



# Lost in the Cloud? There's an App for That

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# What is the problem?



- ◇ Why is it that one can find information on almost anything in milliseconds with a smart phone, but it may take hours or days to get a concentration level or trend for Benzene in MW-105 at your contaminated site?



# What is the problem?



- ◇ Information Management permeates virtually all aspects of environmental management, costs and performance
- ◇ Railroads already own millions of environmental, analytical, and other records across a portfolio of sites
- ◇ For every \$1 spent on environmental management, another \$1.76 is spent on managing information

Source: BTI Report on E-Strategies for Environmental Management: Opportunities for Performance (<http://www.bticonsulting.com/publications.asp>)

# What is the problem?



- ◇ Without an EMIS you have no ability to efficiently mine data for actionable information
- ◇ And, you can't manage what you can't measure





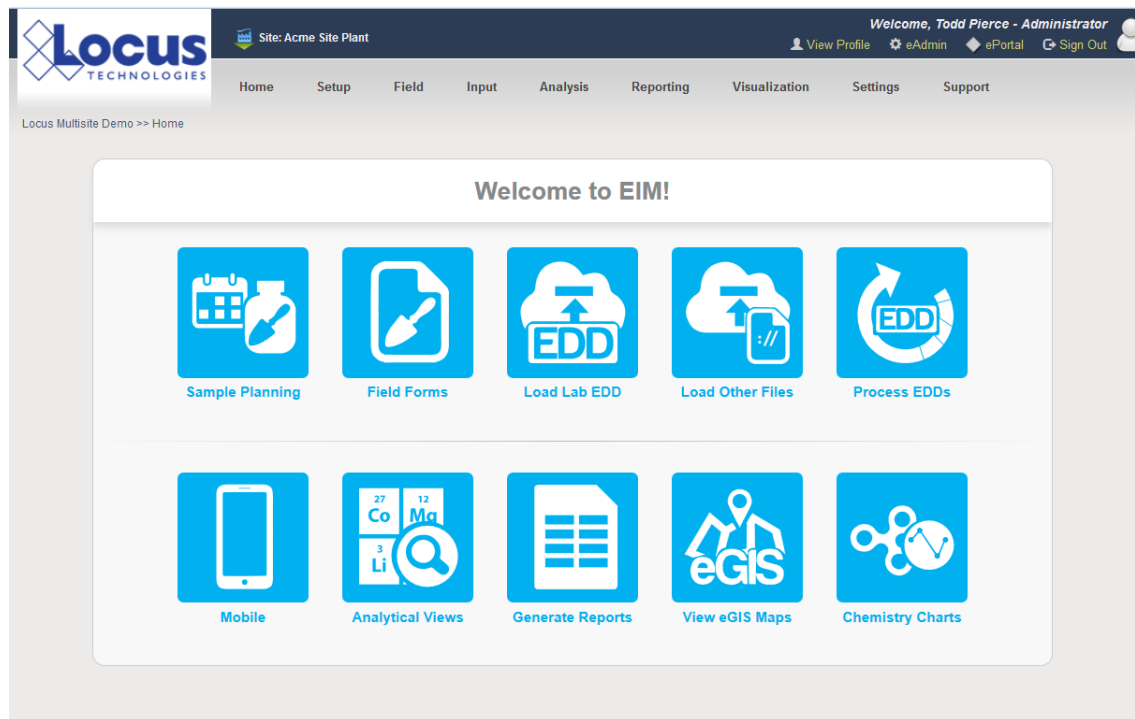
## Getting the Railroad Industry on Track for Environmental Information Management in the Cloud







- ◇ Cloud-based environmental data management software used by many organizations in Energy, Chemical, Mining, Agriculture, and other sectors



# Overview



- ◇ Use of GIS and mobile applications to address the following functions
  - Data Collection & Management
  - Decision Support
  - Regulatory Compliance



# Data Collection & Management



- ◇ Managing field activities
- ◇ Real-time data collection
- ◇ Reduced data transcription
- ◇ Data quality
  - Location identification
  - Input criteria
  - Data review





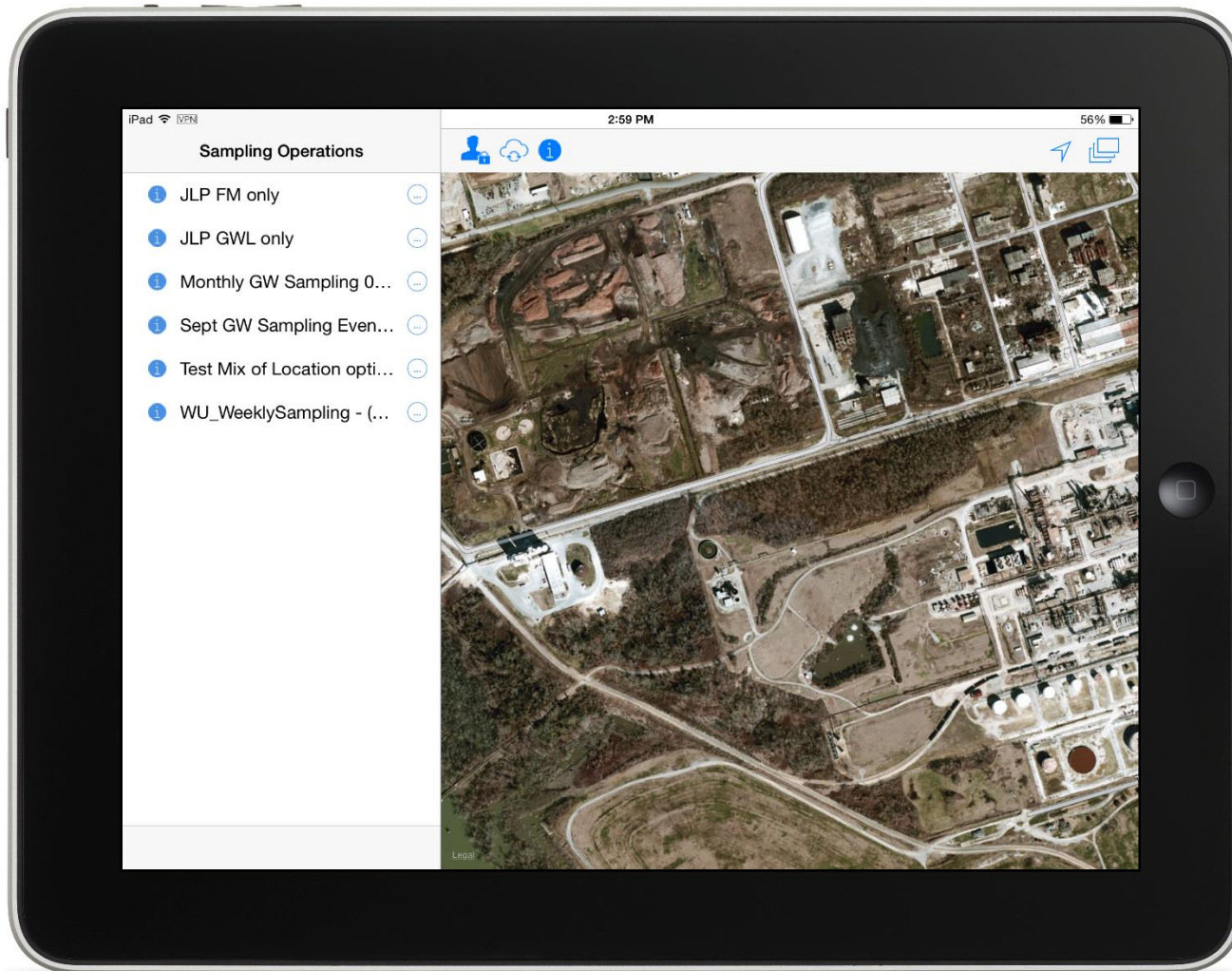
# Mobile Apps for Data Collection



- Configurable data collection templates
- Use mobile map interface to plan routes and gather sampling data
- Synch data back to EIM cloud for analysis



# Mobile Apps for Data Collection



# Mobile Apps for Data Collection

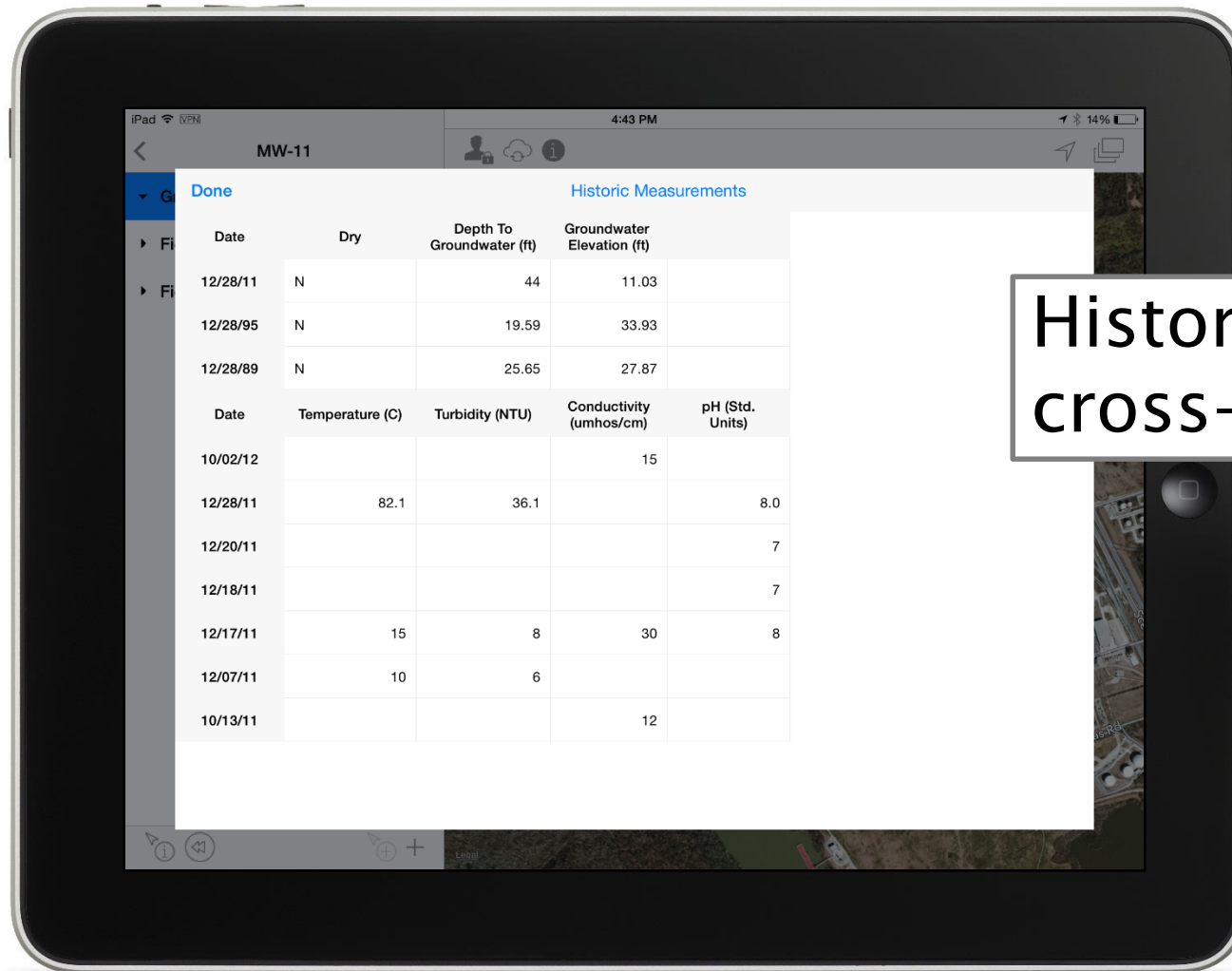


Cancel Entry 1 Save

*Date/Time Mea...	09/29/2014 14:25
*Dry	Well is Not Dry
Depth To Groundwater (ft)	
Groundwater Level Comm...	
Ad hoc Groundwater Level...	
Logging Company	Locus
Measured By	JLP, RW
Prog...	Quarterly Groundwater Moni...

Refresh icon

# Mobile Apps for Data Collection



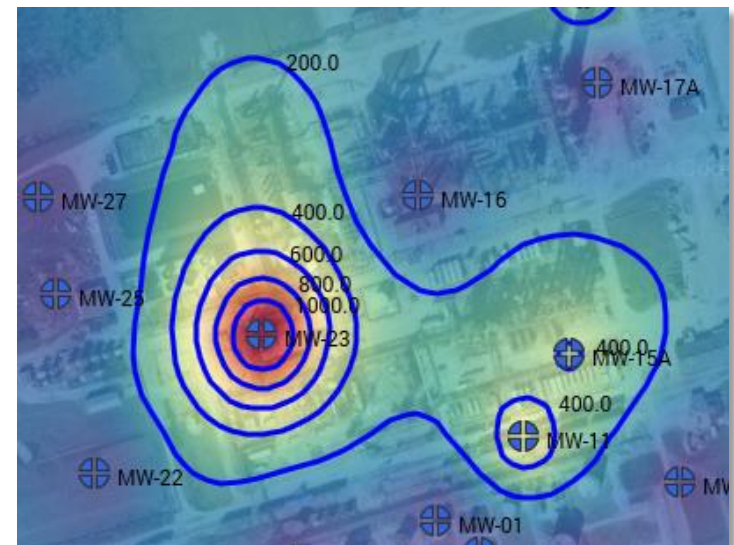
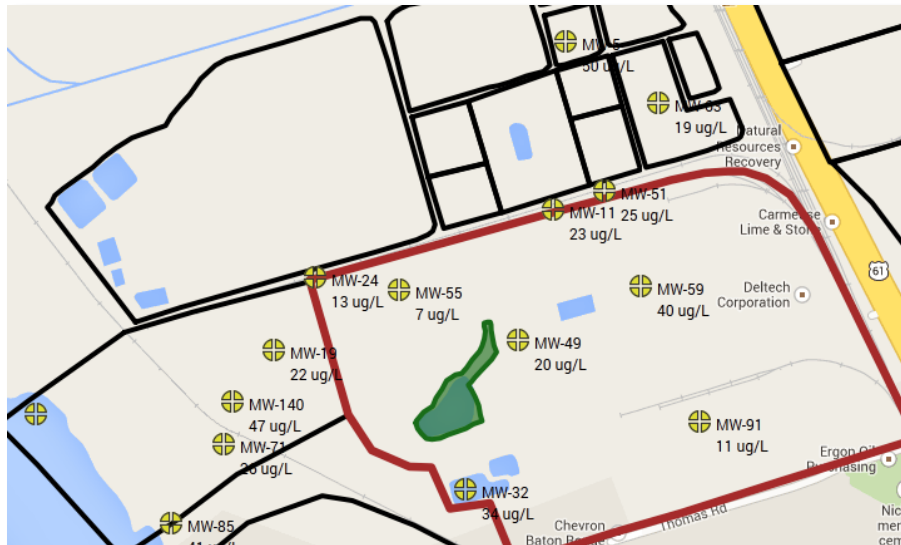
Historical data  
cross-check



# Decision Support



- ◇ Timely access to information
- ◇ Data in spatial context
- ◇ Data analysis
- ◇ Management/mitigation of risk





# Data in Spatial Context



## Selected Analytical Results:

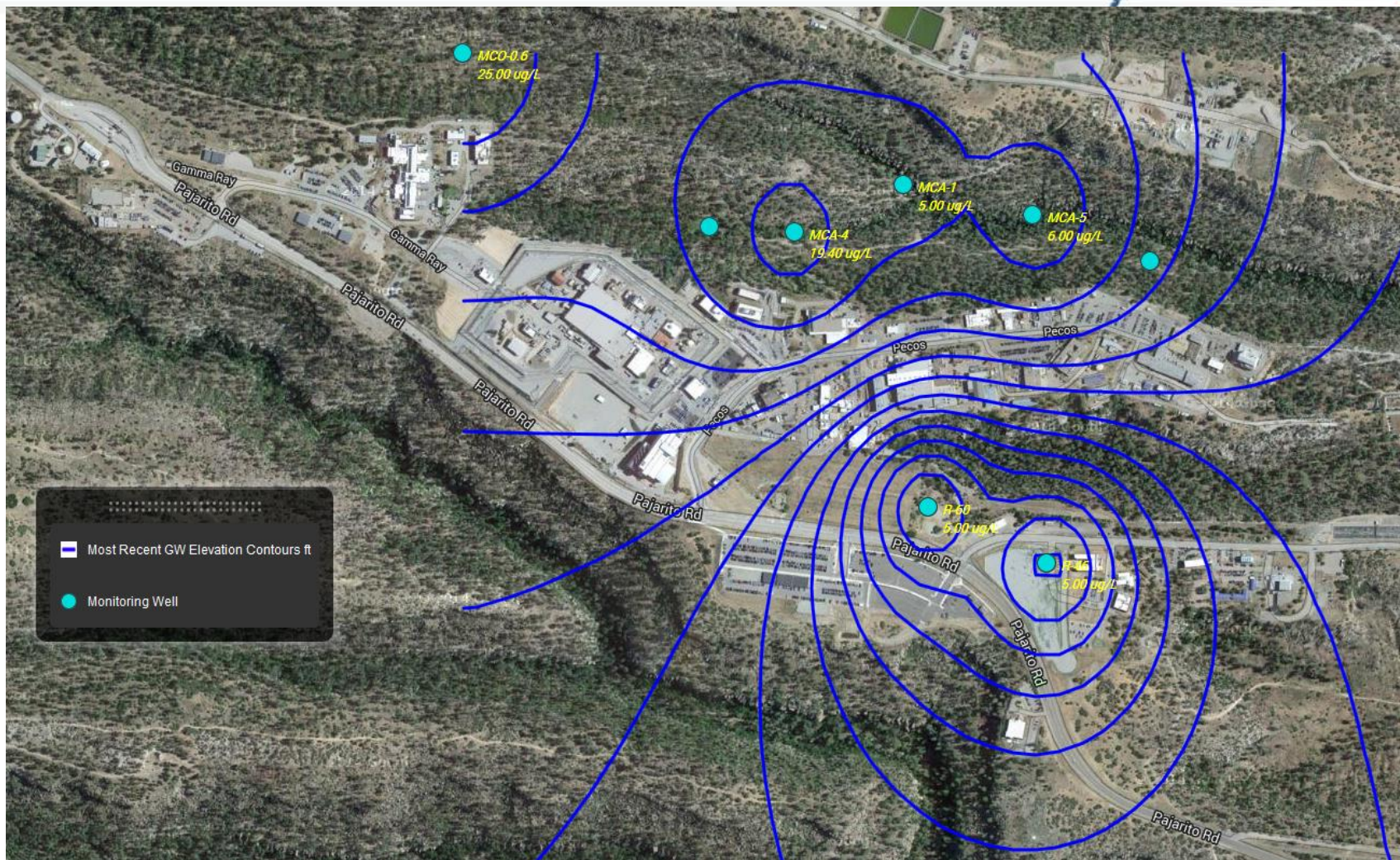
<div> <div> </div> <div> Page 1 of 80 10 </div> <div>View 1 - 10 of 792</div> </div>							
Field Sample ID	Location ID	Date Sampled	Parameter Name	Report Result	Report Units	Lab Qualifier	Detected
CALA-10-17229	PM-4	2010-05-19	Arsenic	5	ug/L	U	N
CALA-10-17231	PM-5	2010-05-19	Arsenic	5	ug/L	U	N
CALA-11-11748	PM-4	2011-05-24	Arsenic	5	ug/L	U	N
CALA-11-11752	PM-5	2011-05-24	Arsenic	5	ug/L	U	N
CALA-12-17389	PM-5	2012-06-21	Arsenic	5	ug/L	U	N
CALA-14-79770	PM-5	2014-06-24	Arsenic	5	ug/L	U	N
CAMO-10-16726	MCOI-4	2010-05-04	Arsenic	3.04	ug/L	J	Y
CAMO-10-16727	MCOI-4	2010-05-04	Arsenic	2.79	ug/L	J	Y
CAMO-10-16734	MCOI-5	2010-05-03	Arsenic	3.41	ug/L	J	N
CAMO-10-16735	MCOI-5	2010-05-03	Arsenic	6.16	ug/L		N

## Selected Groundwater Readings:

<div> <div> </div> <div> Page 100 of 556 10 </div> </div>				
Location ID	Date Measured	Time Measured	Groundwater Elevation	Dry
PM-5	2013-06-22	0:01	5845.96	N
PM-5	2013-06-21	0:01	5845.75	N
MCOI-5	2013-06-21	0:01	6132.914	N
PM-4	2013-06-21	0:01	5830.9	N
MCOI-4	2013-06-21	0:00	6315.651	N
MCOI-4	2013-06-20	0:00	6315.698	N
PM-4	2013-06-20	0:01	5832.81	N
MCOI-5	2013-06-20	0:01	6132.936	N
PM-5	2013-06-20	0:01	5846.32	N
PM-5	2013-06-19	0:01	5846.79	N

Compare these reports of Arsenic results and Groundwater Levels...

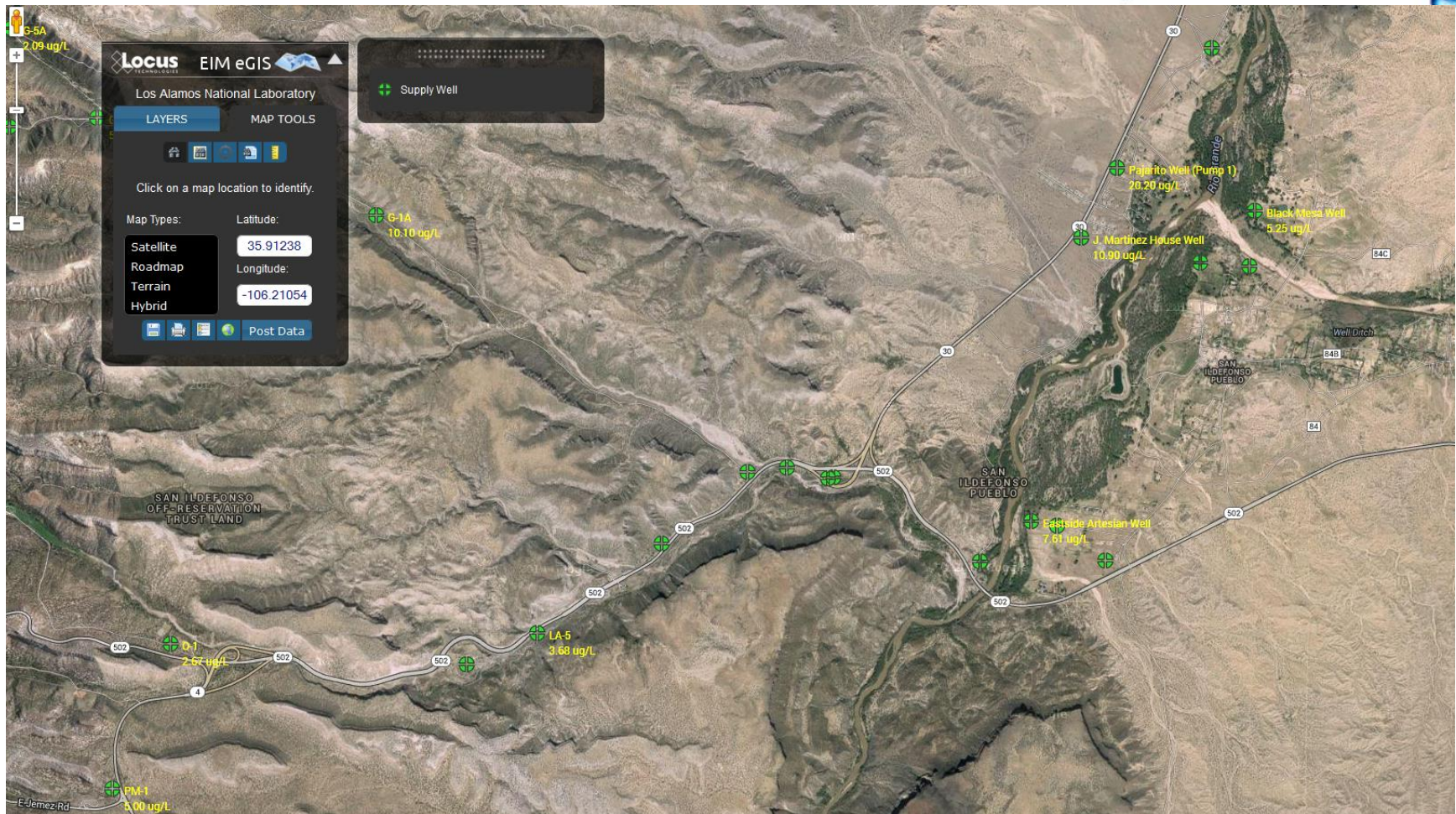
# Data in Spatial Context



...with this GIS map showing arsenic results and groundwater contours...



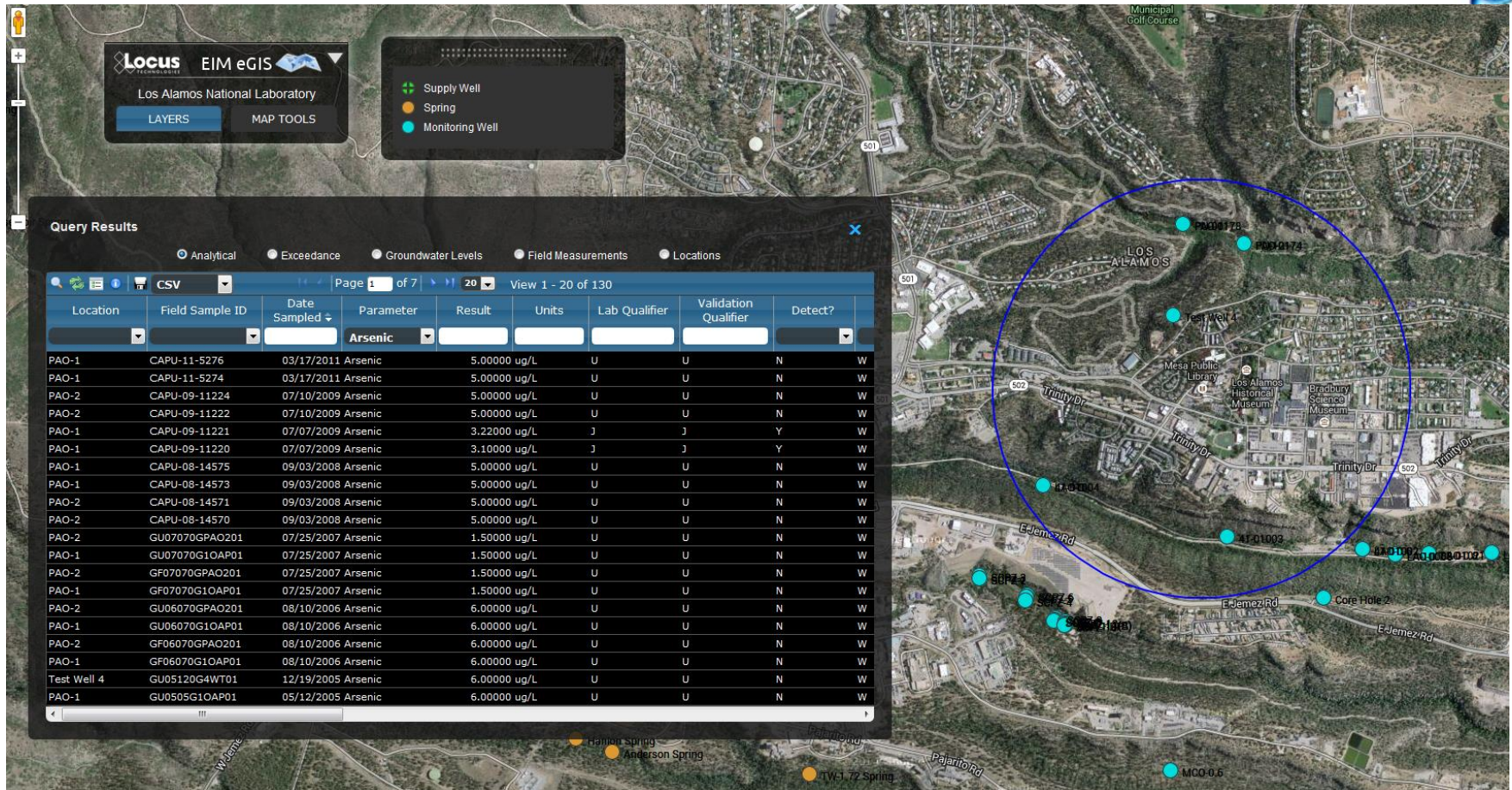
# Data in Spatial Context



Posting most recent Arsenic exceedances to map



# Spatial Analysis

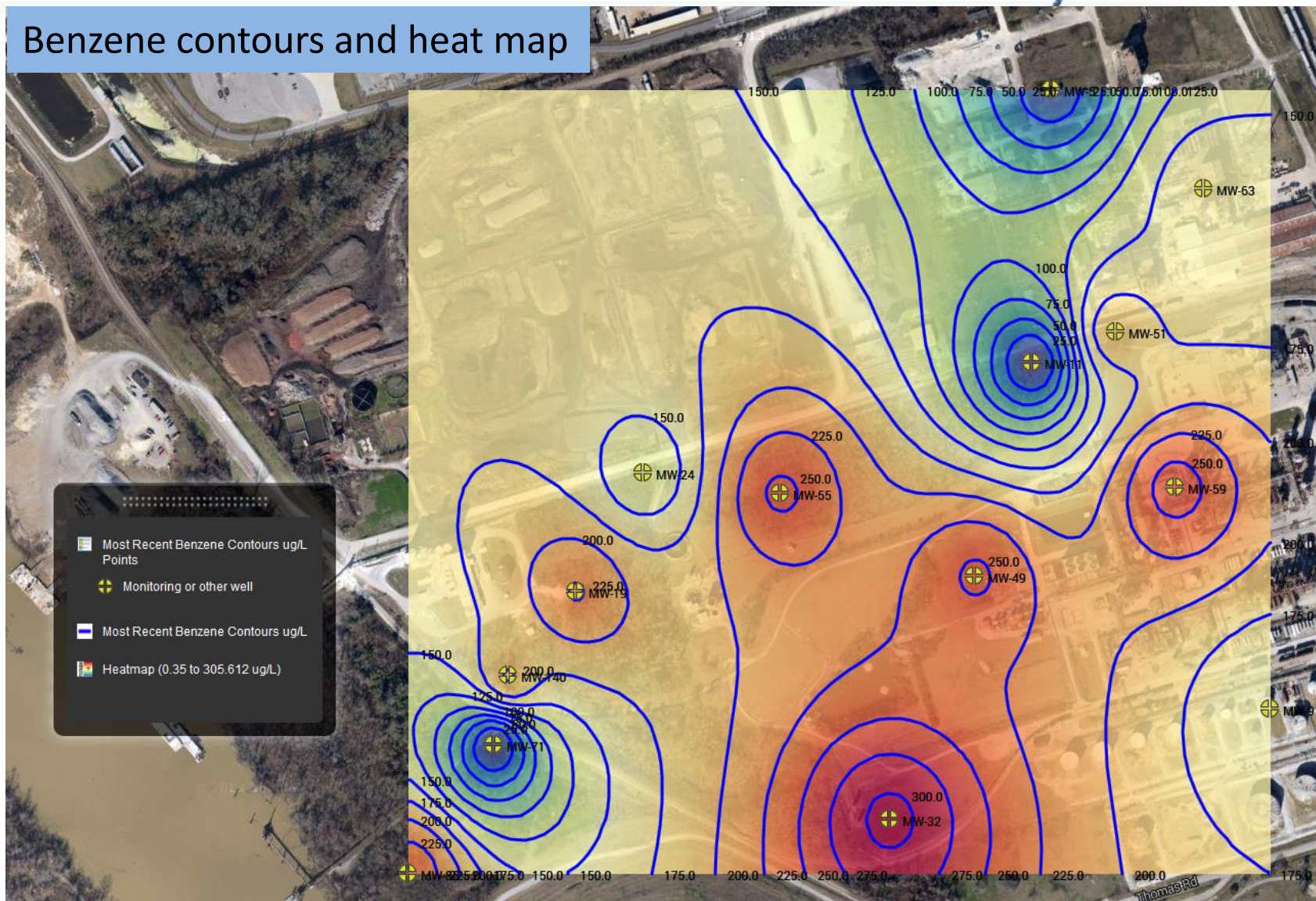


Finding all data at locations within 1000 feet of a sensitive receptor



# Spatial Analysis

## Benzene contours and heat map





# Regulatory Compliance



- ◇ Regulatory reporting
  - Report-ready reports, maps & charts
  - Apply regulatory criteria (Action Levels)
- ◇ Incident Management
  - Field investigation
  - Root cause & corrective actions



# Regulatory Reporting



Locus Multisite Demo >> Reporting >> Formatted Reports

## Run Formatted Report: Select Data Filters

Report Name: Demo Soil Analytical w depths-purpose

Primary Filters	Parameter Filters	Sample Filters	Other Filters
<div> <div> <b>Available Parameter Groups</b> <ul style="list-style-type: none"> <li>Lab QC testing</li> <li>Metals PPlus Total</li> <li>MultiSite Test</li> <li>NPDES</li> <li>PG_Group1</li> <li>SW-846 6010B</li> <li>SW-846 8260B</li> <li>SW-846 8270C</li> <li>SW-846 8310</li> <li>test</li> <li>TSS</li> <li>VOC COCs</li> <li>Volatiles Plus Total</li> <li>Waste Classification</li> <li>Waste_Water</li> </ul> </div> <div> <b>Selected Parameter Groups*</b>  EPA 8260B </div> <div> <b>Action Limit Formatting</b>  Action Limit    Bold   Italic   Underline  Acme 2 Demo Site Limits <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> </div>			
<div> <div> &gt;&gt; &gt; &lt; &lt;&lt; </div> <div> *Required field, must include a specific date range   <input type="checkbox"/> Include filter criteria on output?  Submit    Return    Edit Template </div> </div>			

Parameter Name						Benzene	Ethylbenzene	Methyl-t-butyl ether	Toluene
Report Units						mg/kg	mg/kg	mg/kg	mg/kg
Location ID	Date Sampled	Start Depth	End Depth	Sample Purpose	Report Result	Report Result	Report Result	Report Result	Report Result
Acme 2 Demo Site Limits						0.5	1	1	1
SB-10-1	12/06/2010	2	4	REG	0.080 J	1.7	< 0.12	< 0.083	
SB-10-1	12/08/2010	8	10	REG	0.21 J	9.3	< 0.11	2.4	
SB-10-1	12/08/2010	8	10	FD	0.12 J	11	< 0.11	2.7	
SB-10-2	12/06/2010	2	4	REG	0.050 J	< 0.035	< 0.065	< 0.044	
SB-10-2	12/08/2010	8	10	REG	0.33 J	31	< 0.55	6.3	
SB-10-3	12/06/2010	2	4	REG	< 0.00057	< 0.00066	< 0.0012	< 0.00084	
SB-10-3	12/08/2010	8	10	REG	0.66 J	62	< 0.56	18	
SB-10-4	12/06/2010	2	4	REG	0.0044 J	< 0.00061	< 0.0011	< 0.00077	
SB-10-4	12/08/2010	8	10	REG	< 0.026	0.32	< 0.057	0.22 J	
MW-03A	02/09/2005	4	6	REG	0.0059 J	< 0.0059	< 0.006	0.0059 J	
MW-03A	02/09/2005	7	9	REG	0.0061 J	0.0061 J	< 0.006	0.0063	
MW-13A	03/29/2005	6	8	REG	< 0.0050	0.0050 J	< 0.005	0.0050 J	
MW-13A	03/29/2005	8	10	REG	< 0.0050	0.0050 J	< 0.005	0.0050 J	
MW-15A	03/29/2005	4	6	REG	0.0090	0.0126	0.005 J	0.0057	
MW-15A	03/29/2005	7	9	REG	4.60	36.8	6.10	19.0	
MW-17A	03/29/2005	6	8	REG	0.0050 J	0.0050 J	0.005 J	0.0050 J	
MW-17A	03/29/2005	8	10	REG	0.0050 J	0.0050 J	< 0.005	0.0050 J	
MW-26	03/29/2005	4	6	REG	0.0061	0.0050 J	0.005 J	0.0081	
MW-26	03/29/2005	7	9	REG	< 0.0050	< 0.0050	< 0.005	0.0050 J	

# Regulatory Reporting



## Construct XY Concentration Plots (by Parameter) - Multichart Print

Format

Print Options

View/Select Data

Pre

### Analytical Results for Benzene

#### ☒ MW-11

#	<input checked="" type="checkbox"/> All	Sample Date	ug/L
1	<input checked="" type="checkbox"/>	03/30/2004	1740
2	<input checked="" type="checkbox"/>	06/08/2004	2660
3	<input checked="" type="checkbox"/>	09/07/2004	2000
4	<input checked="" type="checkbox"/>	12/02/2004	1670
5	<input checked="" type="checkbox"/>	03/30/2005	2200
6	<input checked="" type="checkbox"/>	06/21/2005	3440
7	<input checked="" type="checkbox"/>	06/08/2006	3000
8	<input checked="" type="checkbox"/>	10/02/2006	2000
9	<input checked="" type="checkbox"/>	12/15/2006	1800
10	<input checked="" type="checkbox"/>	03/22/2007	2400

#### ☒ MW-17A

#	<input checked="" type="checkbox"/> All	Sample Date	ug/L
1	<input checked="" type="checkbox"/>	03/30/2005	320
2	<input checked="" type="checkbox"/>	06/21/2005	321
3	<input checked="" type="checkbox"/>	06/08/2006	88
4	<input checked="" type="checkbox"/>	10/03/2006	
5	<input checked="" type="checkbox"/>	12/15/2006	
6	<input checked="" type="checkbox"/>	03/23/2007	
7	<input checked="" type="checkbox"/>	05/31/2007	
8	<input checked="" type="checkbox"/>	08/23/2007	
9	<input checked="" type="checkbox"/>	10/26/2007	
10	<input checked="" type="checkbox"/>	01/09/2008	

#### ☒ MW-21

#	<input checked="" type="checkbox"/> All	Sample Date	ug/L
1	<input checked="" type="checkbox"/>	09/07/2004	2960
2	<input checked="" type="checkbox"/>	12/02/2004	3360
3	<input checked="" type="checkbox"/>	03/30/2005	2460

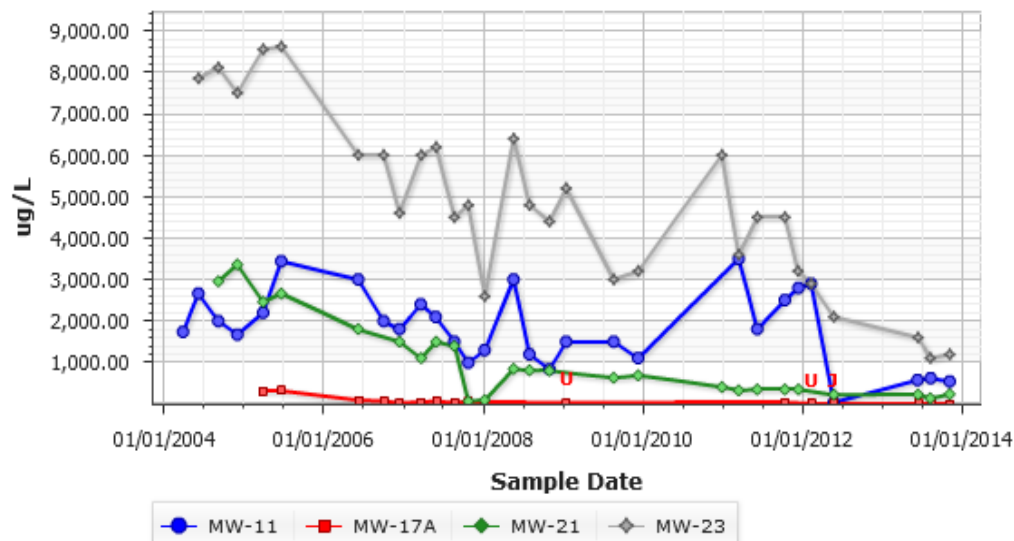
#### ☒ MW-23

#	<input checked="" type="checkbox"/> All	Sample Date	ug/L
1	<input checked="" type="checkbox"/>	06/08/2004	7860
2	<input checked="" type="checkbox"/>	09/07/2004	8120
3	<input checked="" type="checkbox"/>	12/02/2004	7500

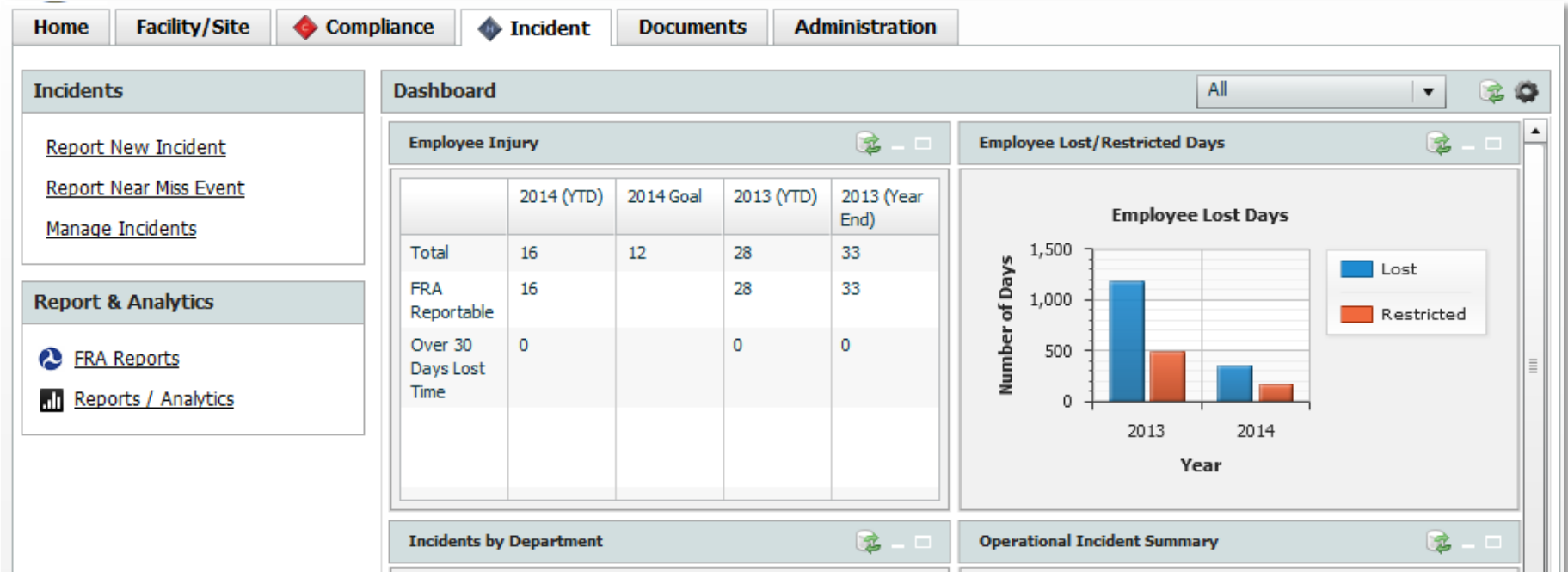
Report ready trends and statistics

### Analytical Results for Benzene

Site: Acme 2 Demo site



# Incident Management



# Incident Management



**View/Edit Incident** Current State : Closed |

[Add Component](#) [Preview FRA Report Data](#)

Incident Info

Location

Persons Involved

Injury/Illness

Treatment

Lost Time

Cost

Rail Incident

Vehicle Accident

Spill Incident

Investigation

Admin

Case Logs

Attachments

\* Case ID : 20130056

\* Date of Incident : 05/28/2013

Time of Incident : : :

\* Facility Reported To : Anchorage

\* Department Reported To : Maintenance of Way

Incident Type : Spill

Incident Category : Environmental

Reportable Incident : No

Events Prior to Incident :

Description of Incident (For non-injury/illness incidents) : Hydraulic

## Rail Incident Data Capture

## Push Button Regulatory Reports

DEPARTMENT OF TRANSPORTATION FEDERAL RAILROAD ADMINISTRATION (FRA)										RAIL EQUIPMENT ACCIDENT/INCIDENT REPORT		OMB No. 2130-0500	
1. Name of Reporting Railroad ████████ Railroad				1a. Alphabetic Code ██████		1b. Railroad Accident/Incident No. 2014-129							
2. Name of Other Railroad or Other Entity Filing for Equipment Involved in Train Accident/Incident N/A				2a. Alphabetic Code N/A		2b. Railroad Accident/Incident No. N/A							
3. Name of Railroad or Other Entity Responsible for Track Maintenance N/A				3a. Alphabetic Code N/A		3b. Railroad Accident/Incident No. N/A							
4. U.S. DOT Grade Crossing Identification Number				5. Date of Accident/Incident 07/21/2014		6. Time of Accident/Incident 08:45 AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>							
7. Type of Accident/Incident (single entry in code box)		1. Derailment		4. Side Collision		7. Hwy-rail crossing		10. Explosion-detonation		13. Other (describe in narrative)			
		2. Head on collision		5. Raking collision		8. RR grade crossing		11. Fire/violent rupture		Code 01			
		3. Rear end collision		6. Broken train collision		9. Obstruction		12. Other impacts					
8. Cars Carrying HAZMAT 0		9. HAZMAT Cars Damaged/Derailed 0		10. Cars Releasing HAZMAT 0		11. People Evacuated 0		12. Subdivision System					
13. Nearest City/Town ████████			14. Milepost (to nearest tenth)			15. State Abbr. ██		16. County ██████████					
7. Temperature (F) (Specify if minus) °F		18. Visibility (single entry)		Code		19. Weather (single entry)		Code		20. Type of Track			
		1. Dawn 3. Dusk		2		1. Clear 3. Rain 5. Sleet		1		1. Main 3. Siding			
		2. Day 4. Dark				2. Cloudy 4. Fog 6. Snow				2. Yard 4. Industry			
21. Track Name /Number ████████ Pass		22. FRA Track Class (1-9, X)		1		23. Annual Track Density (gross tons in millions)				24. Time Table Direction			
										1. North 3. East			
										2. South 4. West			
25. Type of Equipment		5. Single Car		9. Main/Inspect Car		D. EMU		Code		26. Was Equipment Attended?			
1. Freight Train		6. Cut of Cars		A. Spec. MoW Equip.		E. DMU				1. Yes 2. No			
2. Passenger Train-Pulling (single entry)		7. Yard/Switching		B. Passenger Train-Pushing						Code			
3. Commuter Train-Pulling		8. Light Loco(s)		C. Commuter Train-Pushing						1			
4. Work Train										27. Train Number/Symbol 651W			



# Take Away



- ◇ Cloud-based EMIS with integrated GIS and Mobile technologies provides:
  - Efficient & accurate data collection
  - Powerful tools for data analysis & review
  - Timely access to information
    - from anywhere
  - Environmental incident investigation and response





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