Weather Systems Fixed and Mobile Technology

USING DATA FOR WINTER MAINTENANCE DECISIONS

So how can we use RWIS and Mobile data to help us in winter operations?

It can help plan our operations – help us make decisions

It can help us (and others) during operations – make adjustments

It can help us evaluate our performance

Fixed and vehicle mounted units

Fixed Systems

ROADSIDE TOWER

Sensors Measure:

- Surface Conditions
- Surface Temperature
- Present Weather
- Wind Speed & Direction
- Precipitation
- Temperature & Humidity

Cabinet Contains:

- Processing Unit
- Telecommunications & Power Connections
- Digital Barometer – Pressure

Optional Equipment:

Visibility, Cameras, Traffic Counters, Precipitation Type And Amounts

Fixed RWIS: Why?

- Provide road conditions 24/7
- Most accurate way to obtain road conditions ands be alerted on them
- Improves a road weather forecast

Timing of freezing/thawing

Aids in chemical decisions

Improves a weather forecast

Non-invasive sensors are what is trending and offer a friction reading

REAL TIME INFORMATION IS NOT JUST TO CREATE THE FORECAST, IT CAN HELP YOU

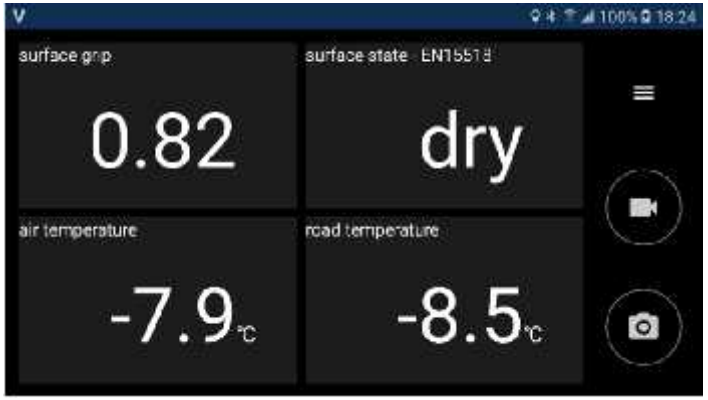
Mobile temperature sensors

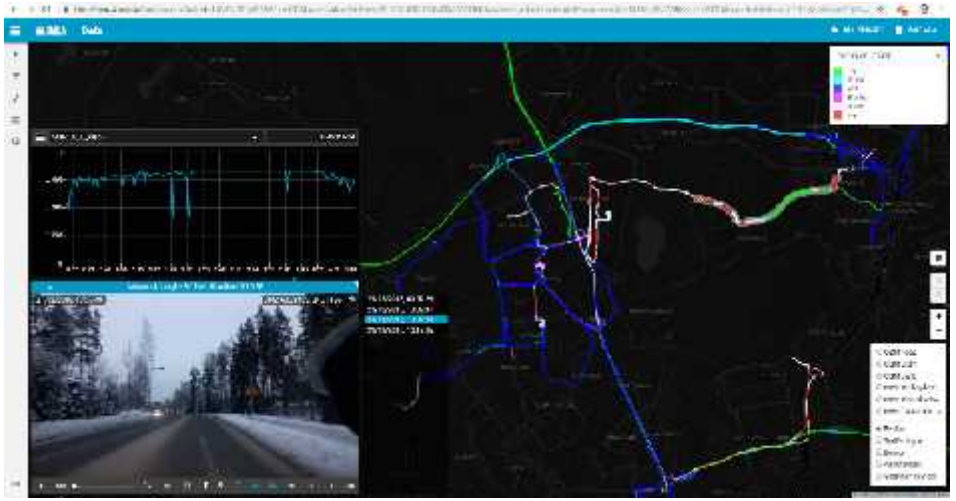
- **Standard Equipment**
  - Pavement Temperature
  - Air temperature
- **Advanced Equipment**
  - Surface grip
  - Surface state
  - Dew point
  - Layer thicknesses of water / ice / snow
  - Relative humidity

  Designed for snow plow trucks

MOIBLE DATA CAN HELP US FILL IN THE GAPS

WE ONLY GET THIS DATA WHEN VEHICLES ARE OUT ON THE ROADS





Data for the operator and the Agency

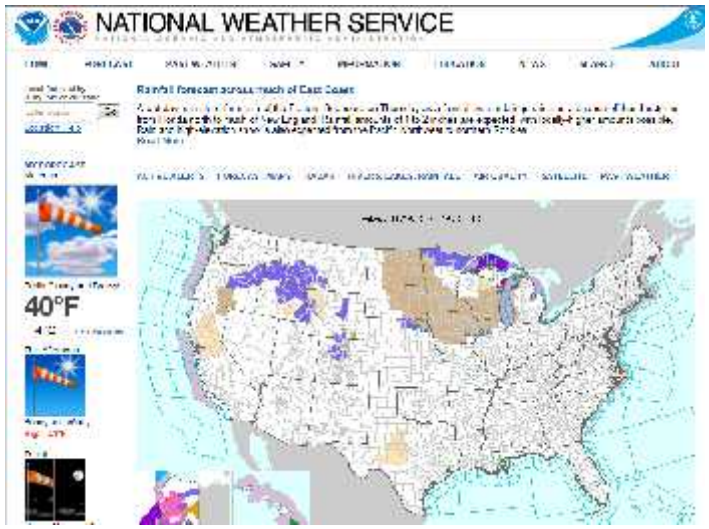
Data -what do we need?

Weather information – forecasting and current conditions, why?

- What is the event
- Can we pre-treat
- When will it begin
- What will it begin as
- What type of conditions will prevail (precipitation type, winds temps etc.)
- When will it end
- What will pavement temperatures do
- What will winds do
- When is the next event
- What do we report to the Public



In Operations, these are good source but do you get what you need?

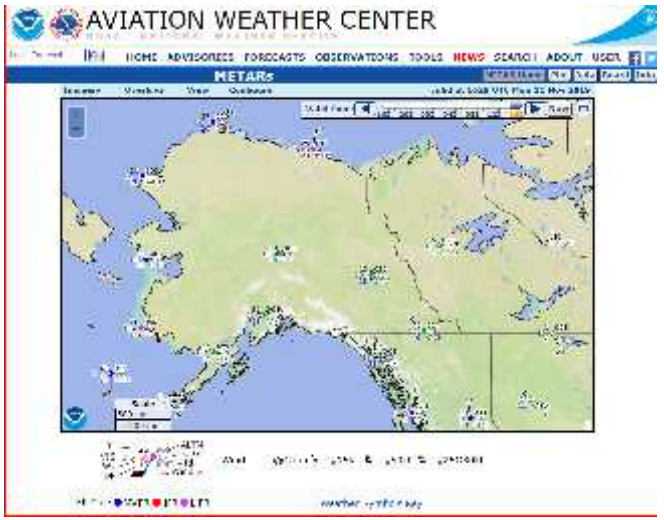


All forecasts begin with data

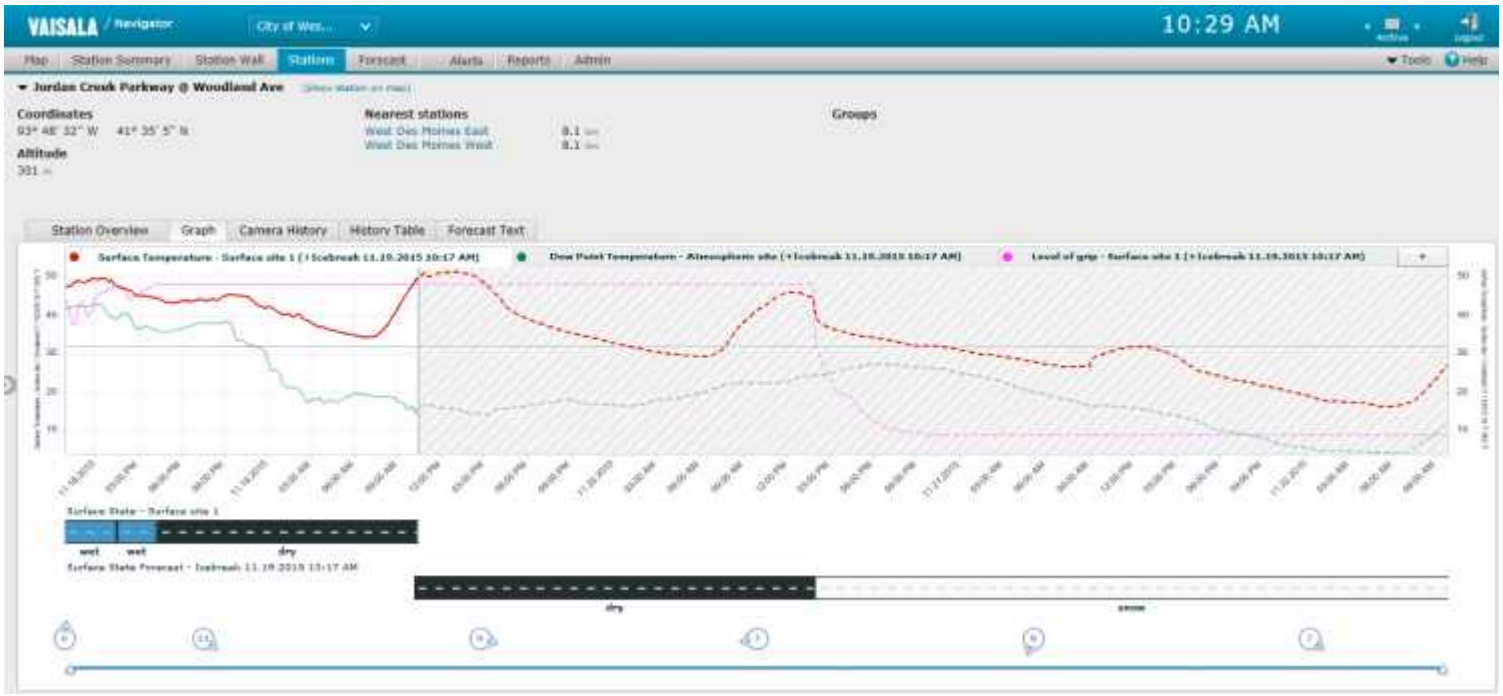
Real time Observations are used as well

- All forecast models begin with balloon data
- Sent up twice a day all around the globe

States, Counties and Cities that have RWIS all contribute to forecasting.
Every airport does as well



We need data that includes what the road conditions and pavement temperatures are predicated to be



Getting a pavement temperature forecast is key to making decisions

Frost will form when the dew point falls below the pavement temperature and if the temperatures are below 32 F. Pavement forecasts can help us make decisions prior to it occurring. When dew point and surface temperature get close we can be alerted if we have a value added service so we can take measures before the event happens

Subsurface temperatures play a key role in what happens on the pavement

Pre-Treating Roadways using Anti-icing

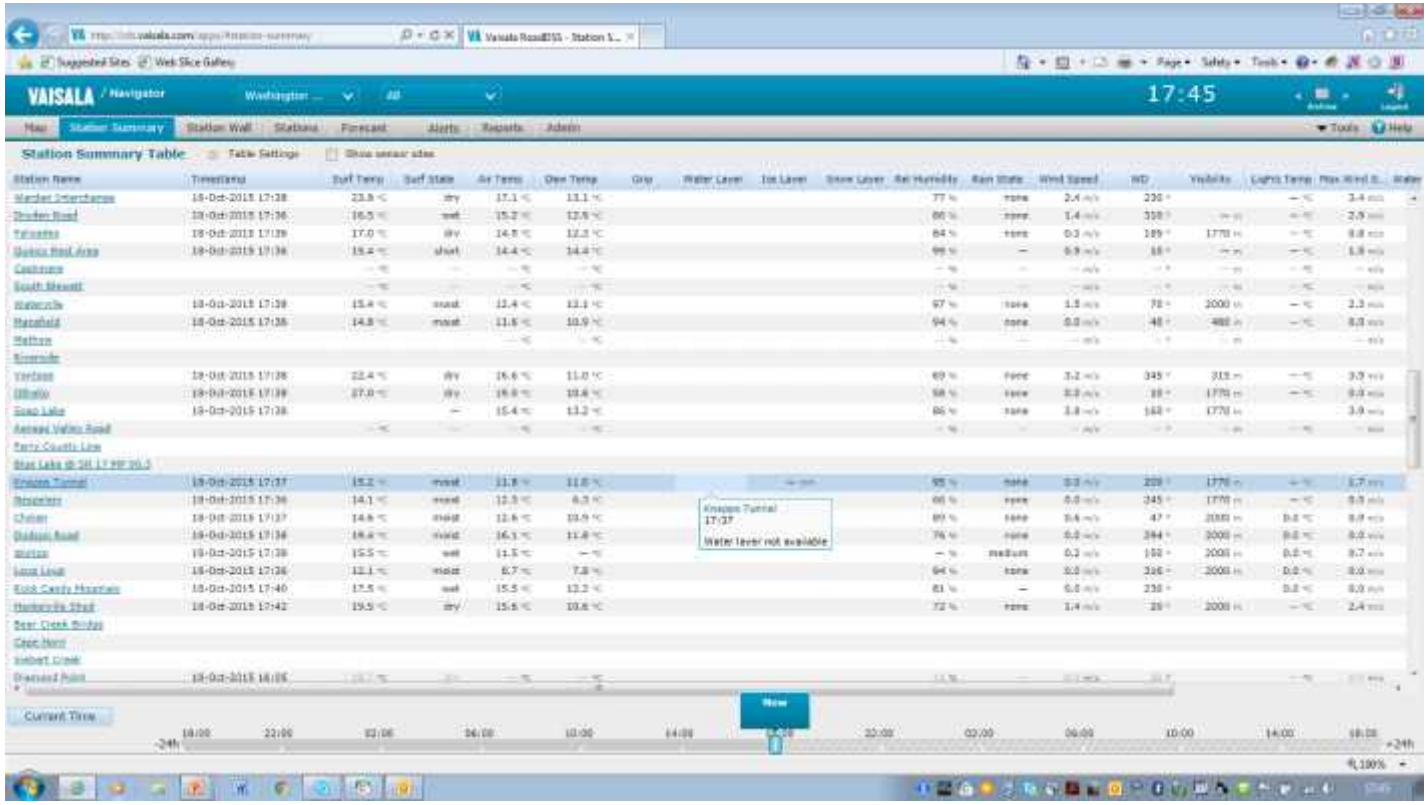
PRO-ACTIVE TREATMENT PRIOR TO AN EVENT

Here we need real time data to make decisions prior to beginning the operation.

A Decision developed to help make the proper choices

This is all based on real time weather observations

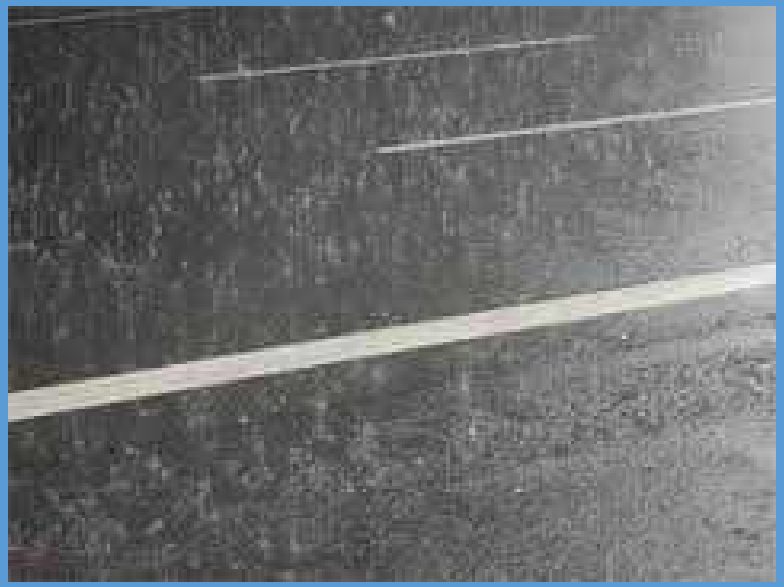
All the data you need can be found in one place



Treated vs. Untreated

THE SAME EVENT, ONE ROADWAY ANTI-ICED, ONE NOT TREATED.

WHEN YOU MAY NOT WANT TO ANTI-ICE



RAIN

FOG/HUMID

BLOWING SNOW

WHEN DO WE DEPLOY

Knowing not just when the storm will hit but when it will actually affect the pavement is vital.

Go sit out there and wait?

The storm started at 5:30pm and did not have an effect on the pavement till 6:54 pm

WHAT SHOULD DICTATE HOW MUCH MATERIAL WE APPLY?

Pavement temperature
Weather Condition
Type of De-Icer

Follow De-Icing Application Rate Guidelines
100 to 300 lbs/ln mile of pre-wetted salt
in most situations

THE PRICE OF SALT SHOULD NOT DICTATE HOW MUCH WE APPLY!!!

A GUIDE FOR OPERATORS IN THEIR VEHICLES

Salt Application Rate Guidelines							
Prewetted salt @ 12' side lane (assume 2-hr route)							
Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	50	75	95	120	140	170
	Drizzle, Medium Snow ½" per hour	75	100	120	145	165	200
	Light Rain, Heavy Snow 1" per hour	100	140	182	250	300	350
Prewetted salt @ 12' wide lane (assume 3-hr route)							
Surface Temperature	(Fahrenheit)	32-30	29-27	26-24	23-21	20-18	17-15
lbs of salt to be applied per lane mile	Heavy Frost, Mist, Light Snow	75	115	145	180	210	255
	Drizzle, Medium Snow ½" per hour	115	150	180	220	250	300
	Light Rain, Heavy Snow 1" per hour	150	210	275	375	450	525

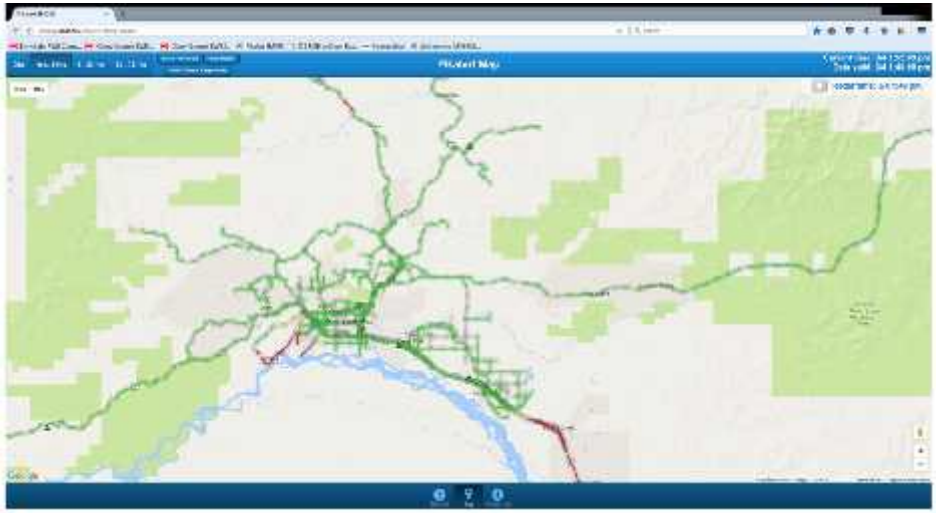
Sensible Salting Thoughts

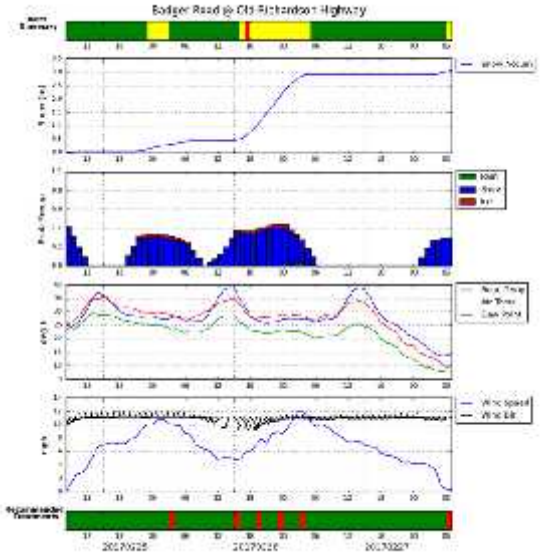
- Putting down only what is needed.
- Level of service – what are we striving to achieve
- When will we achieve it? During the storm, following the storm, how long after the storm?

But sensible salting also means -

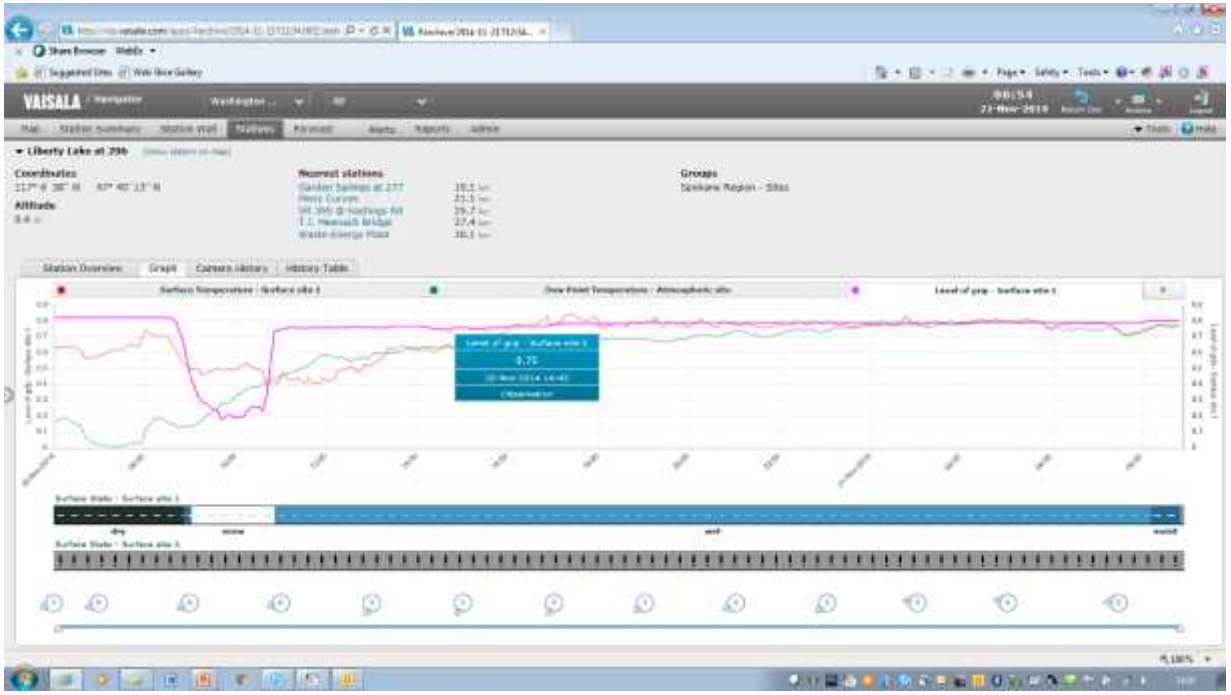
Placing materials at the optimum time, especially in extremely cold situations

MDSS (maintenance decisions support system) is a system to support you





Reviewing data



Would anti-icing have had an impact here?

Storm Performance Index

- **The input parameters are run through an algorithm that produces an index………**

VAISALA

Storm Performance Index Report

24-Oct-2012 05:18 → 31-Oct-2012 05:18

Generation date 31-Oct-2012 05:00

Storm Performance Index Legend

Index	Description
0	Successfully treated
0.00 - 0.30	Significantly accelerated grip recovery
0.31 - 0.49	Some success at grip recovery
0.50 - 0.69	Very little success at de-icing
0.70 +	Limited maintenance or no deicer success
	Observation data / parameter missing or temp is below threshold

Station	Date	Time Range	Event	Duration (hours)	Max Wind Speed (mph)	Max Ice Layer (mm)	Max Snow Layer (mm)	Max Water Layer (mm)	Min Surface Temp (°F)	Severity Index	Performance Index	Mobility Index	Comments
D5 - Malad Summit													
	29-Oct-2012	04:30 - 10:00	FROST treated	5.50	5.59	0.00	0.00	0.02	29.00	17.12	0	100%	
D6 - Idaho Falls													
	25 Oct 2012	02:45 - 04:45	GRIP<.6	2.00	3.80	0.14	0.37	0.21	30.66	14.49	0.14	[illegible]	
	25-Oct-2012	04:15 - 06:00	TREATED	1.25	2.91	0.00	0.00	1.18	31.28	13.68	0		
D6 - Lost Trail Pass													
	24 Oct 2012	09:15 - 10:30	GRIP<.6	1.25	5.14	0.01	0.01	0.12	14.72	25.04	0.05	55%	
	24 Oct 2012	10:30 - 12:00	TREATED	1.50	5.82	0.16	0.04	1.16	19.76	22.16	0		
	25-Oct-2012	02:00 - 11:15	GRIP<.6	5.25	4.47	0.13	0.31	0.00	18.50	21.50	0.43		
	25-Oct-2012	11:15 - 14:00	TREATED	2.75	7.61	0.08	0.13	1.86	20.00	24.09	0	47%	
	25 Oct 2012	14:00 - 20:00	GRIP<.6	9.00	9.06	0.07	0.75	2.06	4.62	22.66	0.12		
	25-Oct-2012	23:00 - 12:45	TREATED	13.75	7.61	0.14	0.00	1.32	15.16	27.95	0		
	26-Oct-2012	15:00 - 16:00	TREATED	1.00	5.11	0.10	0.01	0.31	26.76	15.92	0	4%	
	26 Oct 2012	16:00 - 13:45	GRIP<.6	21.75	7.30	0.26	0.35	0.20	21.00	23.62	0.82		
	27 Oct 2012	16:30 - 17:30	TREATED	1.00	5.69	0.04	0.02	0.27	30.58	15.74	0	[illegible]	
	27-Oct-2012	17:30 - 19:30	GRIP<.6	2.00	6.71	0.11	0.63	0.00	23.22	17.97	0.11		
	27-Oct-2012	22:15 - 06:15	GRIP<.6	7.50	7.03	0.06	0.47	0.00	[illegible]	[illegible]	0.39	0%	
	29 Oct 2012	08:15 - 09:15	GRIP<.6	1.00	4.92	0.04	0.73	0.00	29.54	15.07	0.06	0%	
	29-Oct-2012	23:00 - 05:00	TREATED	6.00	4.25	0.00	0.00	0.16	30.58	14.29	0		
	30-Oct-2012	05:00 - 10:00	GRIP<.6	5.00	5.69	0.18	0.05	0.01	27.68	15.68	0.30	67%	
	30 Oct 2012	10:00 - 10:30	TREATED	0.50	9.50	0.00	0.00	0.17	29.04	13.37	0		

THANKS SNOW MUCH

QUESTIONS ?

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