

Wayside and On Board Sensing

Don Loftis

Principle Software Engineer

Rail Security Coordinator

Olin Corporation

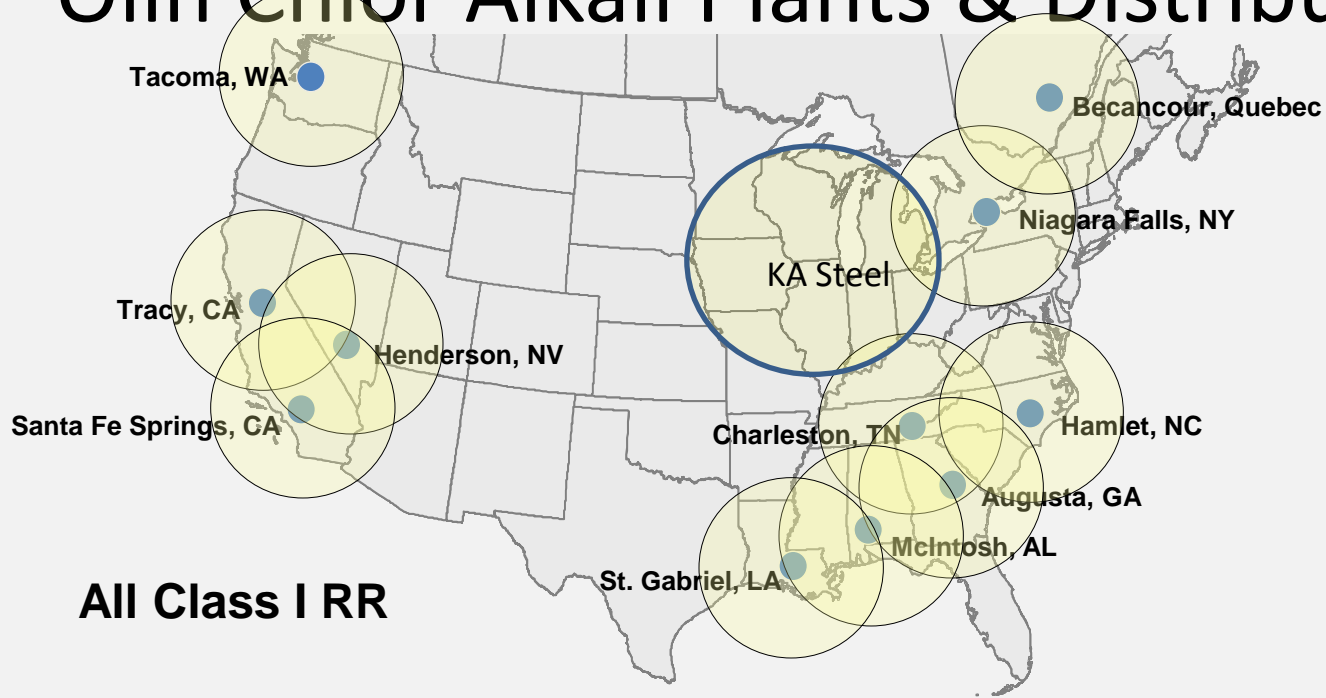
Thank You for the opportunity

Olin's North American Position

- Largest shipper of chlorine by rail in North America
- #1 merchant marketer of chlorine
- #1 industrial bleach producer in North America
- #1 producer of on-purpose Hydrochloric Acid
- Widest geographic coverage of any N.A. producer



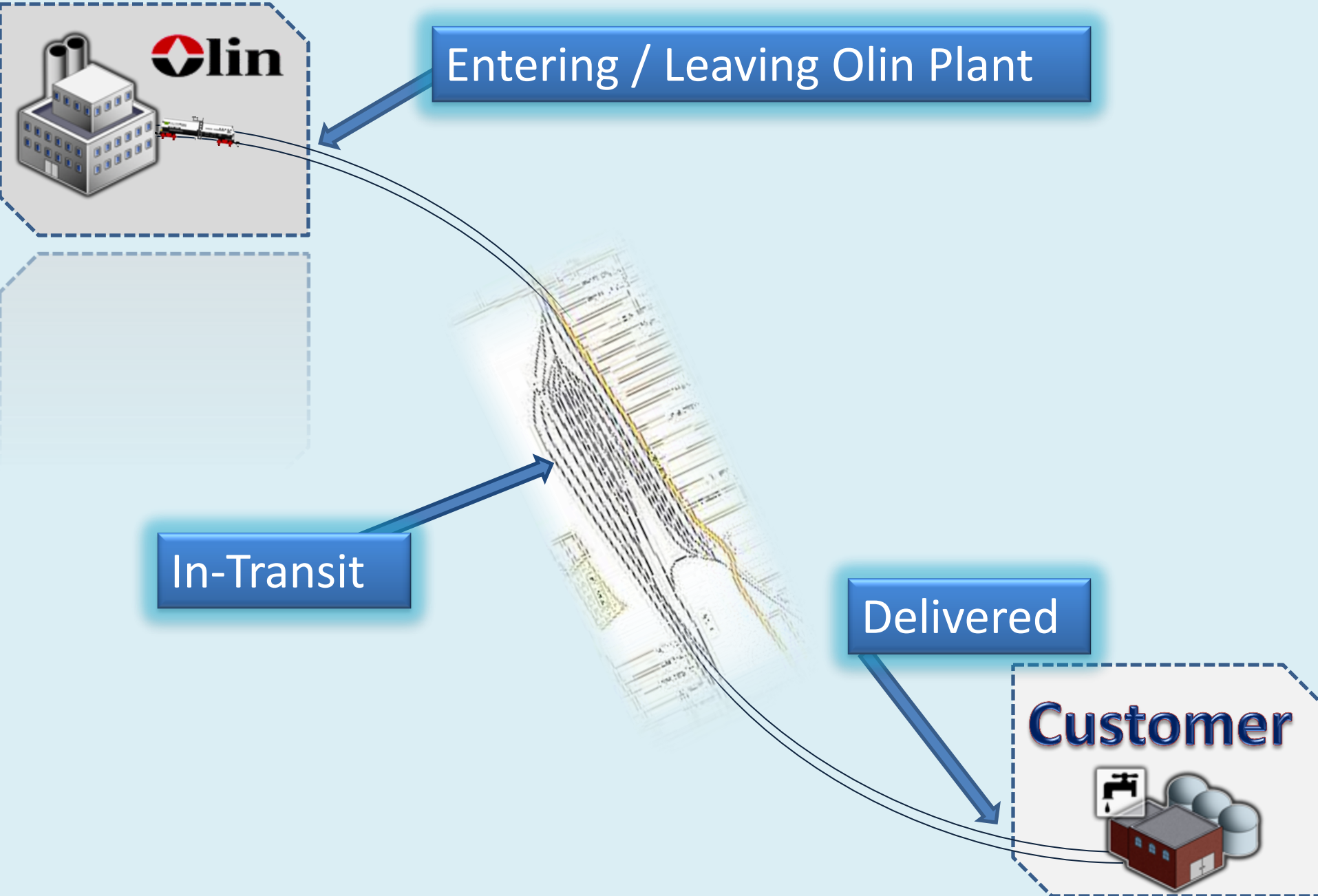
Olin Chlor Alkali Plants & Distribution



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	-	-	-	-	•

Railcar Shipment Overview



Entering / Leaving Olin

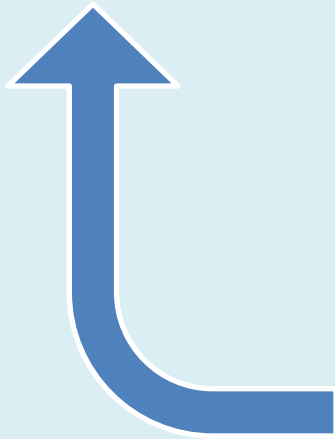
Read AEI Tags

Capture HD Car Images

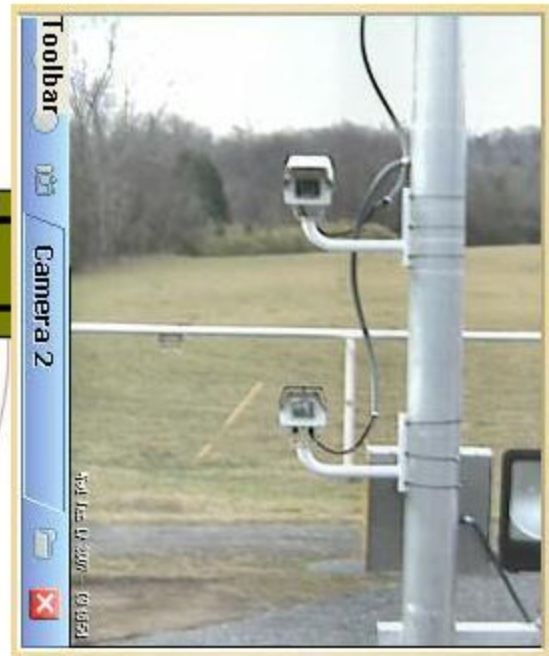
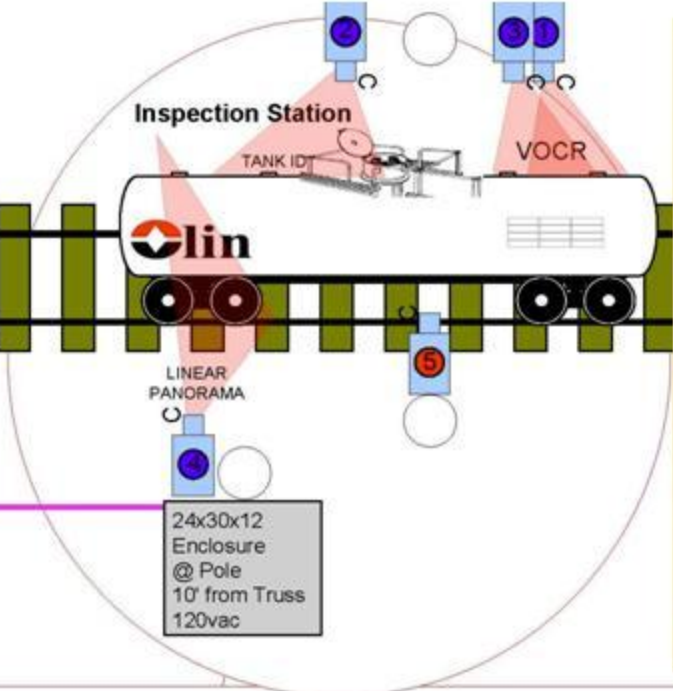
Due REG. Maintenance

EHM 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

24x30x12 Enclosure @ Pole 10' from Truss 120vac

Sony Ipela Fixed Cam 3

Sony Ipela Fixed Cam 2

VOCR
TANK ID
VOCR

Sony Ipela Fixed Cam 1

LINEAR PANORAMA

4" Conduit



- Maintenance
- Maintenance Du...
 - within Months
 - Out of Complianc...
 - HM201 All Regu...
 - 010 TANK QUALI...
 - 020 TEN YR TA...
 - 030 THICKNES...
 - 040 SERVICE E...
 - 050 PRESS RE...
 - 060 STUB SILL...
 - 070 RULE 88.B...
 - 080 THICKNES...
 - 090 DOT E-119...
 - 100A PAINT & C...
 - 100B PAINT & C...
 - 100C PAINT & C...
- Maintenance Optio...
- Include Cars wit...
 - Cars Missing Da...
 - Off-Route SAP P...
 - Over-Due SAP P...
 - Late By >
 - Not Moved >

Olin Railcar SBLX 24129 OCR Viewer

SBLX 24129 Image Detail Maintenance



Date
20060821
20060821
20060821
20060821
20060821
20060815
20060821
20060819
20060814
20060814
20060813
20060821
20060821
20060815

OCR Table:			
	STATION STENCIL	QUALIFIED	DUE
TANK QUALIFICATION	FRAL	2003	2013
THICKNESS TEST	FRAL	2003	2013
SERVICE EQUIPMENT	FRAL	2003	2013
PRD:VALVE 75 PSI	FRAL	2003	2013
	(null)	(null)	(null)
LINING/COATING	FRAL	PP	NONE
88.B.2 INSPECTION	FRAL	2003	2013
STUB SILL INSPECTI	FRAL	2003	2013

SAP Dates:	
Previous	Due
2003	2013
2003	2013
2003	2013
2006	2013
2003	2013
2003	2013

Late	Ship-Type	C
1	400_RAIL...	00
0	400_RAIL...	00
0	400_RAIL...	00
-1	400_RAIL...	00
-1	400_RAIL...	00
0	400_RAIL...	00
0	400_RAIL...	00
8	400_TO ...	00
0	400_RAIL...	00
0	400_RAIL...	00
0	400_RAIL...	00
-4	400_RAIL...	00
0	400_RAIL...	00
0	400_RAIL...	00

Who Damaged This Car??



Leaving Plant



RailRoad Equipment Health (pilot)

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

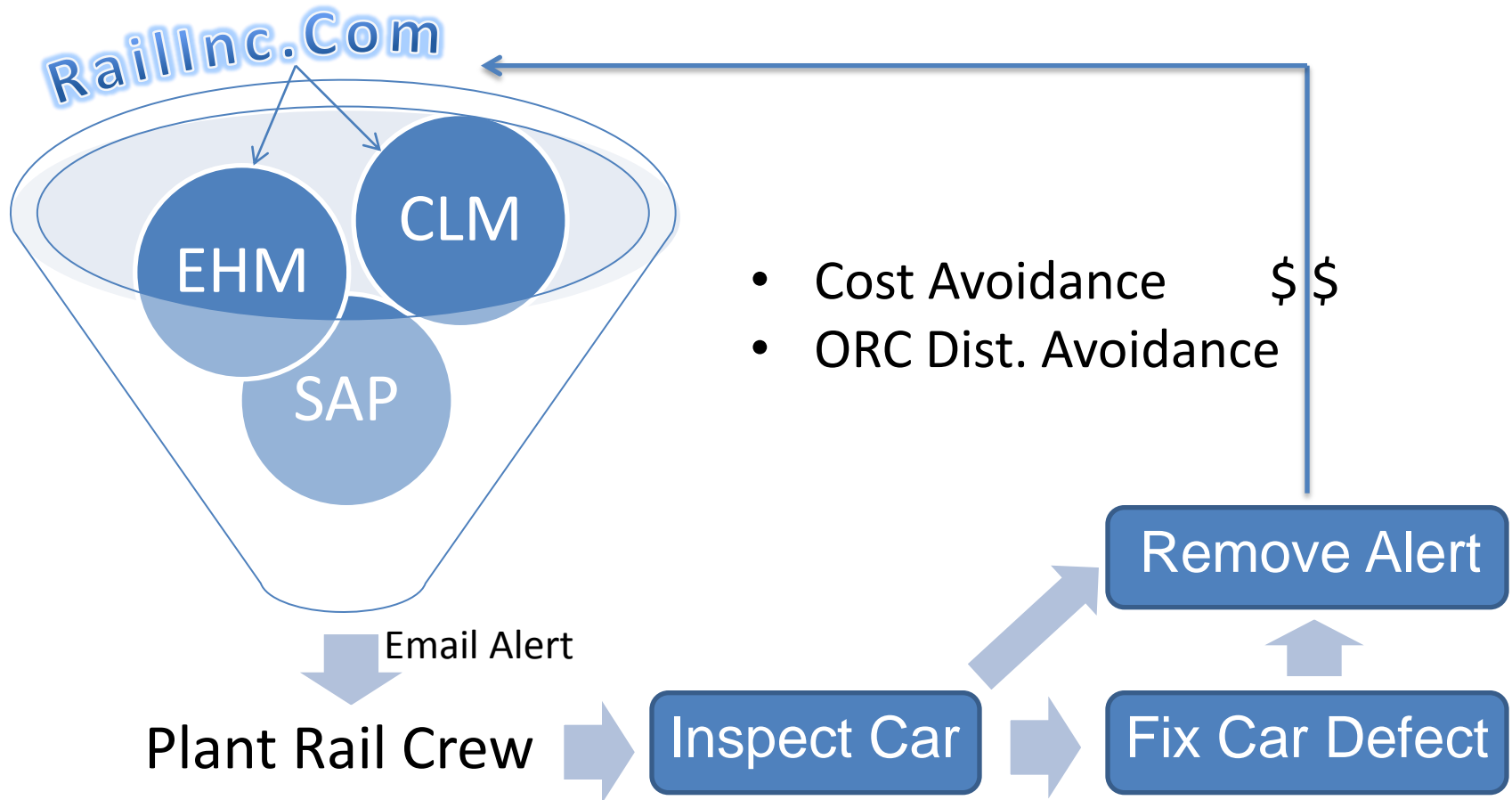
- THD- Truck Hunting Detector
- TPD- Truck Performance Detector
- WILD- Wheel Impact Load Detector
- ABD- Acoustical Bearing Detectors
- Others (Profilers, Hot/Cold Boxes, etc)



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



EHM Pilot Results

- Averaging \$14K/mon savings by removing alerts on new WS
- Found 1 Dangerous Truck - newly Shopped car
- Focus and streamline our inspections
- Save by preferring Turned Wheels over New
- We are happy with this new RailInc service!!

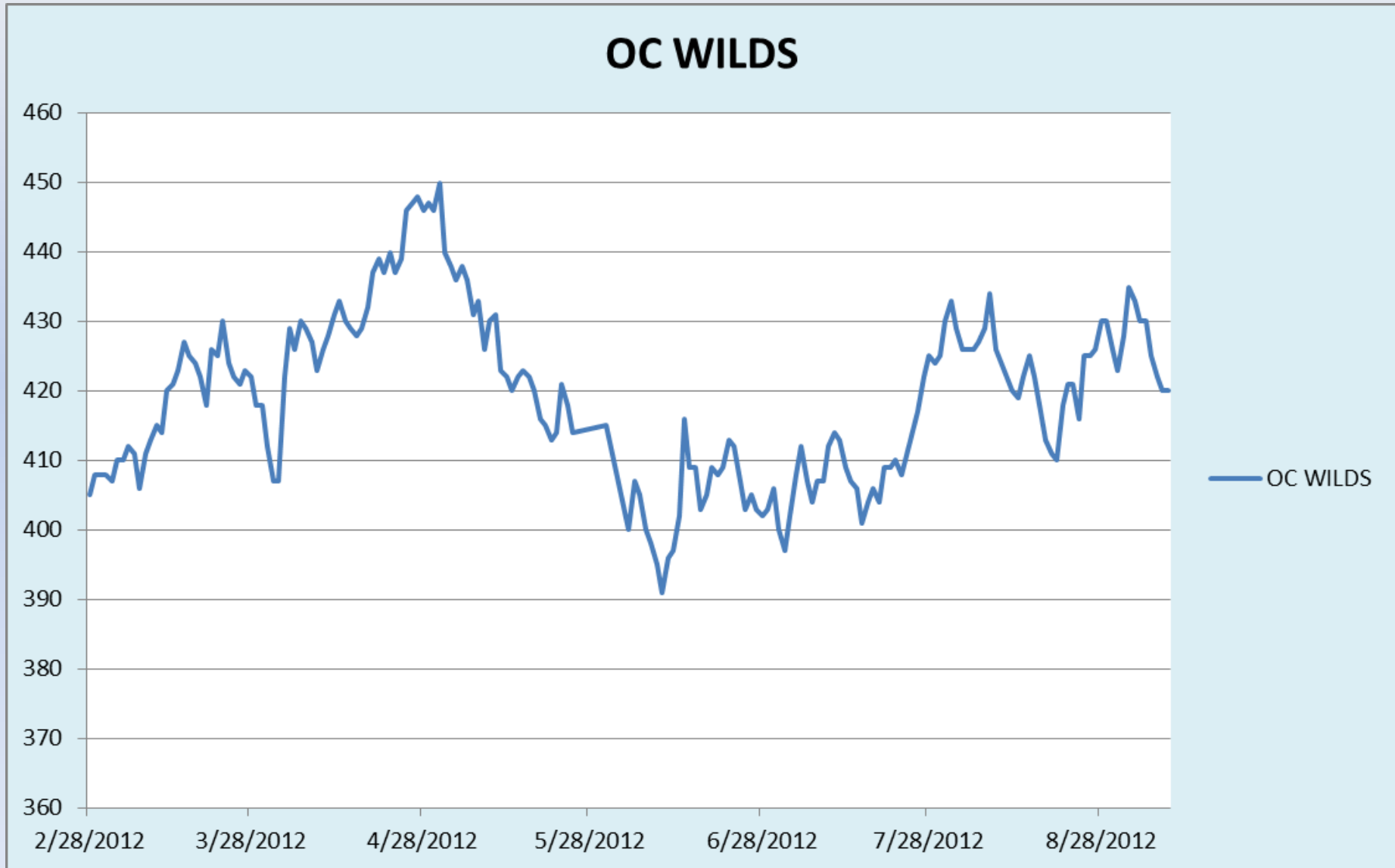
This report lists Railroad Equipment Health Railcar Alerts Delivered to your plant
Total Records: 4

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		



2012/06/27 02:53:37PM

Active Olin WILD Alerts



In-Transit Monitoring

- GPS with Open/Close Dome Detection
 - Motion Detection Image Capture
 - Impact and Deceleration Data

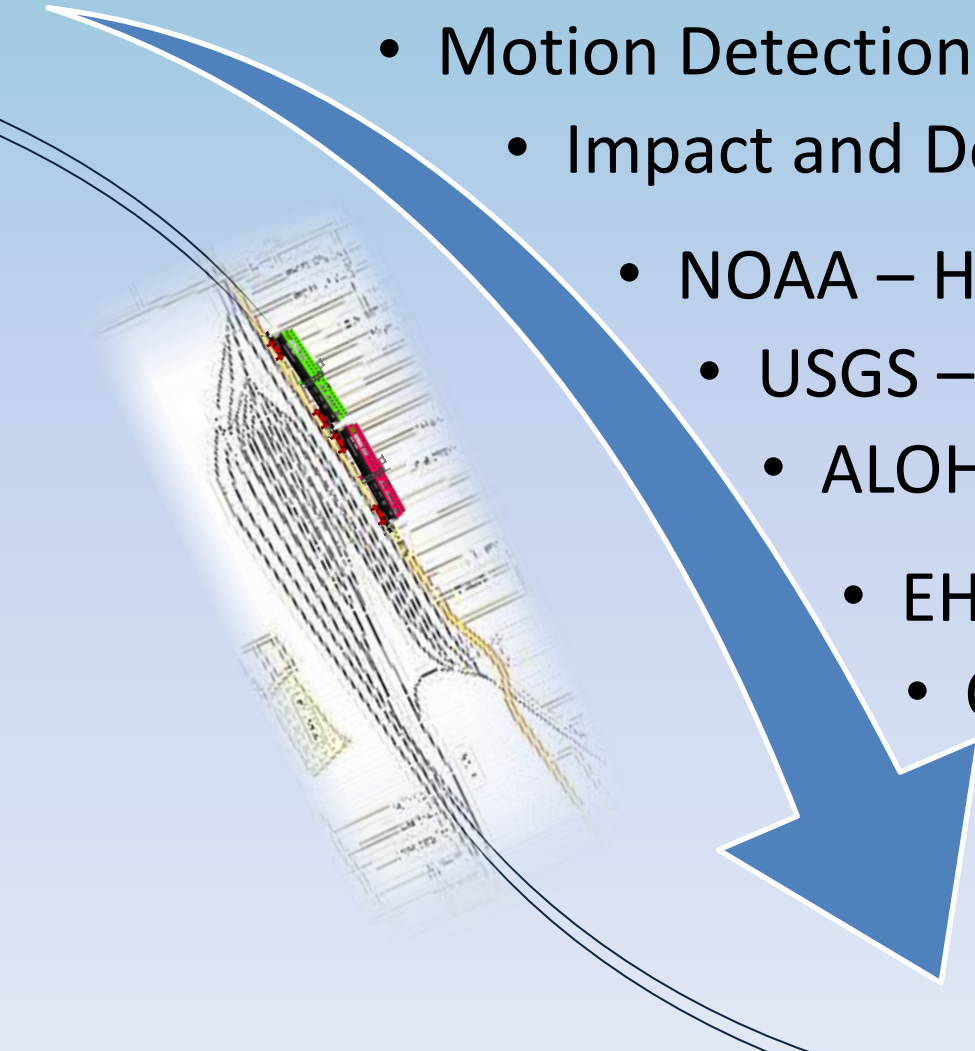
GPS

- NOAA – Hurricanes Storms
- USGS – Earthquake Data
- ALOHA Plume Modeling

WEB

- EHM Alert Data
- CLM Data

RailInc

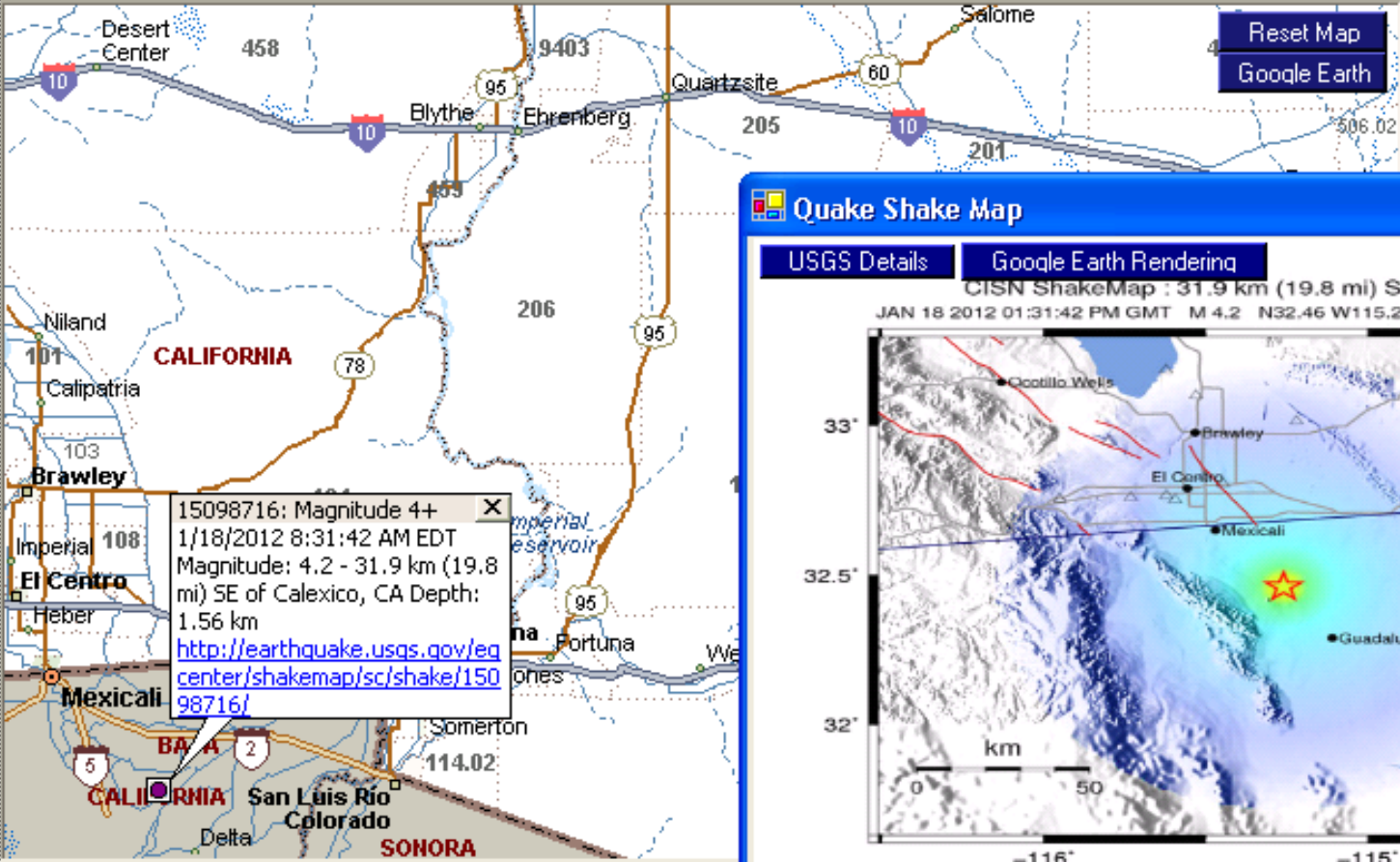


Weather and Earthquake Tracking

- 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

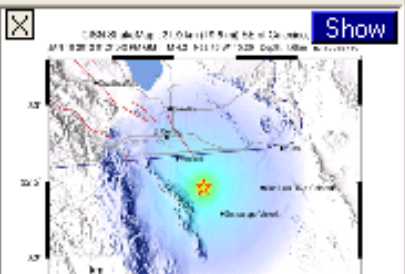
← → Type place or address Find Road and Data Map

North America United States California Bard



15098716: Magnitude 4+
 1/18/2012 8:31:42 AM EDT
 Magnitude: 4.2 - 31.9 km (19.8 mi) SE of Calexico, CA Depth: 1.56 km
<http://earthquake.usgs.gov/earthquakecenter/shakemap/sc/shake/15098716/>

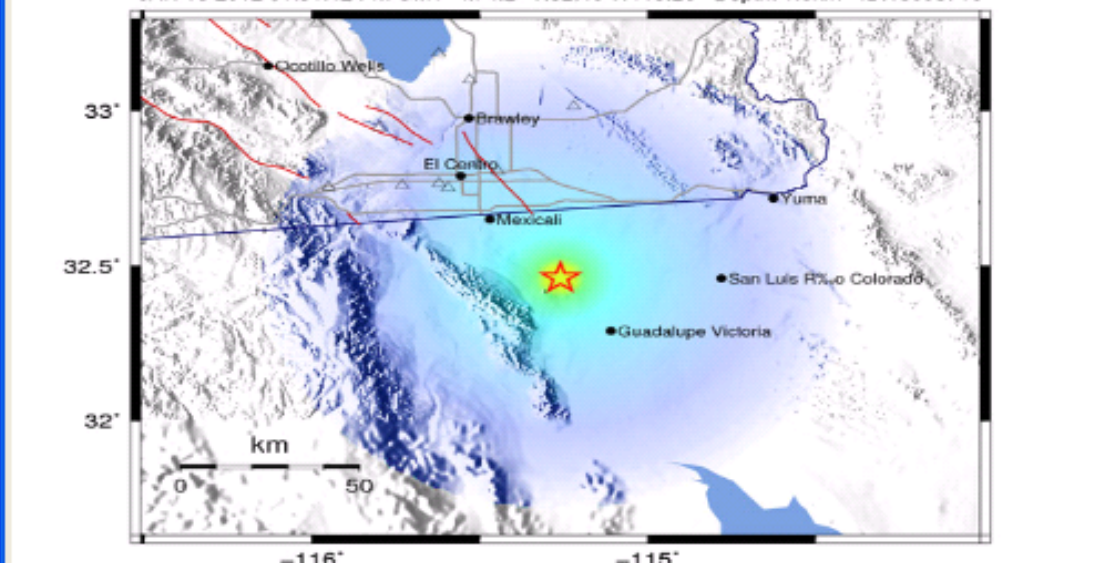
Event Info



Quake Shake Map

USGS Details Google Earth Rendering

CISN ShakeMap : 31.9 km (19.8 mi) SE of Calexico, CA
 JAN 18 2012 01:31:42 PM GMT M 4.2 N32.46 W115.25 Depth: 1.6km ID:15098716



Map Version 6 Processed Thu Jan 19, 2012 07:47:25 PM GMT

	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
PERCEIVED SHAKING	None	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(mg)	<0.17	0.17-1.4	1.4-4.0	4.0-9	9-17	17-32	32-61	61-114	>114
PEAK VEL.(cm/yr)	<0.12	0.12-1.1	1.1-3.4	3.4-8	8-16	16-31	31-59	59-115	>115
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Wald, et al., 1999

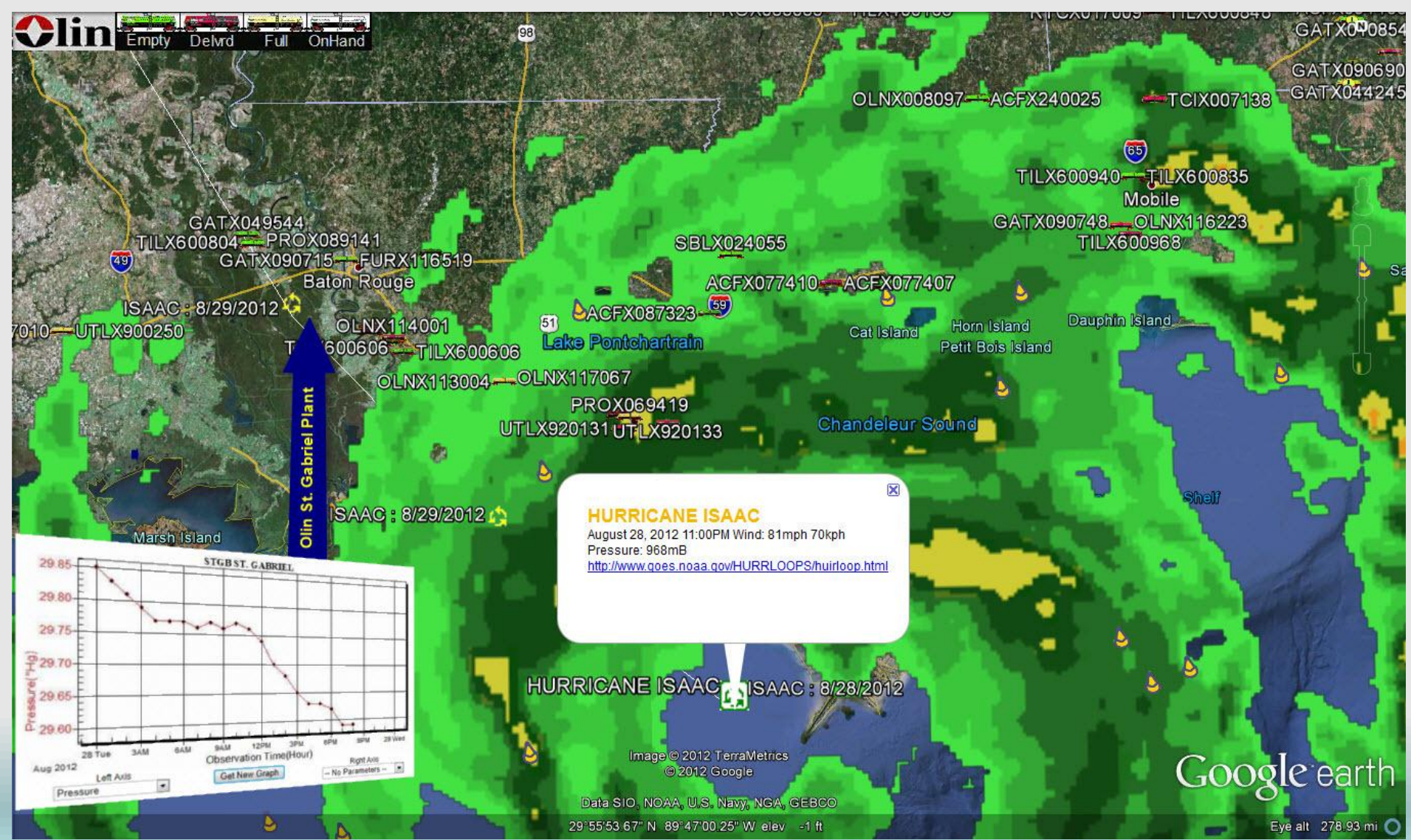
Previous Plume Plots

- [-] Events
 - + 1282011
 - + 152010
 - + 172010
 - + 212010
 - + 232010

TIH HTUA Storm
 Hurricanes Quak

Start Aloha
 Clear Plumes
 Show Selected Plumes

Hurricane and Severe Weather



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

Perkins Ave Burke St

Roxabel St Sibert St Shade Ln Bluejay Ln Morill Ave Franklin Ave Bluejay Ln Broaded St Maxine St Fredson St La Doñana Ln Jersey Charlesworth Rd Adlee Ave

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

Santa Fe Springs

Plume-7-1-2009-11hr58 AM.itv X

5027

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))

SIMULATED Event !!!!

ICAL DATA:

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

Local Emergency (Medi...
Locate a Railcar
Pick Location for plume
Click on Map
Sense
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. © 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
- 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

False Alarms

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



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

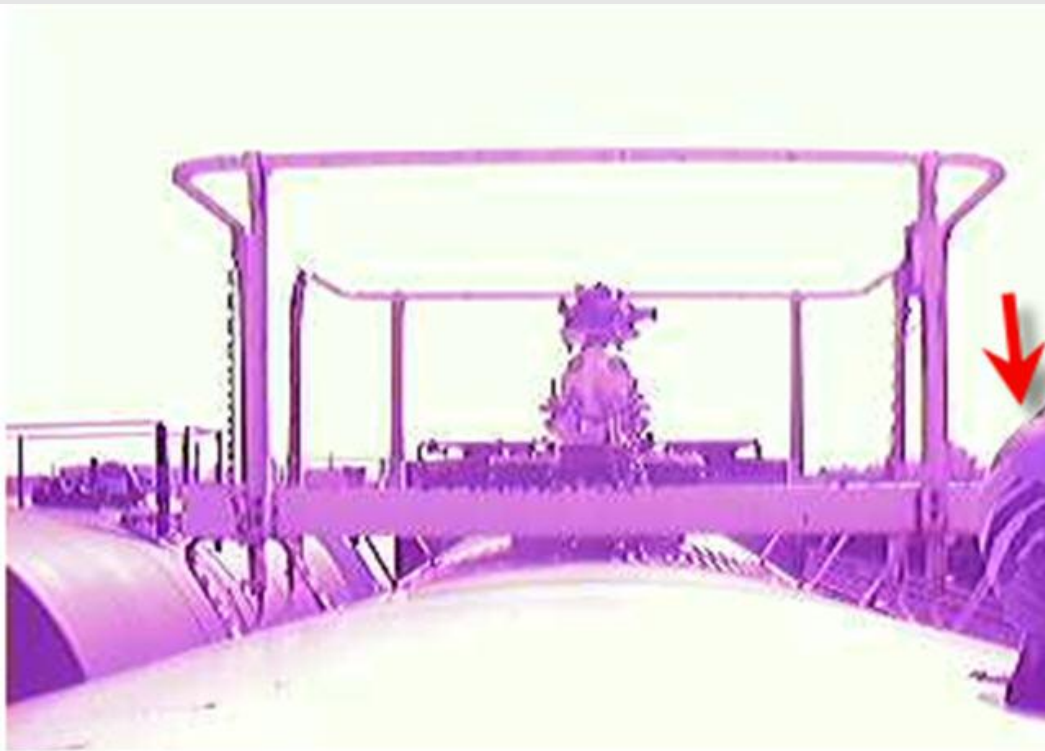
From: itview@olin.com Sent: Thu 2/9/2012 8:30 AM
 To: Loftis, Don B CHAS
 Cc:
 Subject: ITview Report: AllPhotosLastDay 27 Records Sent: 2/9/2012 8:30:25 AM

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

Motion Image Capture

FALSE ALARMS

- Wildlife
- Drastic light changes
 - Locomotive
 - Yard Lights
 - Fast moving clouds



But It works...

- False Alarms can be reduced
- Takes about 2 minutes to review images each day (about 120 images)

Man Spies GPS Unit



Impact then Unit on Ground



SHPX203820 HCL L GPS 4/5/2012 9:59:4
☆
38.5178, -90.
[Directions](#) [S](#)



GPS Unit Into Dumpster



4/5/2012 10:57 pm

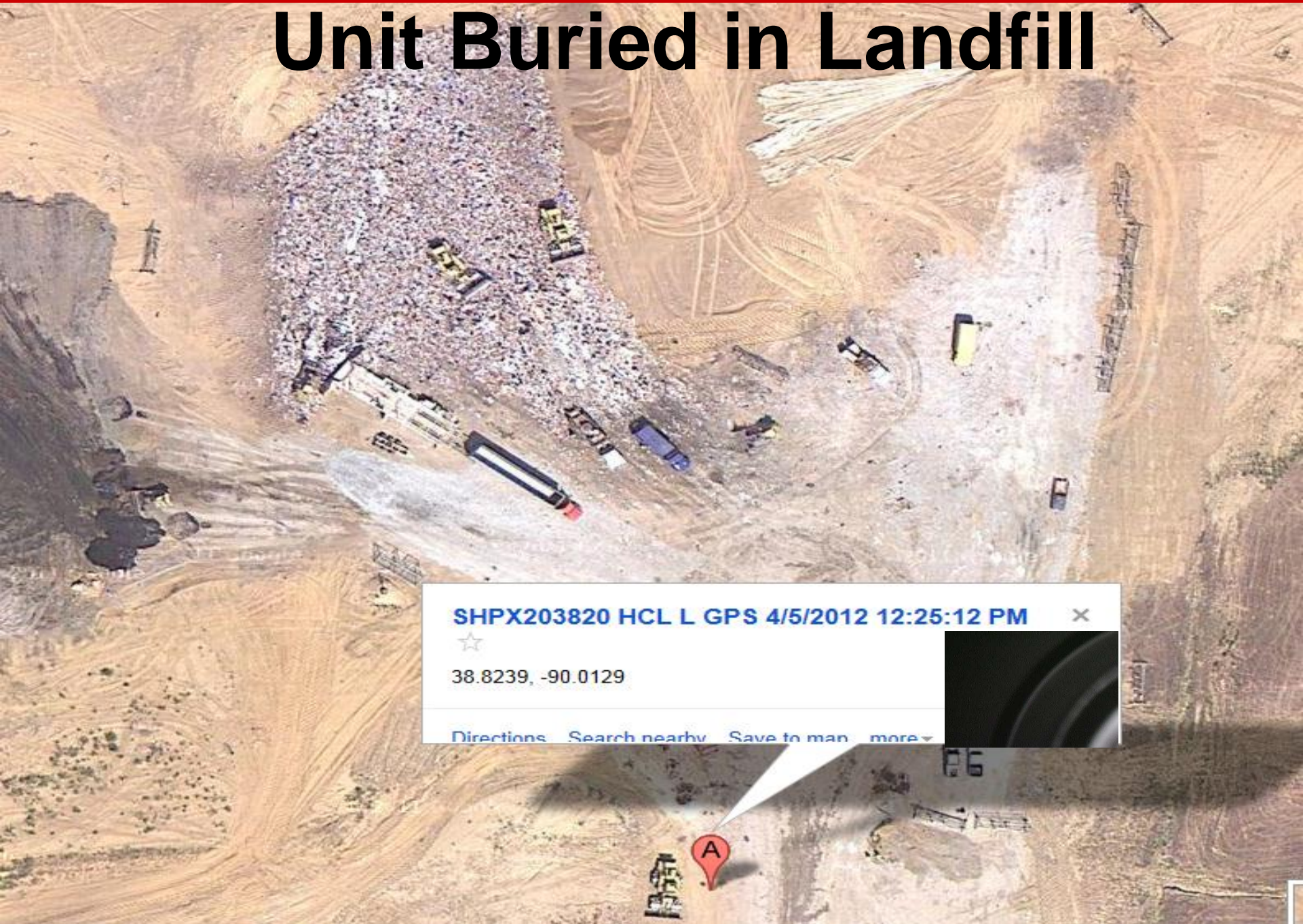


38.5178, -90.2128

[Directions](#) [Search nearby](#) [Save to map](#) [more](#)



Unit Buried in Landfill



SHPX203820 HCL L GPS 4/5/2012 12:25:12 PM



38.8239, -90.0129

[Directions](#) [Search nearby](#) [Save to map](#) [more](#)



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

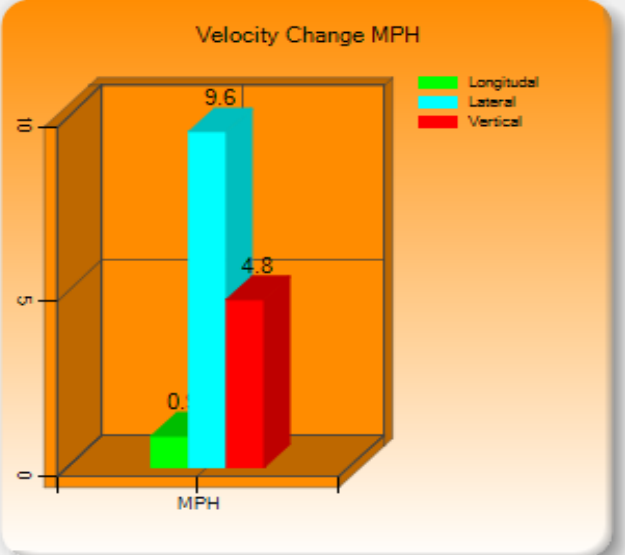
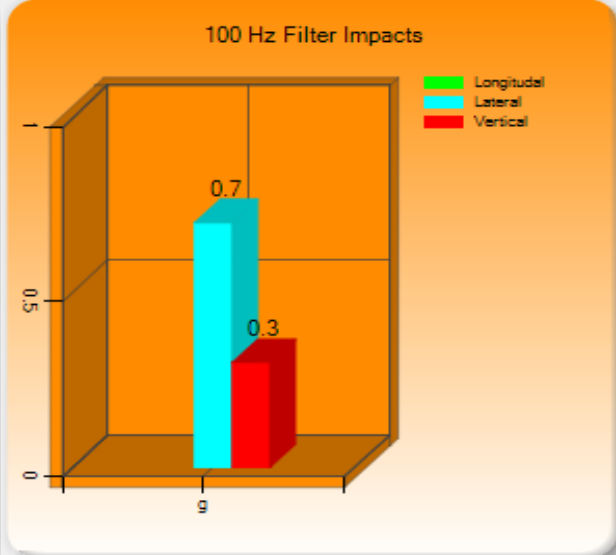
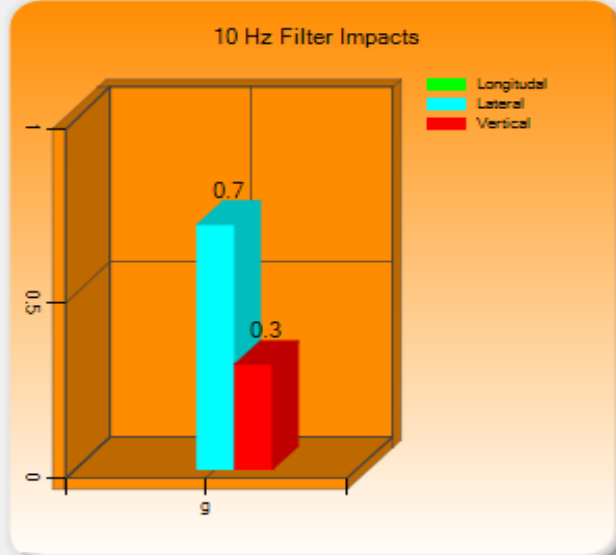
SBLX014016 : 9/17/2012
3:10:32 PM
Loaded Moving Haynesville, LA .7G

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		



Impact Picture →

After Re-Track



SKIN

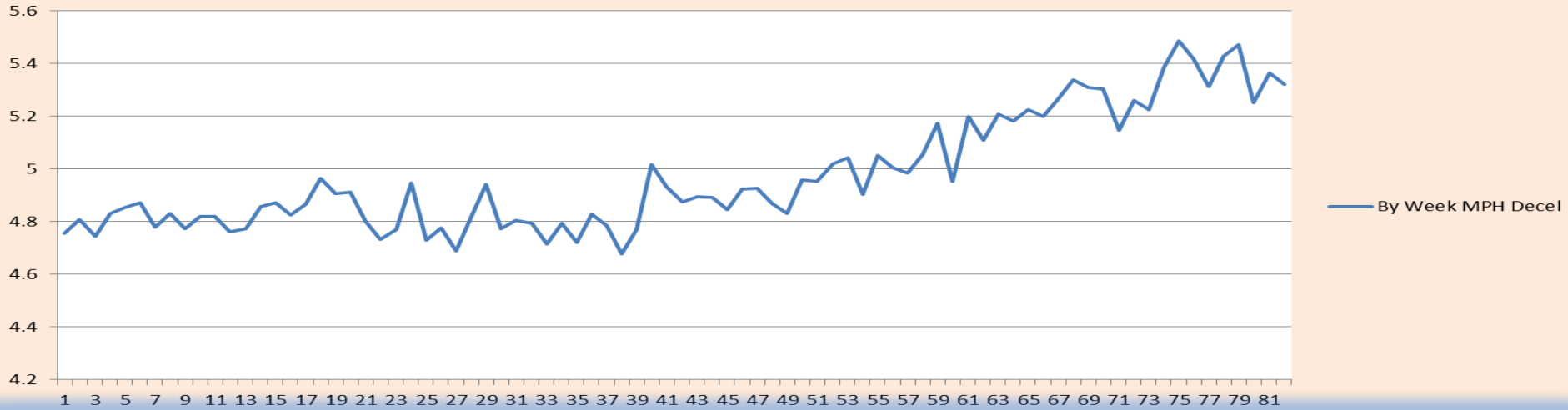
Dome

GPS Coupling Speeds (Decelerations)

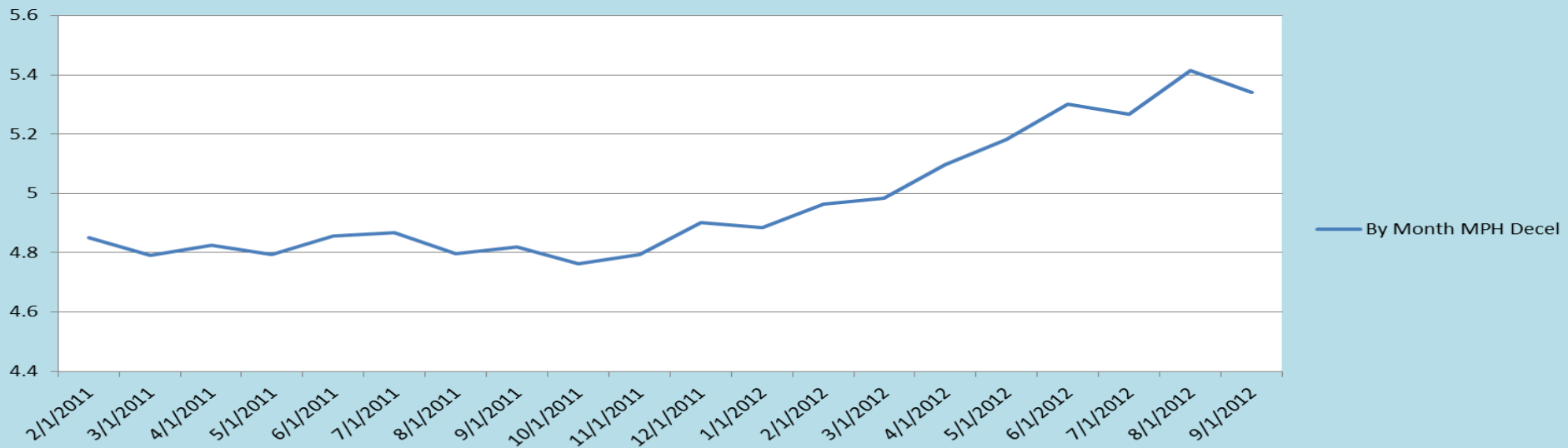
- Speed checked in motion over 3 mph (GPS)
- Coupling Speed is reported as Speed-Drop
- Original Speed = Final Speed + Speed Drop
- Good Correlation between Delta-V from accelerometers and Speed Drop from GPS data

Decelerations 2011-2012

By Week MPH Decel



By Month MPH Decel



Coupling Speeds Analysis

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

Date Range: From: Hide IDs To: Any Device IONX LATLON
 Sunday, January 01, 2012 Thursday, September 20, 2012

Additional Selections: 3.5 MPH * - All Camers * - 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	700
4 Yard	700
5 Yard	700
6 Yard	500
7 Yard	500
8 Yard	488
9 Yard	400
10 Yard	400

8 Yard has 488 Deceleration Events

High Deceleration

Summary | Yard Impact Profile

g-force	Approximate Events
2 g	10
3 g	10
4 g	180
5 g	120
6 g	70
7 g	30
8 g	30
9 g	30
10 g	80

Yard Profile for 8 Yard has 488 Deceleration Events

Map showing location and tracks. A red arrow points to a cluster of yellow and orange dots on the map, labeled "FEEDER OR FLAT TRACKS".

Olin's Intent

- Share a RR's Data with THAT RR
- **Not** share a RRs ride quality data with any 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 associated with resolving individual events.
- Share results about systematic problems

Olin ORC Focus

- Work with carriers to improve ride quality (Share Data)
- Explore techniques to help reduce and 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 and security

Thank You ♥