

Industry Innovations Fleet Health Safety and Security

Don Loftis

Principle Software Engineer

Rail Security Coordinator

Olin Corporation

GOAL:

Create comprehensive tracking records on every shipment including safety and environmental effects

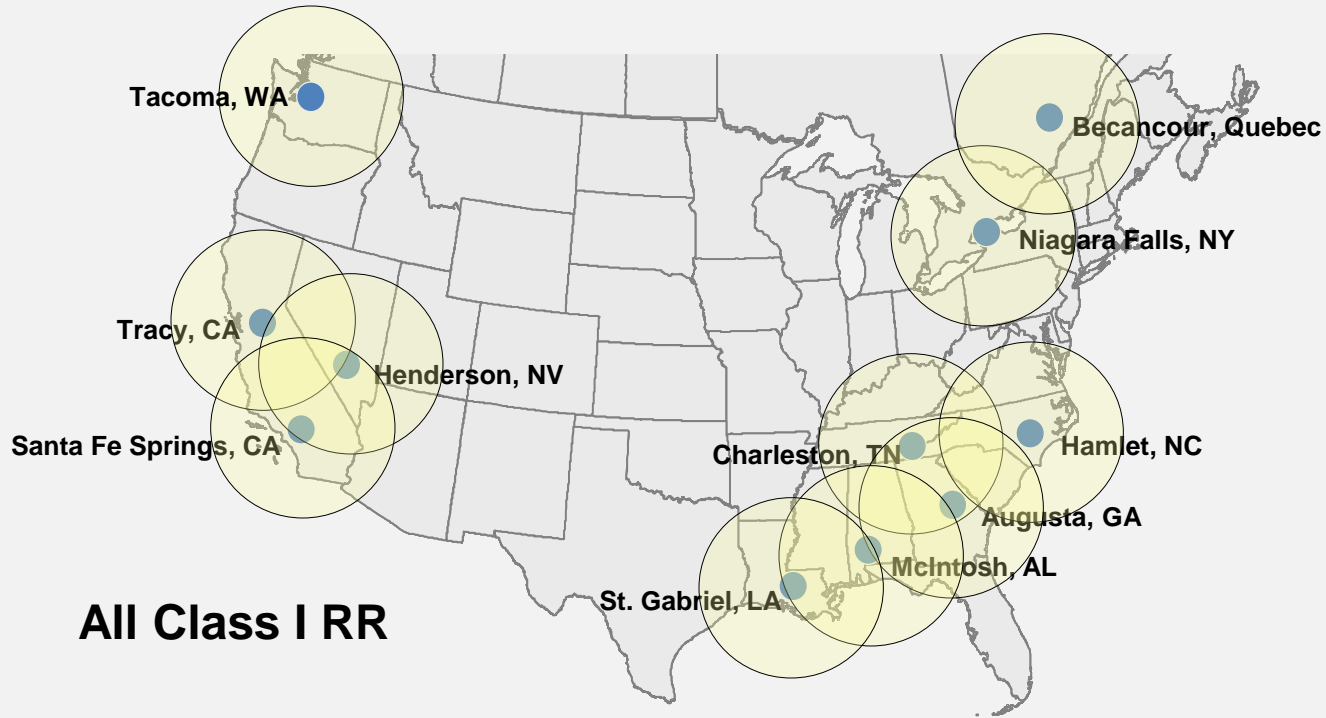


Olin's C/A North American Position

- Largest shipper of chlorine by rail in North America
- Largest bleach producer in North America
- Largest Manufacturer of on-purpose Hydrochloric Acid
- Widest geographic coverage of any N.A. producer



Olin Chlor Alkali Plants & Distribution



All Class I RR

Plant Location	Chlorine	Caustic	KOH	HCL	Bleach
McIntosh, AL	•	•	-	•	•
Becancour, PQ	•	•	-	•	•
Niagara Falls, NY	•	•	-	•	•
Charleston, TN	•	•	•	•	•
St. Gabriel, LA	•	•	-	-	•
Henderson, NV	•	•	-	•	•
Augusta, GA	•	•	-	•	•
Hamlet, NC (JV)	-	• -	-	-	•
Tracy, CA	-	-	-	-	•
Santa Fe Springs, CA	-	-	-	-	•
Tacoma, WA	-	-	-	-	•

ACC - Responsible Care



- Olin is a Responsible Care Member
- Olin cares about all distribution events even non-custodial events
- All in together....

How often does this happen? RailInc - Fleet Health Service



RailRoad Equipment Health

Class I RR – Wayside Sensor Network → ALERT Data → EHM

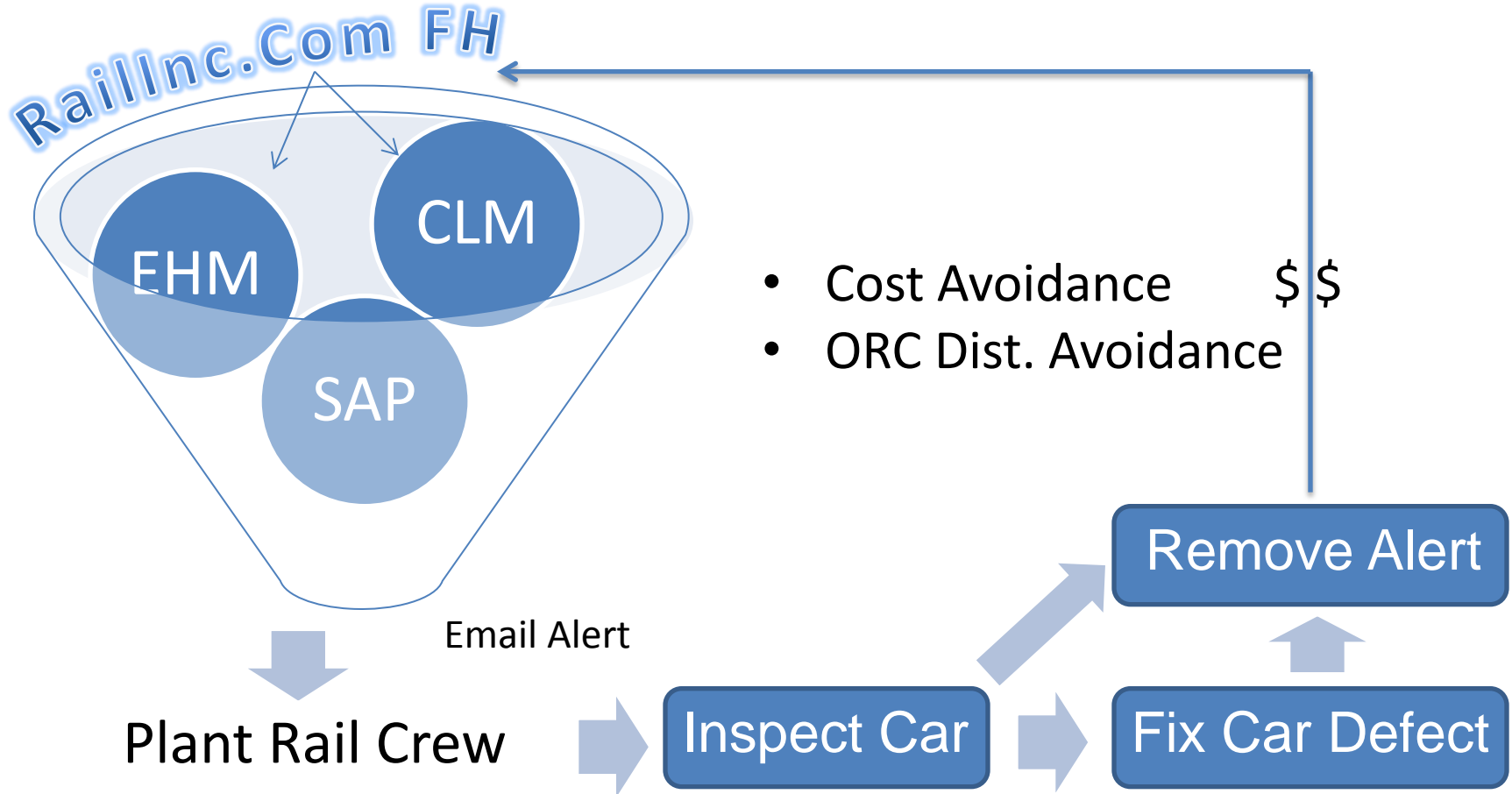
- THD- Truck Hunting Detector
- TPD- Truck Performance Detector
- WILD- Wheel Impact Load Detector
- ABD- Acoustical Bearing Detectors
- Others (Profilers, Hot/Cold Boxes, etc)



AAR Rules allow InTransit repairs based on Alerts

- Running Repair Bills and Service Interruptions – 70 WS / month and 4 days / car transit

EHM DDCT EW MA Olin Alerts directed to Rail Crew





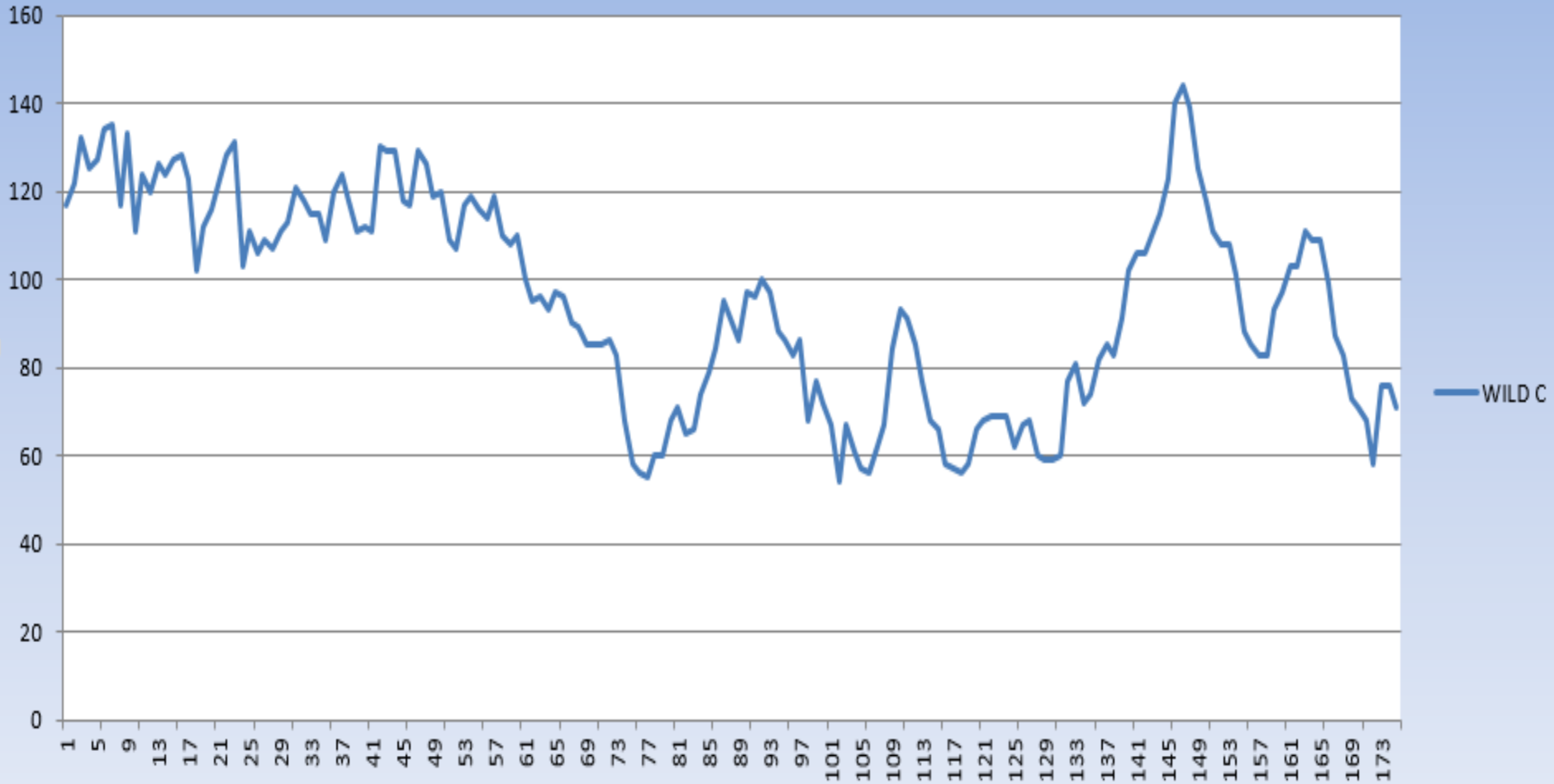
BAD WHEEL



BAD TRUCK

2012/06/27 02:53:37PM

Weekly Average Condemnable Wheels 2012-2015



Receive 128 Cars

Last Update: 10/2/2015 3:12:28 PM Total Cars: 210 Ordered Cars: 0 Over Track Capacity Cars: 3

Move Cars M

Percent Capacity -
Loaded Cars -
Empty Cars -
Average Dwell -
Avg. Dwell Loaded -

Search

EQUIP_ID
ACFX073778
ACFX073788
ACFX073793
ACFX077318

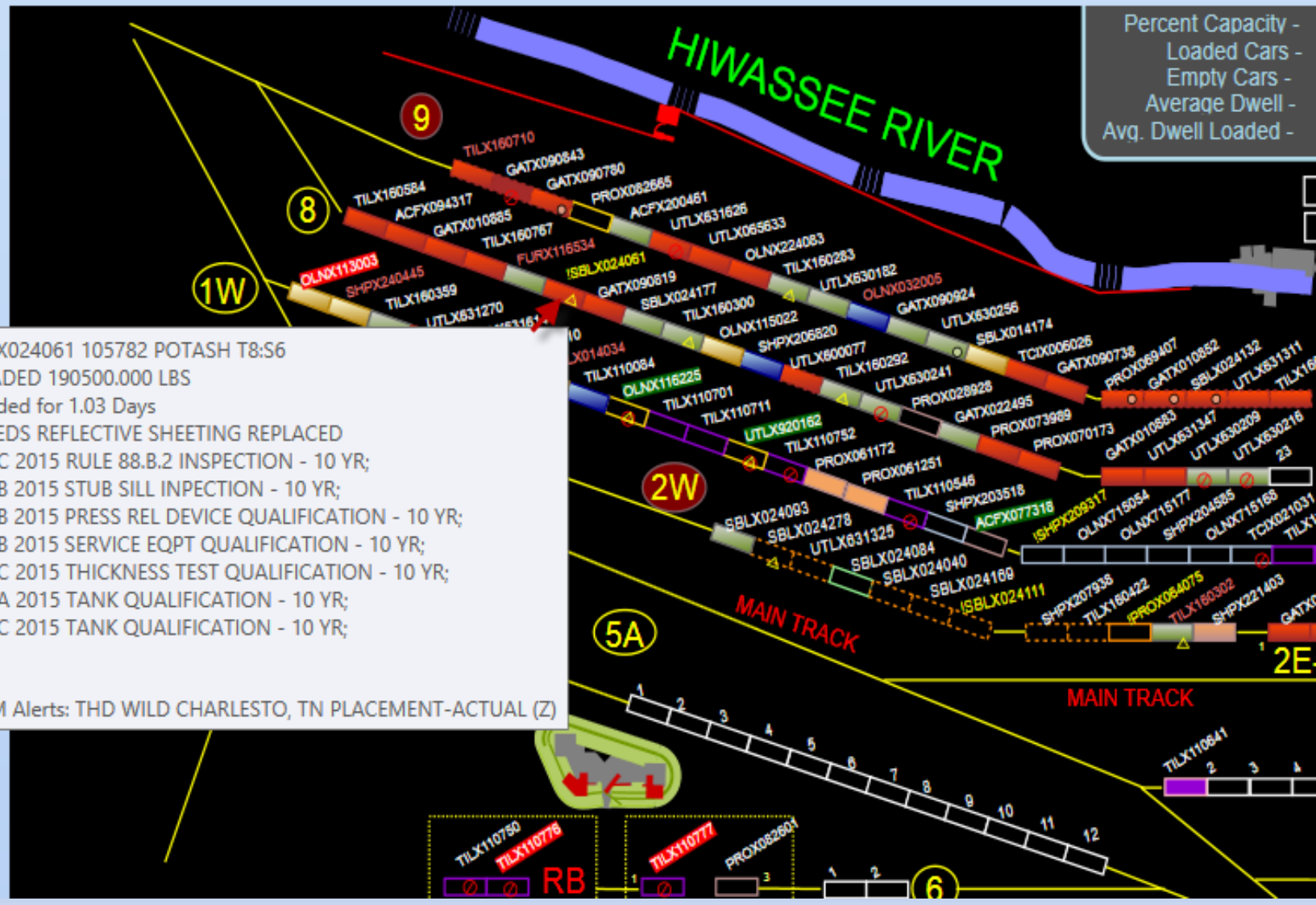
All Products

- Empty Cars only
- Loaded Cars only
- Do Not Load
- Do Not Use
- Due Maintenance
- Bad Quality
- Cleaned
- Equip Health
- Dwell >

SELECTED CAR

- Maintenance
- Car Type
 - Car Status
 - Car Loaded Date
 - Car Loaded By
 - Car Weight
 - Car Flags
 - Car Inspection
 - Inspection Date

REMARK M DUE



SBLX024061 105782 POTASH T8:S6
 LOADED 190500.000 LBS
 Loaded for 1.03 Days
 NEEDS REFLECTIVE SHEETING REPLACED
 070C 2015 RULE 88.B.2 INSPECTION - 10 YR;
 060B 2015 STUB SILL INSPECTION - 10 YR;
 050B 2015 PRESS REL DEVICE QUALIFICATION - 10 YR;
 040B 2015 SERVICE EQPT QUALIFICATION - 10 YR;
 030C 2015 THICKNESS TEST QUALIFICATION - 10 YR;
 020A 2015 TANK QUALIFICATION - 10 YR;
 010C 2015 TANK QUALIFICATION - 10 YR;

EHM Alerts: THD WILD CHARLESTO, TN PLACEMENT-ACTUAL (Z)

Olin Rail View – FHS Alerts

The screenshot displays a rail yard layout with various tracks and equipment. A pop-up window titled "SBLX024061 AAR EQUIPMENT HEALTH DATA" is overlaid on the map, showing a table of inspection records for a specific truck.

EQUIPID	ALERT_TYPE	LEVEL	Cleared	COMPONENT	AXLE	SIDE	TRUCK	ALERT_DATE	LAST_WILD_READ	??
SBLX024061	THD	W	Active	TRUCK			A	1/13/2013		
SBLX024061	WILD	W	Active	WHEEL	02	R		3/11/2010	3/11/2010	
SBLX024061	Expired ABT Inf	B	2012-11-26	CAR				5/1/1997		
SBLX024061	EW5299		Active	CAR				7/9/2015		

Below the table, there are two buttons: "Email Good Inspection" (with a gear icon) and "Email Bad Inspection" (with an envelope icon).

The background map shows a "MAIN TRACK" with numbered segments (1-12) and various equipment labels such as "TILX110641", "SBLX014130", and "ACFX073778". Other features include "Water Stations", "Reconditioning Station", "OH", "CL2 Load", and "5W".

Fleet Health Results

- Averaging \$\$K/mon savings by removing alerts on new WheelSets
- Found Dangerous Trucks – 2 newly Shopped car
- Focus and streamline our inspections
- Save by preferring Turned Wheels over New
- 2014 resulted in favorable maintenance budget
- Win Win !!!

This report lists Railroad Equipment Health Railcar Alerts Delivered to your plant
Total Records: 4

EQUIPID	owner	MATERIAL	LOCATION	LE	ALERT	LEVEL	STATUS	Description	ALERT_DATE	PART	AXLE	SIDE	TRUCK	RR	COUNT	LAST_WILD
SBLX024019	Olin	CAUSTIC	BECANCOUR	E	WILD	C	OPEN	Wild Wheel Detectors (Bad Wheels - Flat Spots - Spalling)	01/19/2012	WHEEL	04	R		CN	20	08/27/2012
GATX090948	Olin	CAUSTIC	MCINTOSH	E	WILD	C	OPEN	Wild Wheel Detectors (Bad Wheels - Flat Spots - Spalling)	10/20/2011	WHEEL	03	L		NS		
OLNX051009	Olin	CP SALT	MCINTOSH	E	WILD	C	OPEN	Wild Wheel Detectors (Bad Wheels - Flat Spots - Spalling)	11/16/2011	WHEEL	01	L		NS	4	05/27/2012
OLNX051015	Olin	CP SALT	MCINTOSH	E	MA0128		MA	DDCT Maintenance Advisory for Rule 108 Incidents (Car Requires Extensive Repair)	07/25/2012	CAR				NS		

Additional Info

- Study 50 cars False Wild Alerts (passed 2 WAS)
- 10 % of cars reoccurred WILD Alert within 3 M
- 4 of 5 cars wrong AEI Tag Locations
- Adjusting our secondary inspections to look for proper Tag placements
- Future: Correlate and Dive Deeper into Car Repair information (CRB is Delayed)

Entering / Leaving Olin

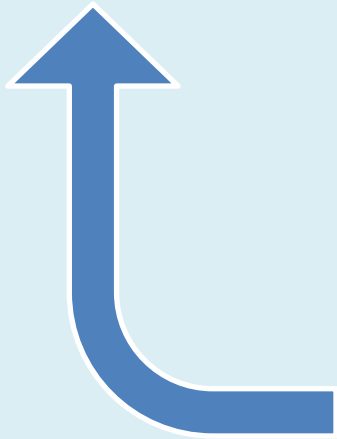
Read AEI Tags

Capture HD Car Images

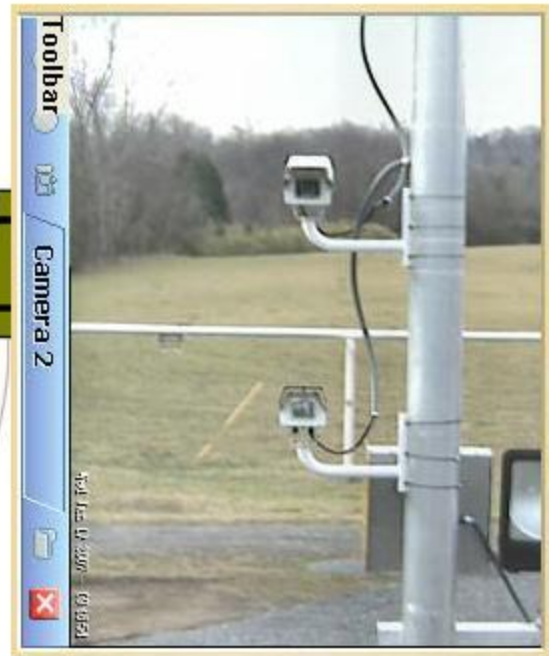
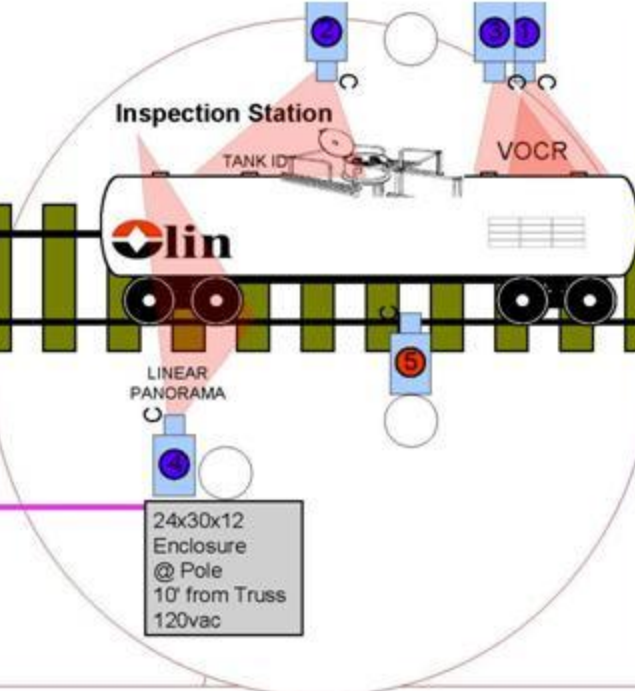
Due REG. Maintenance

★ FHS Alerts

Send Notifications/Alerts to
RIGHT PERSON - RIGHT DEVICE



Entering / Leaving Plant



5 ~2.1mi.

Pelco Espirit PTZ Cam 5

Pelco 1390 Fixed Cam 4

Sony Ipela Fixed Cam 3

Sony Ipela Fixed Cam 2

VOCR

TANK ID

VOCR

Sony Ipela Fixed Cam 1

24x30x12 Enclosure @ Pole 10' from Truss 120vac

LINEAR PANORAMA

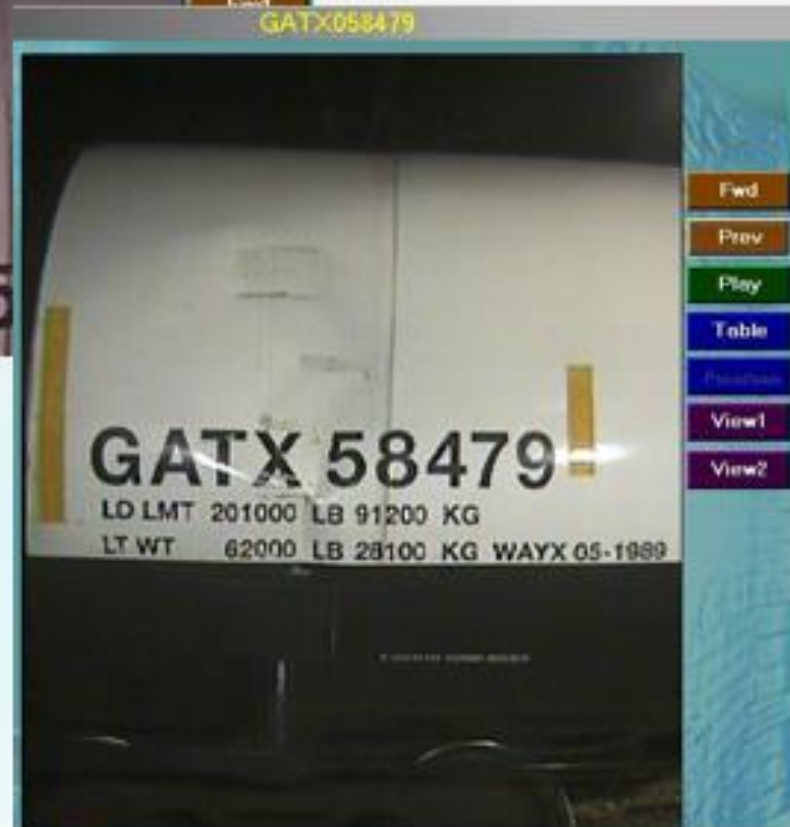
4" Conduit

Document Car Damage



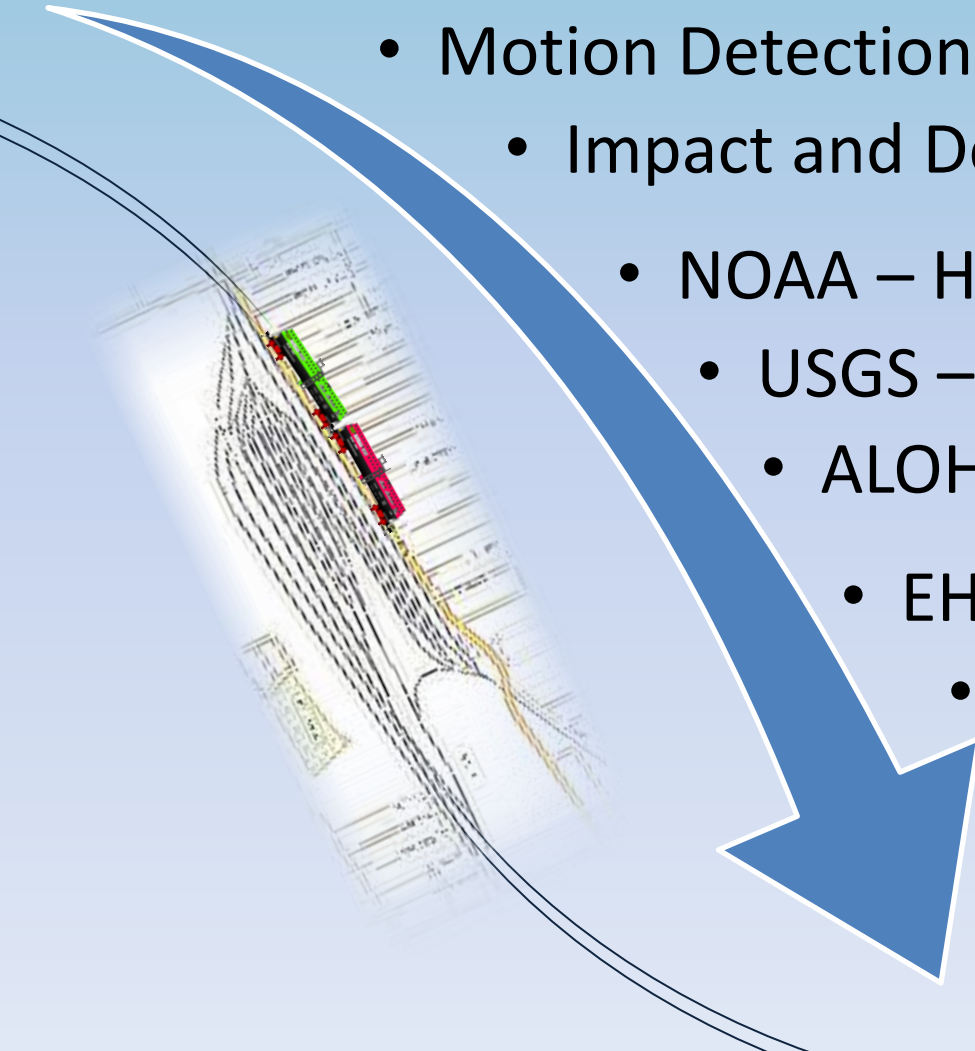
Leaving Plant

Return to Plant



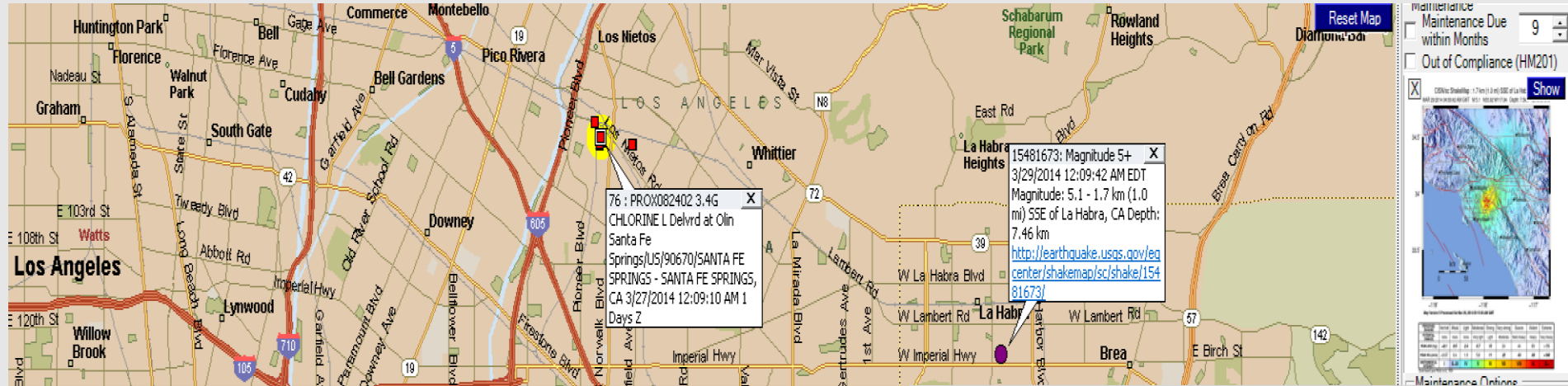
In-Transit Monitoring

- GPS with Open/Close Dome Detection
 - Motion Detection Image Capture
 - Impact and Deceleration Data
 - NOAA – Hurricanes Storms
 - USGS – Earthquake Data
 - ALOHA Plume Modeling
 - EHM Alert Data
 - CLM Data
- GPS**
- WEB**
- RailInc**



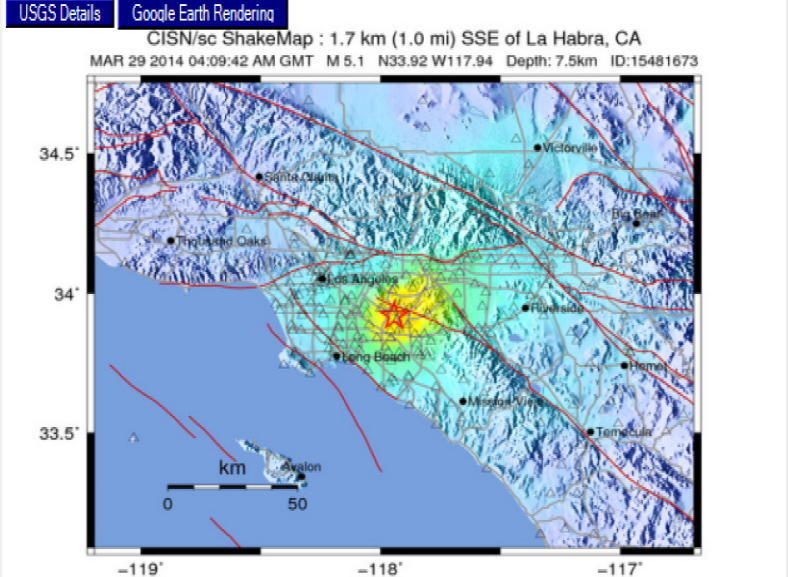
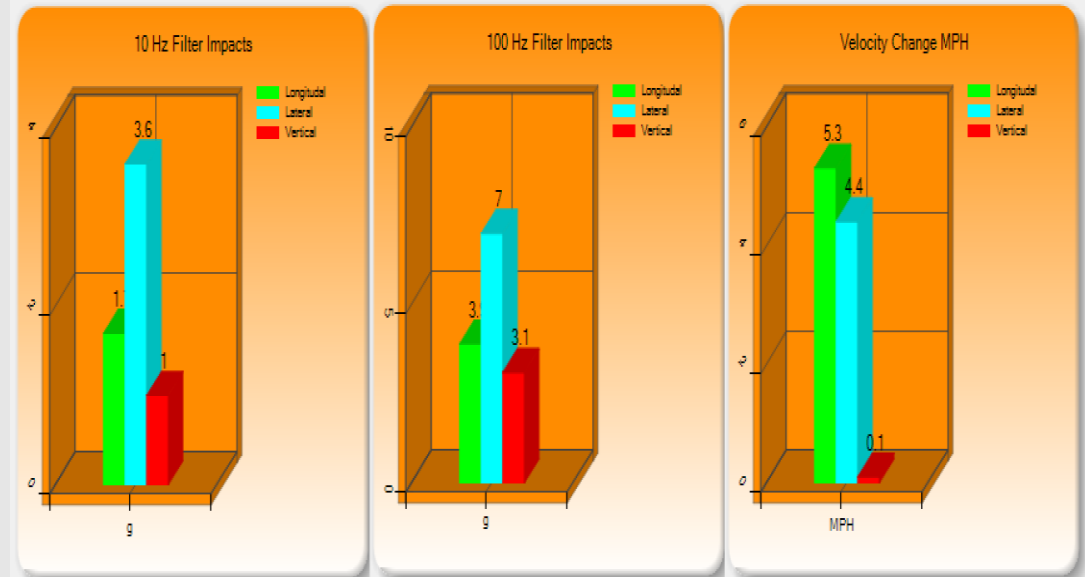
Weather and Earthquake Tracking

- Ensure that Olin railcars do not contribute to derailments or track infrastructure decline
 - Railcars are flagged for inspection (Bearing damage – Flooding, Wheel & PRV Earthquake)
- Probability Extreme weather events is high in the Gulf regions and East Coast
- Probability Earthquake activity high on West Coast



Impact Event Detail on PROX082402 for event 146222510

Quake Shake Map

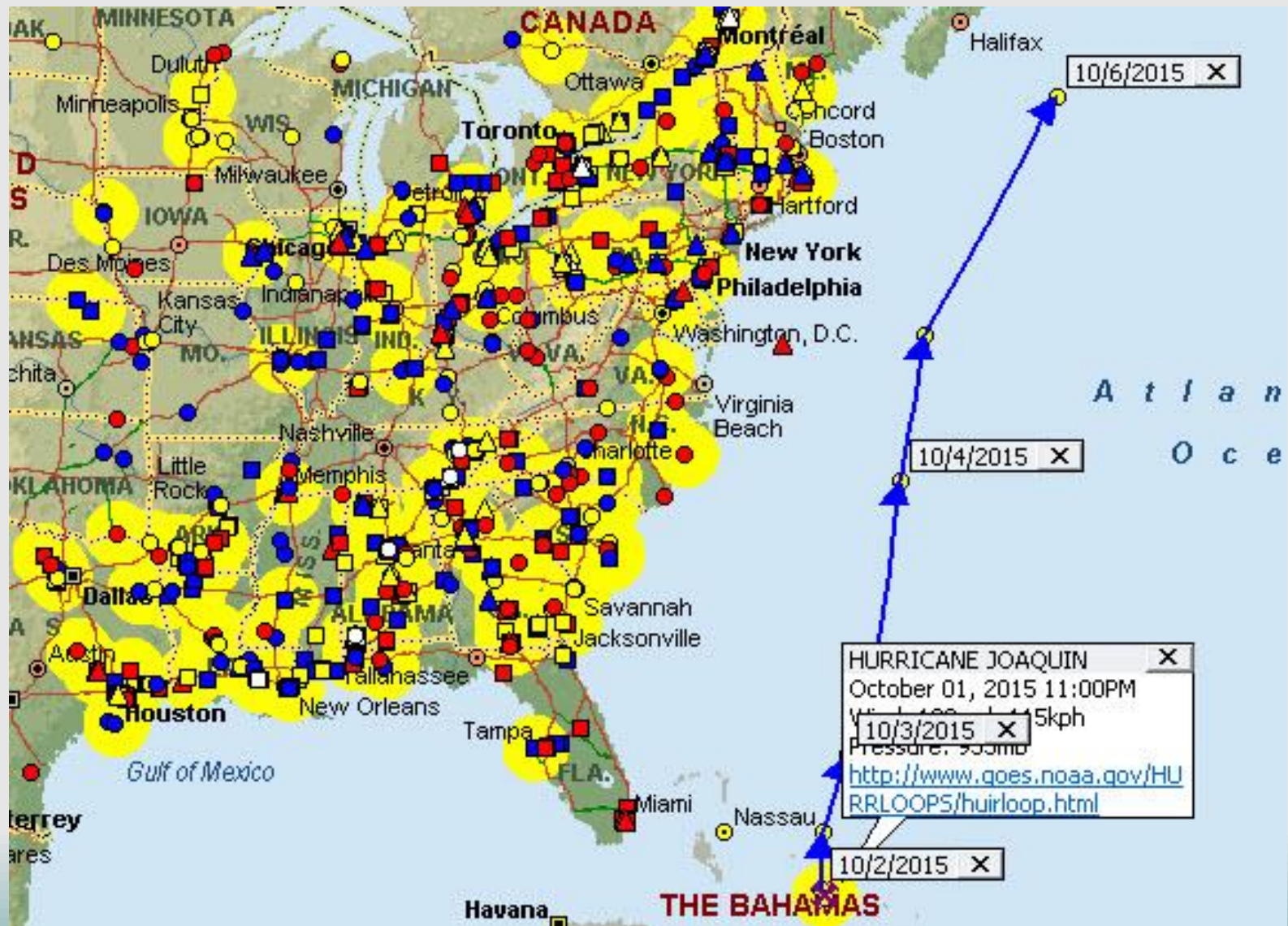


car_number	z_10hz	y_10hz	x_10hz	z_100hz	y_100hz	x_100hz	z_dvmp	y_dvmp	x_dvmp	speed	cours
PROX082402	1.7	1	3.6	3.9	3.1	7	5.3	0.1	4.4	5	88

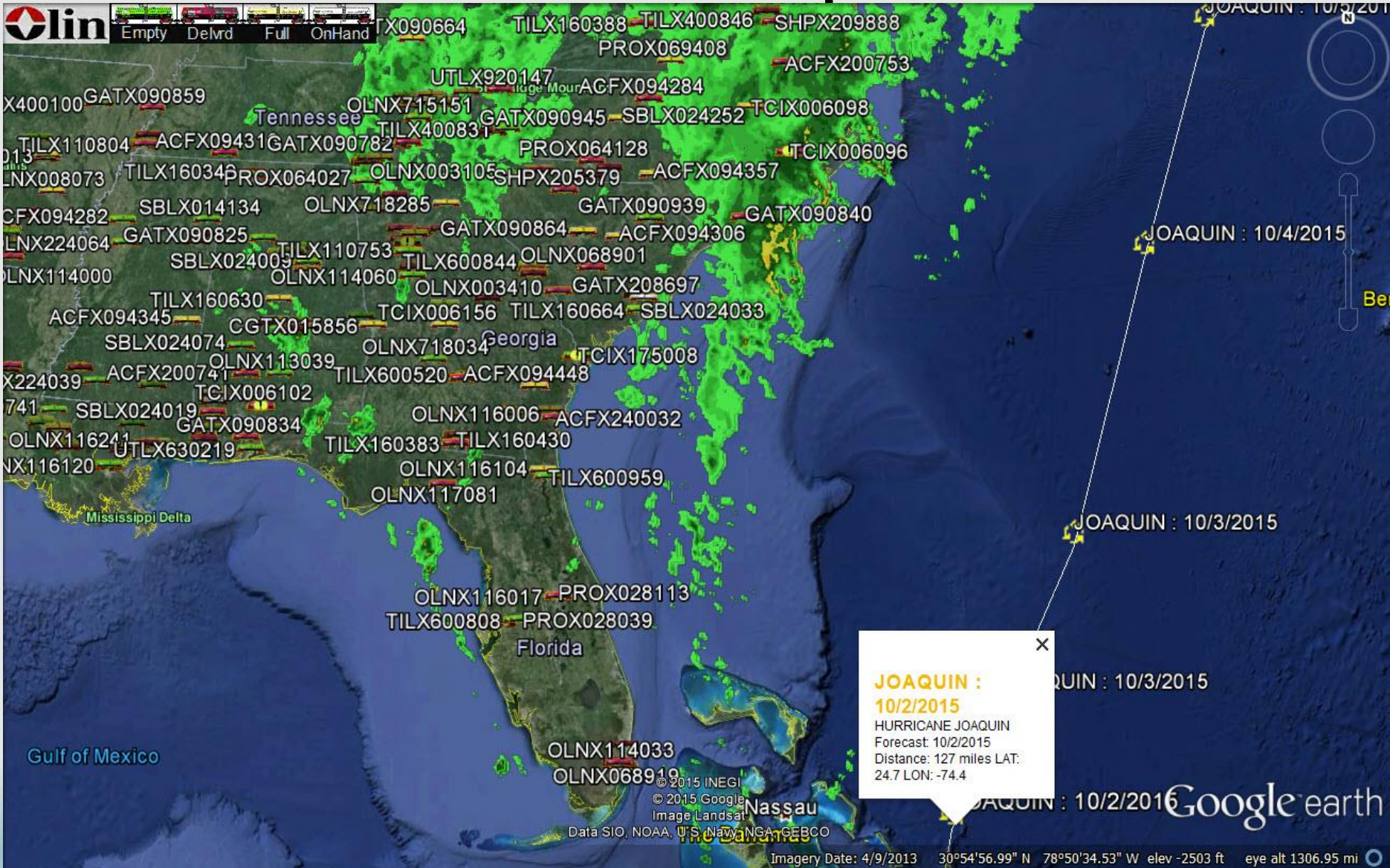
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%)	<0.1	0.5	2.4	6.7	13	24	44	83	>156
PEAK VEL.(cm/s)	<0.07	0.4	1.9	5.8	11	22	43	83	>160
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Wald, et al., 1999

Hurricane and Severe Weather



Dual Interface Options GE



Document Trips via GE Flights

lin Empty Delvrd Full OnHand

UTLX028797 : 10/15/2010 10:23:23 PM

UTLX028797 : 10/15/2010 7:22:40 PM UTLX028797 : 10/15/2010 7:52:39 PM

UTLX028797 : 10/15/2010 6:52:58 PM

53 55

© 2013 Google
Image Landsat

UTLX028797 : 10/15/2010

1997 Imagery Date: 4/9/2013 42°33'39.63" N 73°50'43.73" W elev 174 ft eye alt 2531 ft

Tour Guide

- Images
- Impacts
- Storms
- Decels
- Notes
- Maint
- EHM Alert

Integrated Release modeling

EPA Aloha, WISER

ALOHA heavy gas threat zone CHLORINE Historic: Plume-7-1-2009-11hr58 AM.itv

File Tools News Weather-Radars About

Type place or address Find

SFSP FSP SFSP ERP SFSP Photo SFSP Plot Full TIH

5023.01 5023.02

Burke St Perkins Ave Los Niños Rd

Roxabel St Sibert St Shade Ln Bluejay Ln Merrill Ave Falcon Ave Bluejay Ln Broaded St Maxine St Fredson St La Doñana Ln Jersey Charlesworth Rd Arisee Ave Pike St

Population (2002) by Census Tract divided by Area
5027: 2,645.8279

Santa Fe Springs Plume-7-1-2009-11hr58 AM.itv X

Event Info

Wind: 6 knots from ene at 3 meters

THREAT ZONE:
Model Run: Heavy Gas
Red : 437 yards
(20 ppm = AEGL-3(60 min))

Brown: 1457 yards
(2 ppm = AEGL-2(60 min))

Yellow: 1.7 miles
(0.5 ppm = AEGL-1(60 min))

Previous Plume Plots

Events

TIH in HTUA
Track Hurricanes
Start Aloha
Clear Plumes
Show Selected Plume

IL - Local Emergency (Medi...
Locate a Railcar
Pick Location for plume
Sense Click on Map to select new plume locator
33.9568030
-118.07382

Level

Santa Fe Spr

1.0

WISER - [Chlorine]

File Edit Data Tools Window Help

1st Responder

Chlorine
CAS RN: 7782-50-5
[View Substance Data](#)

Map Control Panel

Spill Location
 Address Lat/Long
33.9568 / -118.0738

Wind Direction

Point the compass into the wind.

Spill Size
 Large Small

Time of Day
 Day Night

Displayed Units

2D 3D Road Aerial Bird's eye Labels

Santa Fe Springs

0.3 mi

150 yds

bing

© 2009 Microsoft Corporation. © 2009 NAVTEQ © AND
Intel® technology by INTEL

First ISOLATE 200 ft in all directions, then PROTECT downwind 0.3 mi

Multi-K Sensor Equipped GPS Devices



In-Transit Monitoring GPS

SECURITY (Tampering)

- Motion detection Image capture (pilot)
- In-transit valve dome access with Image

RIDE QUALITY

- Impact Accelerations in G's
- MPH Coupling and Decelerations speed
- Image Capture for high impact events

Security Events Reported

- 21 HCL tank-car tampering since October-09
 - Working with RR, TSA, Rail Police, State police
- Tamper indicator bags
- Inspection Photos post-load
- Motion Detection GPS Cameras pilot



False Alarms

- Photos provide visual context
- Paired Tank-Car Alerts (redundancy)
- Turn Alerting on between end points



Pictures provide context

Photo Triggers:

- Deceleration Events > 5 mph
- Impacts over 5 Gs
- In-Transit Valve Dome Open Events
- Motion Detection (Tampering)
- Manual page requests

Daily Summary Email

Immediate Email

From: dataservice@Olin.com [mailto:dataservice@Olin.com]
 Sent: Friday, August 01, 2008 10:15 PM
 To: Loftis, Don CHAS
 Subject: OLNX 114016, Alarm: OPEN, 0 ppm, 08/01/2008 9:48AM(EST), Charleston, TN

This is an automatic Olin.com Transportation alarm message.

Customer: Olin
 Car Number: OLNX 117063
 Message Received: Aug 1 2008 10:15AM(EST)
 Message Created: Aug 1 2008 9:48AM(EST)
 Message: Alarm: OPEN, 0 ppm
 Location:

town: Charleston
 state: TN
 distance: 1.4091 mi
 bearing: 60.137 deg

Latitude: 35.3042
 Longitude: -84.7736
 Railroad: NS
 Extra Data:



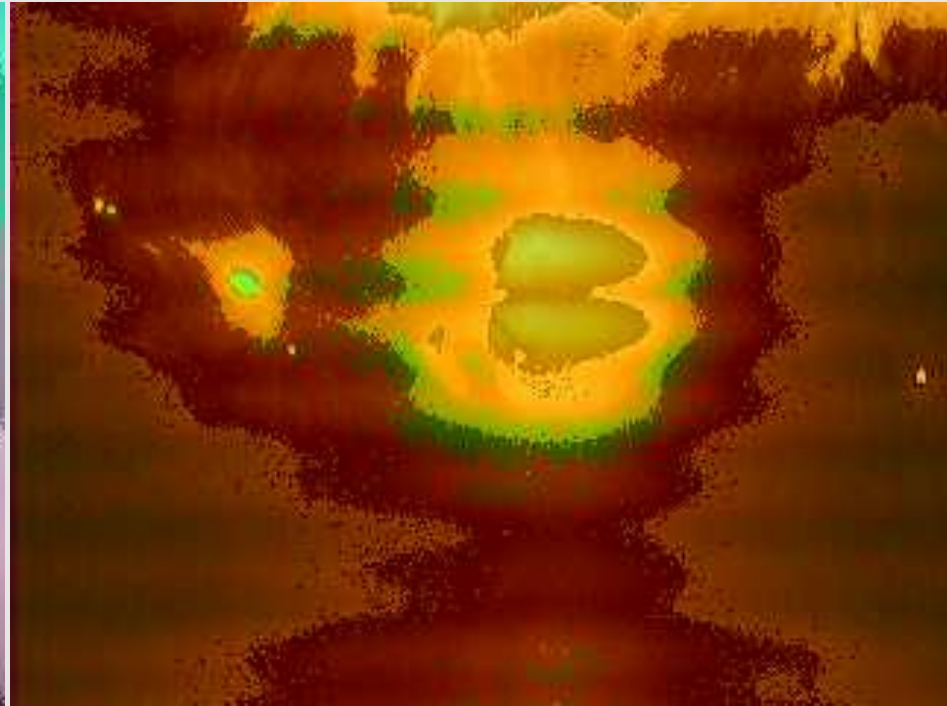
For additional information contact Olin 423-336-4340

ITview Report: AllPhotosLastDay 27 Records Sent: 2/9/2012 8:30:25 ...

File Message

From: itview@olin.com Sent: Thu 2/9/2012 8:30 AM
 To: Loftis, Don B CHAS
 Cc:
 Subject: ITview Report: AllPhotosLastDay 27 Records Sent: 2/9/2012 8:30:25 AM

SHPX203447	HCL	E	
TILX400859	CHLORINE	E	
TILX600835	CHLORINE	L	
TILX600847	CHLORINE	L	



- Takes only a few minutes
- Enjoy the Free Art...

Abnormal Ride Quality Events

- Short Duration high impact events < 50 ms
- Over-Speed events (7 mph) GPS based
- Vertical or Side events
- **Olin Marks these for inspection**
- **LOGIC to Insert Event into OEHM Alert CUE**

**HighG, Decel, Security, Quake, Water,
Wind, EW, MA, ABD, THD, WILD, DDCT**

Derailment 9/17

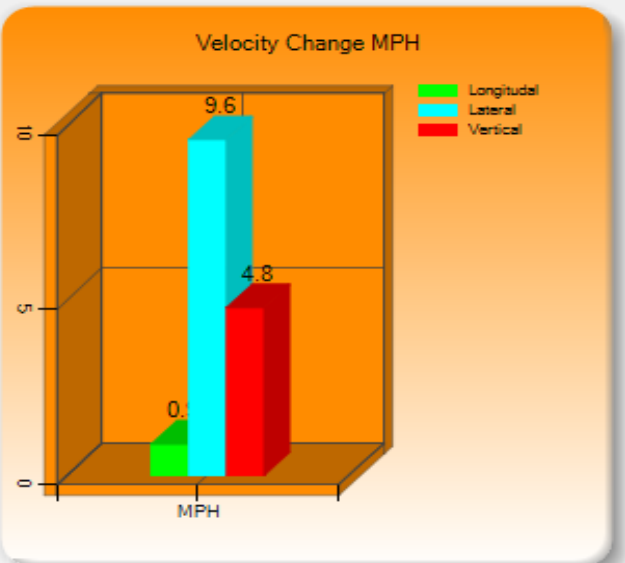
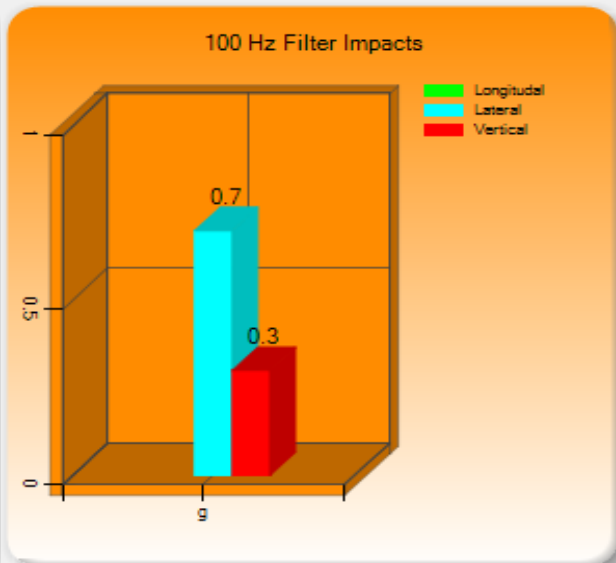
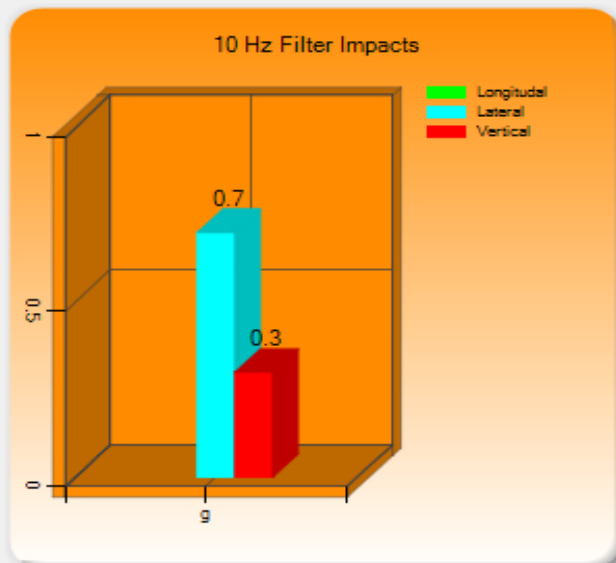


SBLX014016 : 9/17/2012
3:10:32 PM
Loaded Moving Haynesville, LA .7G

9/17/2012 3:10:32 PM L 1 mph Going To BROMET, AR Impact Alarm Haynesville, LA .7G LNW R 00:00:00
[View Maint/Notes](#)

SBLX014016 : 9/17/2012 7:13:44 PM

Impact Event Detail on SBLX014016 for event 95812723



SBLX014016										95812723		GO	Maintenance
vmph	y_dvmph	x_dvmph	speed	course	message_typ	photo	gps_unit	unit_id	id	unit_dttm	latitude		
	4.8	9.6	1	102	Impact Alarm	0	LAT-LON	233391161699	95812723	9/17/2012 3:1	32.898712		



↑
After Re-Track

Impact Picture →



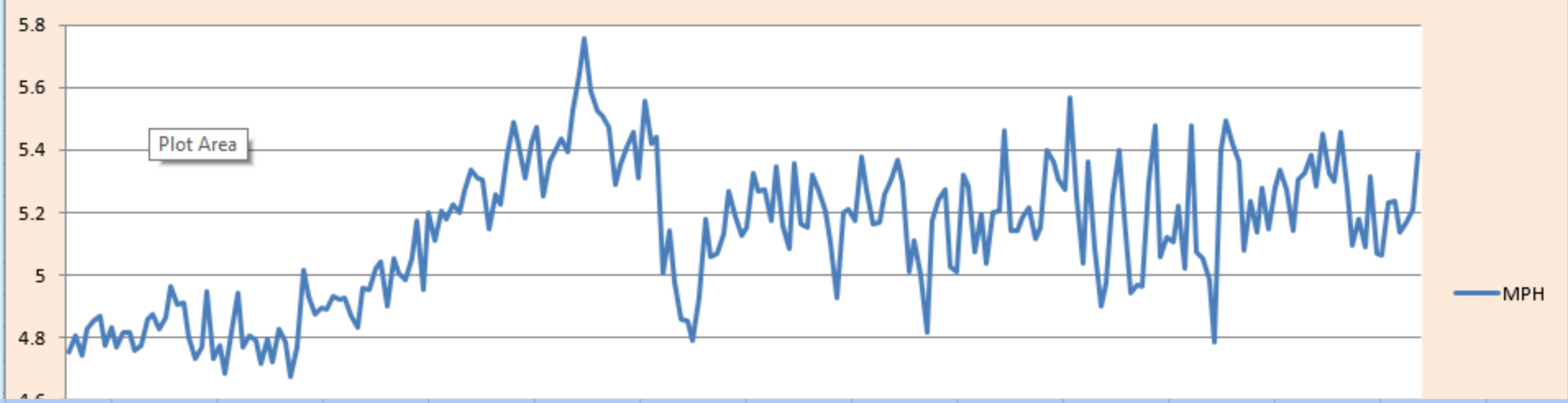
Rollover Image – Damaged



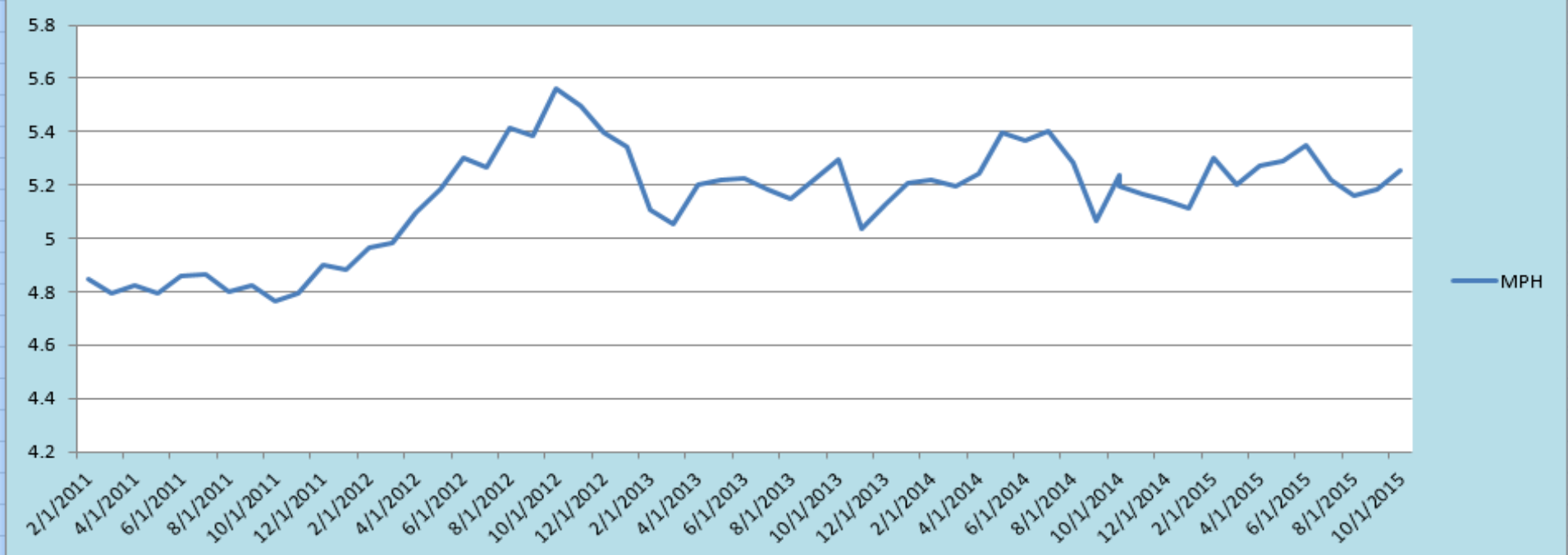
GPS Coupling Speeds (Decelerations)

- Speed checked in motion over 3 mph (GPS)
- Coupling Speed is reported as Speed-Drop
- Original Speed = Final Speed + Speed Drop
- Good Correlation between Delta-V from accelerometers and Speed Drop from GPS data

Weekly Deceleration Events 2011-2015



Deceleration Events by Month 2011 - 2015



Coupling Speeds Analysis

Average Deceleration MPH: 6.3 Total Couplings >= 4 MPH: 27722

Date Range: From: Hide IDs To: Any Device IONX LATLON

Additional Selections: 3.5 MPH - All Carriers - Both Empty/Full
 - All Products - All Yards - All Cars

Summary | 1 Yard | 2 Yard | 3 Yard | 4 Yard | 5 Yard | 6 Yard | 7 Yard | 8 Yard | 9 Yard | 10 Yard | All | Un-Identified

Yard	Approximate Events
1 Yard	1400
2 Yard	1000
3 Yard	750
4 Yard	700
5 Yard	700
6 Yard	550
7 Yard	500
8 Yard	488
9 Yard	400
10 Yard	400

8 Yard has 488 Deceleration Events

Summary | Yard Impact Profile

Deceleration (g)	Approximate Events
2 g	10
3 g	10
4 g	180
5 g	120
6 g	80
7 g	40
8 g	30
9 g	30
10 g	100

Yard Profile for 8 Yard has 488 Deceleration Events

FEEDER OR FLAT TRACKS

Impacts on Images



7 MPH with 5.5 G Vertical



8 MPH with 4.9 G Lateral

Olin's Intent

- Share a RR's Data with THAT RR
- **Not** share a RRs ride quality data with other RR!!!
- Hope/belief RR will use data to fix issues

As a Rule:

- Olin will **not** report individual event to RR.
This avoids RR costs to resolve single events
- Share results about systematic problems

Olin ORC Focus

- Work with carriers to improve ride quality (Share Data)
- Explore techniques to mitigate tampering
- Ensure that **ZERO** Olin rail equipment leaves Olin with any defects
- Strengthen relationships with industry partners and carriers to improve everyone's safety
- Share this info with other Shippers

Thank You ♥