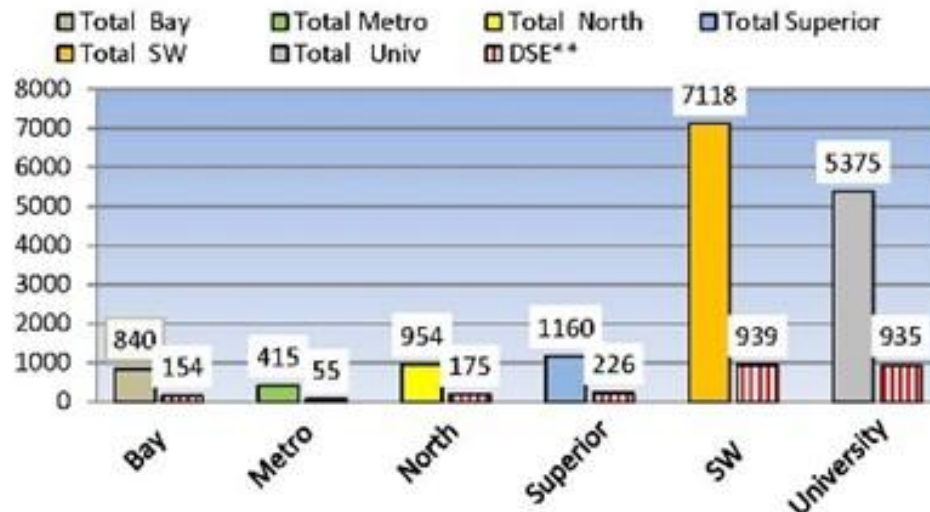
# FY 2015 MDOT Direct Force Salt Efficiency Data\*

2/1 to 2/16/15

## Salt Efficiency per Region 2/1 to 2/16



## AVL Salt Tonnage per Region 2/1 to 2/16



## Statewide Direct Force Salt Data

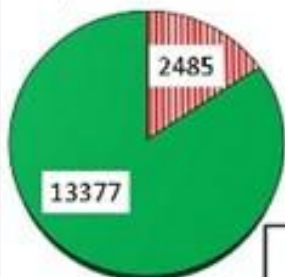
2/1 to 2/16

Total Tons Salt

15862

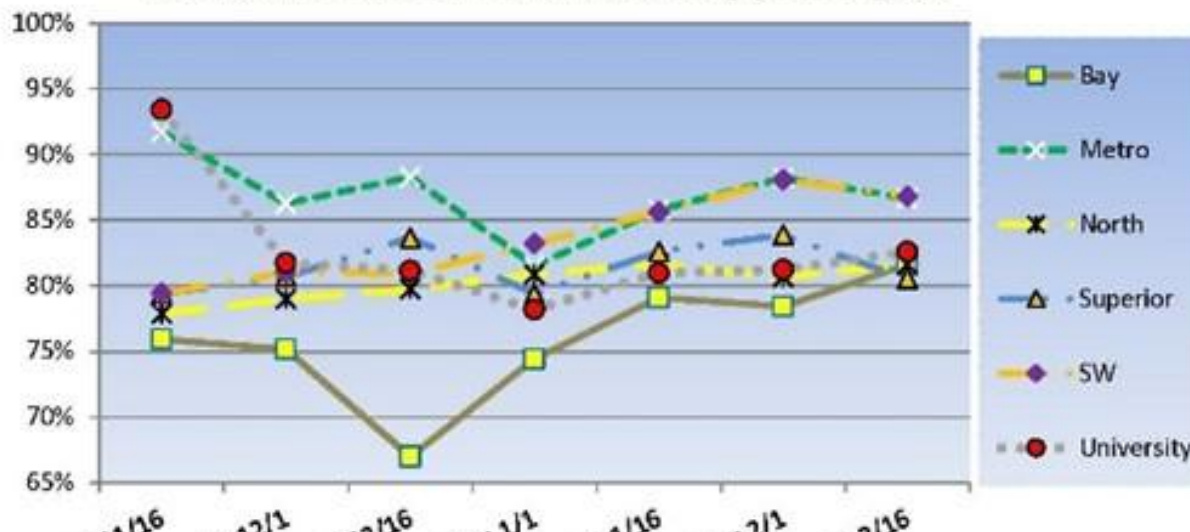
Efficiency

84.33%



DSE MDOT (tons)  
OSE MDOT (tons)

## Winter 2014/2015 Salt Efficiency per Region



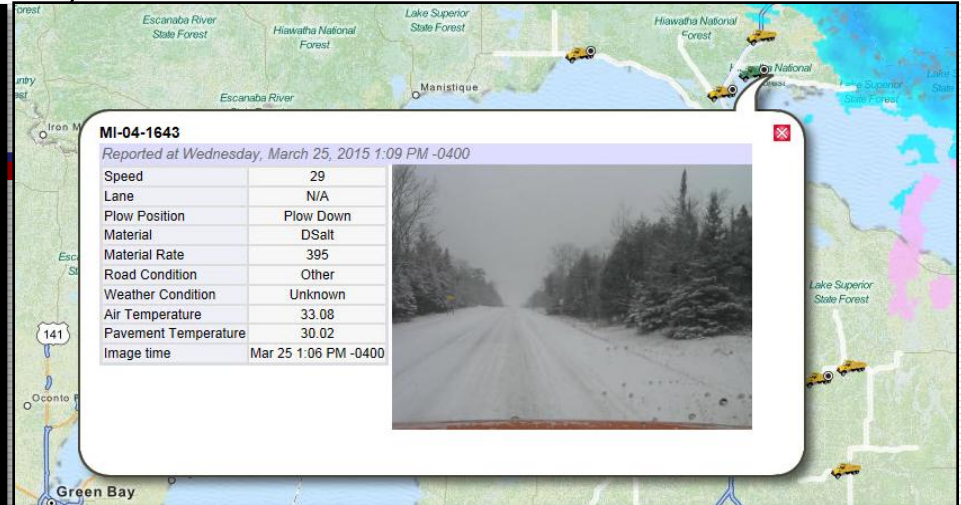
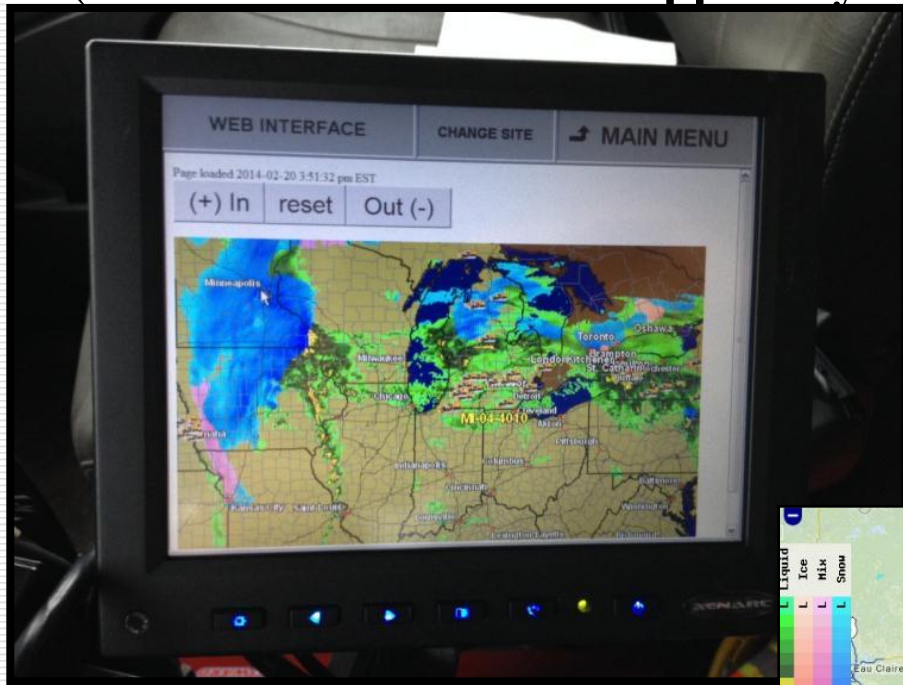
\* Based on AVL data and MDOT Salt Bounce and Scatter Study findings.

**Overall MDOT Efficiency has increased more than 5% since start of season**

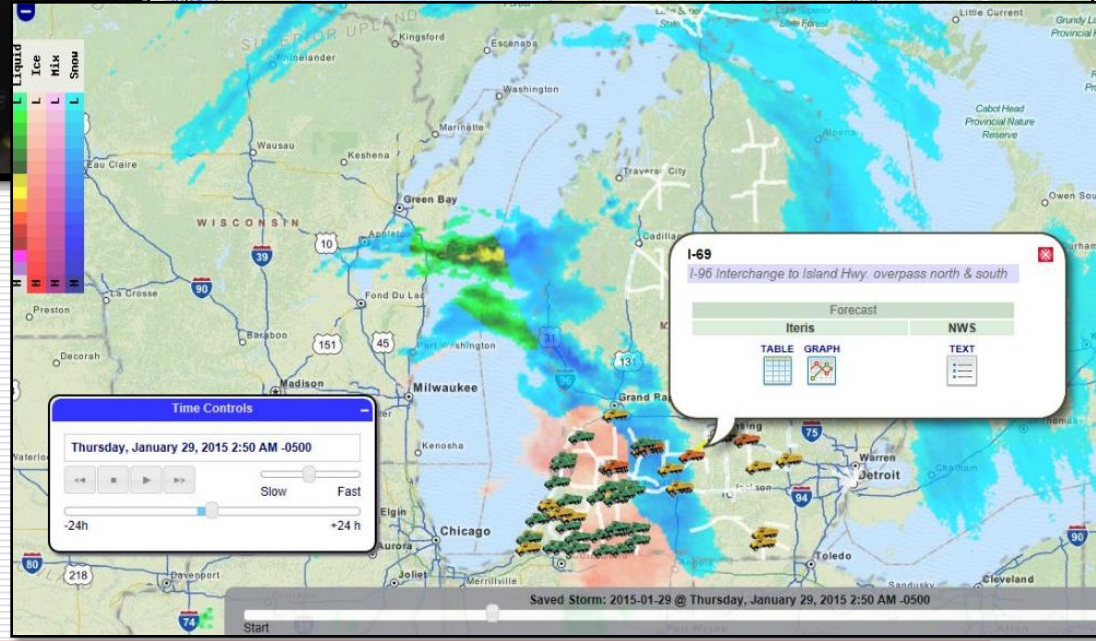


# MDSS Website

## (Maintenance Decision Support System)



- Weather Radar with WMT info.
- Info provided to in-cab monitors or desktop.
- Detailed weather forecasts
- Treatment recommendations per route.



ISSAEST, Fairbanks, AK, USA, August 2-5, 2015



# Pavement Forecast and Recommendations

I-75 [MBA to Chippawa Co Line, SB]  
 I-75 -- MBA to Chippawa Co Line, SB Table View  
Last updated: 4:24:03pm

Time (GMT-0400)	Roadway: Treatment: None					Roadway: Treatment: MDSS					Wind				Precipitation					Time (GMT-0400)								
	Temp (° F)	Pvnt Cond	Frost Prob (%)	Maintenance Rate	Temp (° F)	Pvnt Cond	Frost Prob (%)	Maintenance Rate	Air Temp (° F)	Dew Pt (° F)	Humidity (%)	Direction	Speed (mph)	Gust (mph)	Mind CHILL (° F)	Type	Precip Prob (%)	Liq Rate (in/hr)	Liq Acc (in)		Ice Rate (in/hr)	Ice Acc (in)	Sn Rate (in/hr)	Sn Accum (in)	Cloud Cover	Visibility (mi)	Vis Obstruct	
Tue 8pm	38	Dry	0	---	38	Dry	0	---	28	21	75	↖ESE	10	---	19	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Tue 8pm	
Tue 9pm	34	Dry	0	---	34	Dry	0	---	27	20	76	↖ESE	9	---	18	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Tue 9pm	
Tue 10pm	31	Dry	0	---	31	Dry	0	---	26	21	81	↖ESE	10	---	16	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Tue 10pm	
Tue 11pm	29	Dry	5	---	29	Dry	5	---	26	21	81	↖ESE	11	---	16	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Tue 11pm	
Wed 12am	28	Dry	5	---	28	Dry	5	---	26	21	81	↖SE	10	---	16	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 12am	
Wed 1am	27	Dry	10	---	27	Dry	10	---	25	20	81	↖SE	10	---	15	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 1am	
Wed 2am	25	Dry	15	---	25	Dry	15	---	24	20	84	↖ESE	12	---	13	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 2am	
Wed 3am	25	Dry	25	---	25	Dry	25	---	24	21	87	↖ESE	12	---	13	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 3am	
Wed 4am	24	Dry	25	---	24	Dry	25	---	24	20	84	↖ESE	12	---	13	---	0	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 4am	
Wed 5am	23	Dry	30	---	23	Dry	30	---	24	20	84	↖E	13	19	12	☁SN	20	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 5am	
Wed 6am	24	Dry	35	---	24	Dry	35	---	25	21	86	↖ESE	13	19	13	☁SN	20	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 6am	
Wed 7am	24	Dry	30	---	24	Dry	30	NaCl	225	26	21	84	↖ESE	14	21	14	☁SN	20	0.00	0.00	0.00	0.00	0.00	0.0	☁	10.00	---	Wed 7am
Wed 8am	25	Dry	30	---	26	Dry	25	---	26	22	86	↖ESE	14	22	14	☁SN	80	0.00	0.00	0.00	0.00	0.45	0.0	☁	0.50	---	Wed 8am	
Wed 9am	27	SN	25	---	26	Slush	25	NaCl	150	27	24	86	↖ESE	15	24	15	☁SN	80	0.00	0.00	0.00	0.00	0.63	0.5	☁	0.50	---	Wed 9am
Wed 10am	29	SN	25	---	28	Slush	30	150 lbs of Prewet Salt (w/ Brine)	---	---	---	---	15	26	19	☁SN	70	0.00	0.00	0.00	0.00	0.59	1.1	☁	0.25	---	Wed 10am	
Wed 11am	30	SN	15	---	29	Slush	15	---	---	---	---	15	30	20	☁SN	70	0.00	0.00	0.00	0.00	0.48	1.8	☁	0.50	---	Wed 11am		
Wed 12pm	31	SN	10	---	30	Slush	10	NaCl	150	27	24	86	↖ESE	15	26	19	☁SN	70	0.00	0.00	0.00	0.00	0.41	2.2	☁	0.50	---	Wed 12pm
Wed 1pm	32	CompSn	5	---	32	Slush	5	---	---	---	---	---	---	---	---	☁SN	70	0.00	0.00	0.00	0.00	0.32	2.7	☁	0.50	---	Wed 1pm	
Wed 2pm	32	CompSn	10	---	33	Slush	10	---	---	---	---	---	---	---	---	☁RA	70	0.01	0.00	0.00	0.00	0.01	3.0	☁	5.00	HAZE	Wed 2pm	
Wed 3pm	32	CompSn	10	---	35	Wet	10	---	---	---	---	---	---	---	---	☁RA	70	0.01	0.01	0.00	0.00	0.01	3.0	☁	5.00	HAZE	Wed 3pm	

NaCl 150 27 24 86 ↖ESE SN 70 0.00 0.00 0.00 0.00 0.41 2.2 ☁ 0.50

150 lbs of Prewet Salt (w/ Brine)

Start Time: Wed 8:23am  
 End Time: Wed 10:03am



# MDSS Mobile App



Verizon LTE 3:04 PM 85%

Home Map Hide

Background FAA/NWS RWIS

Radar None None

**MI-13**  
M-26: Erickson Drive in Houghton to Ontonagon CL  
Maintenance: Plow & Chemicals Recommended

Settings 2-24 7:50 AM Play Stop

Verizon LTE 3:39 PM 81%

Home Map Hide

Alert Camera Trucks

Maintenance Off On

**Truck**  
MI-04-1653

Settings 2-23 3:30 PM Play Stop

Map Erickson Drive in Houghton to Ontonagon CL

MDSS Roadway

Time	Road Cond	% Ice	Mob Index	Maint Action	Frost
Tue 9:30: AM	Slush	85	57	Plow	22
Tue 8:30: AM	SN	87	55	N/A	42
Tue 7:30: AM	SN	100	53	NaCl	52
Tue 6:30: AM	SN	100	50	Plow	60
Tue 5:30: AM	SN	100	56	N/A	52

Table Current

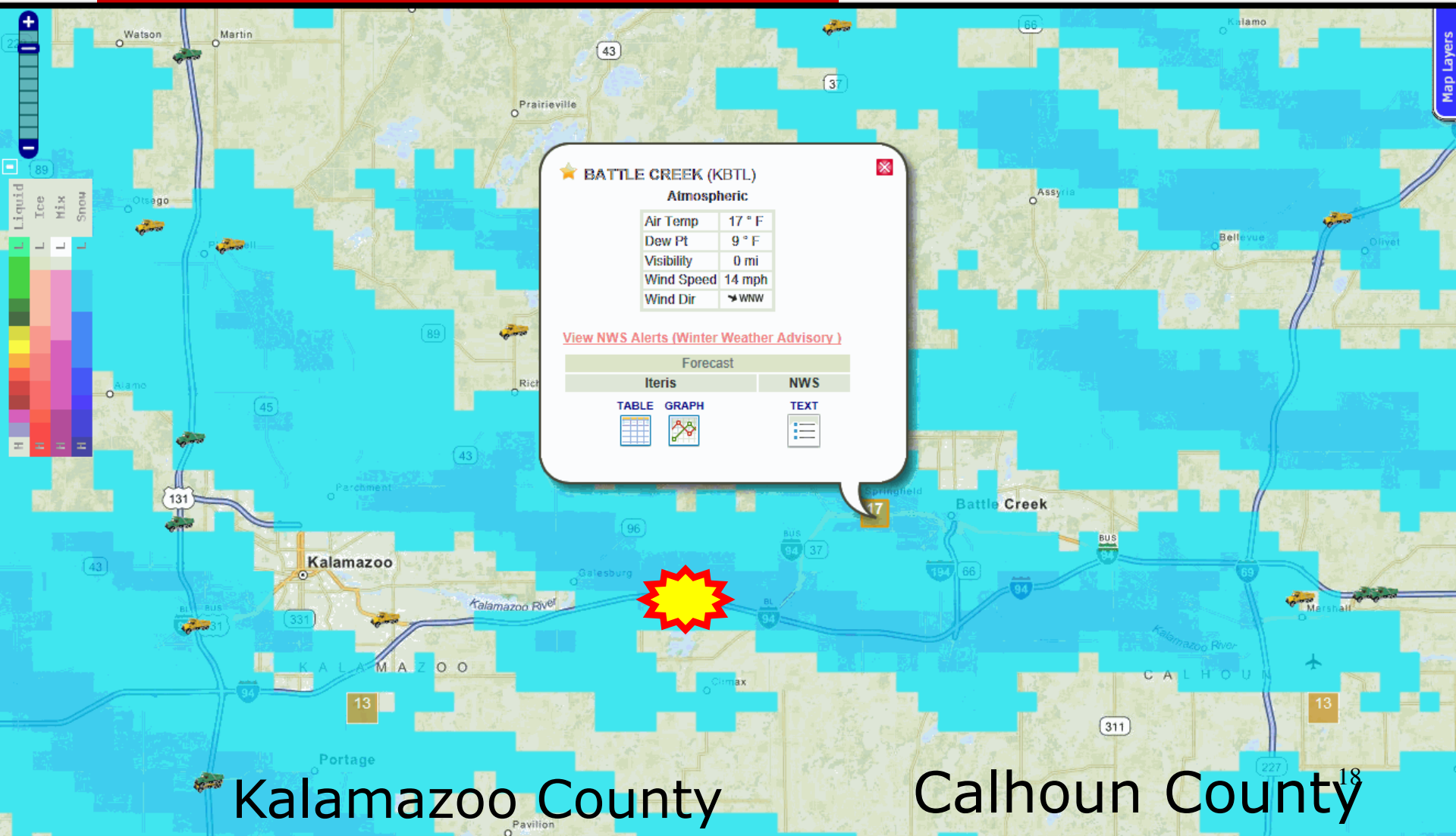


ISSAEST, Fairbanks, AK, USA, August 2-5, 2015



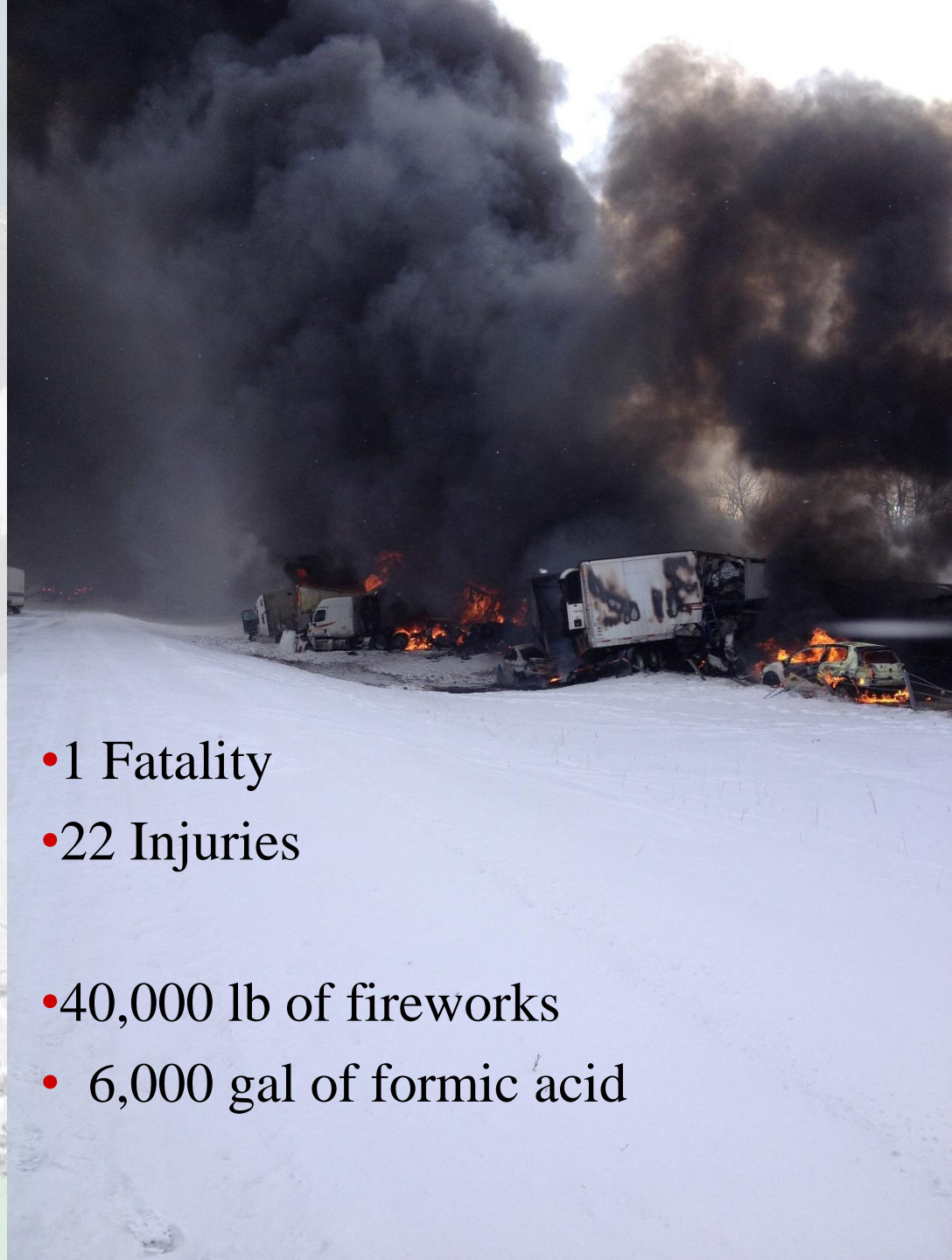
# Additional Benefits: Post Storm/Incident Reviews

January I-94 Mega Crash



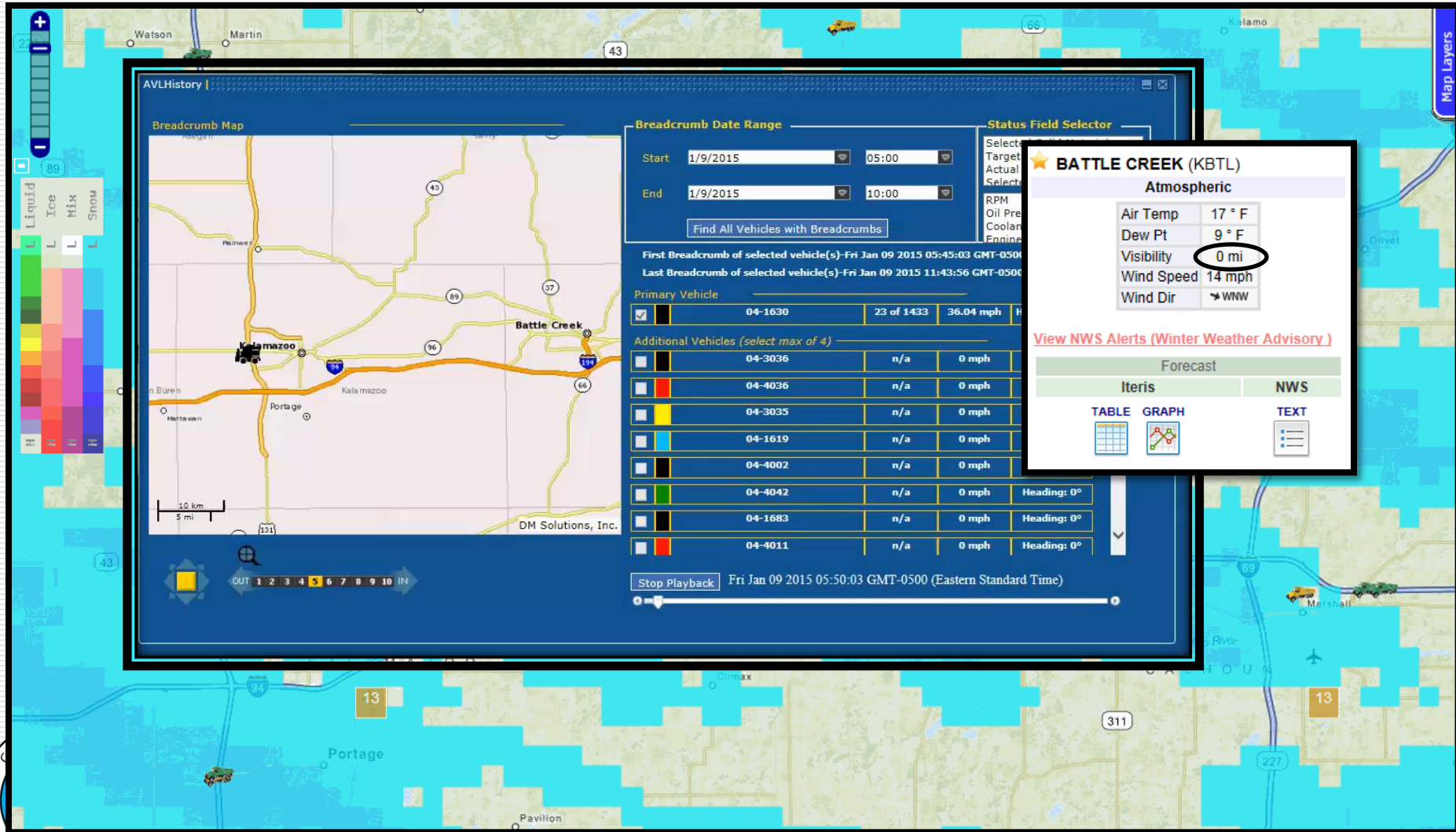
# I-94 MEGA CRASH

- By the numbers
  - 193 Total vehicles:
  - EB
    - 26 Trucks
    - 34 Cars
    - 44-hour closure
  - WB
    - 50 Trucks
    - 83 Cars
    - 39-hour closure



- 1 Fatality
- 22 Injuries
- 40,000 lb of fireworks
- 6,000 gal of formic acid

# I-94 Mega Crash





# I-94 Mega Crash

"We've never experienced anything of this magnitude and I hope we never do again," - Michigan State Police Lt. Dale Hinz



# MDSS: Forecast and Strategy

## □ Communication Tool

From: Giles, Brian (MDOT)

[↑ Next](#) [↓ Previous](#)

Sent: Wednesday, January 07, 2015 5:45 AM

To: Smith, Joe (MDOT); Weaver, Fredrick (Rick) (MDOT); Ingold, Glenn (MDOT); Brink, Stephen (MDOT); Stineback, Terry (MDOT); Steele, Ty (MDOT); Martin, Ed (MDOT); Marsh-McCarty, Lisa (MDOT); Wilson, Zachary (MDOT); Roland, Jason (MDOT); Iocca, Michael (MDOT); Winchester, Michael (MDOT); Owsiany, Jeanne (MDOT); Eckler, Matt (MDOT); Brown, Jeffrey M. (MDOT); Strefling, Sarah (MDOT); Shindeldecker, Douglas (MDOT); Collins, Danny (MDOT); Braybrooks, Charles (MDOT); Riever, Randy (MDOT); Streeter, Mike (MDOT); Bessey, Al (MDOT); Cooper, Janine (MDOT); Smith, Jonathon (MDOT); Reiter, Brian (MDOT); DenBraber, Kerry (MDOT)

Subject: FW: Winter Wig

Good morning all,

Last night South haven finally had a small break from the snow at approximately 7pm. I don't believe that other areas were as fortunate. But then at midnight it started all over again. MDSS is calling for 5.8 inches of snow to fall between now and 5pm with temps hovering around 13 degrees and wind at 18mph gusting to 33mph. Everyone is in and all trucks are on the road.

VAN BUREN-

INCLUDING THE CITIES OF...SOUTH HAVEN

338 AM EST WED JAN 7 2015

...WINTER WEATHER ADVISORY IN EFFECT UNTIL 4 PM EST THIS AFTERNOON...

.TODAY...SNOW SHOWERS. AREAS OF BLOWING SNOW. SNOW ACCUMULATION 5 TO 7 INCHES. HIGHS 10 TO 15. NORTHWEST WINDS 15 TO 25 MPH WITH GUSTS TO AROUND 35 MPH. CHANCE OF SNOW 100 PERCENT. WIND CHILL READINGS AS LOW AS MINUS 12.

.TONIGHT...SNOW. SNOW ACCUMULATION AN INCH OR LESS. LOWS 5 TO 10 ABOVE NEAR LAKE MICHIGAN AND ZERO TO 5 INLAND. WEST WINDS 15 TO 20 MPH WITH GUSTS TO AROUND 30 MPH. CHANCE OF SNOW 80 PERCENT. WIND CHILL READINGS AS LOW AS 9 BELOW TO 19 BELOW ZERO.



# Lessons Learned

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## **AVL and MDSS are game changers**

- Proactive vs reactive
- Adapting operational approach based on MDSS
- Incorporating pavement forecasts into pre-storm planning
- Supervisors and operators are more informed

## **Takes time to gain trust in MDSS treatment recommendations**

*(weather forecasting has been a big positive)*

## **Lots of data; What's the most useful?**

- Material usage report
- Salting speed compliance reports
- Blade usage
- Supervisors know what their operators are applying





# Questions



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*ISSAEST, Fairbanks, AK, USA, August 2-5, 2015*

MICHIGAN DEPARTMENT OF TRANSPORTATION  
**Automated Vehicle Location (AVL) and Maintenance Decision Support System (MDSS)**

**AVL Program**

MDOT began equipping 270 Winter Maintenance Trucks (WMTs) with AVL equipment in the Fall of 2013. With this technology, MDOT garages and regions are able to better monitor their winter operations. Authorized users are able to see where and when activities are being done, and can view integrated sensory data (such as camera images, plow position, and salt usage). Data can also be easily compiled into executable reports. Shown below is the salting speed compliance report, which relates to efficient use of salt. Similar reports are available for blade life, engine idling, and vehicle usage.

**MDSS Program**

As an enhancement to the AVL technology, MDOT's contract also includes MDSS service. MDSS is a road weather forecasting service which utilizes specific information about a route (road type, traffic, etc) coupled with MDOT winter operations policies to provide treatment recommendations to operators. With real-time data transmittal from WMT AVL units, MDSS is able to utilize previous operational data to enhance future recommendations.

**Recognition**

At the 2014 ITS World Congress held in Detroit, MDOT won a "Best of ITS" (ITS America) award for its AVL and MDSS program implementation. While members of the MDOT Operations Field Services Division were present to accept the award, the efforts of many, through contracting and procurement, installation and maintenance by garage employees, and support by region and field services management and personnel, are reasons why MDOT's AVL and MDSS Program is nationally recognized as an innovative program in transportation sustainability.

For Further Information about MDOT's AVL/MDSS Program, contact the Region Support Unit at Operations Field Services.