

Paperless Track Inspection for Transit Systems

Dave Graves

*ENSCO, Project Engineer
Charlottesville, VA*

On behalf of

Rick Bellew

*Transit America Services Inc.,
Deputy General Manager
MOW*



2012 RAIL CONFERENCE

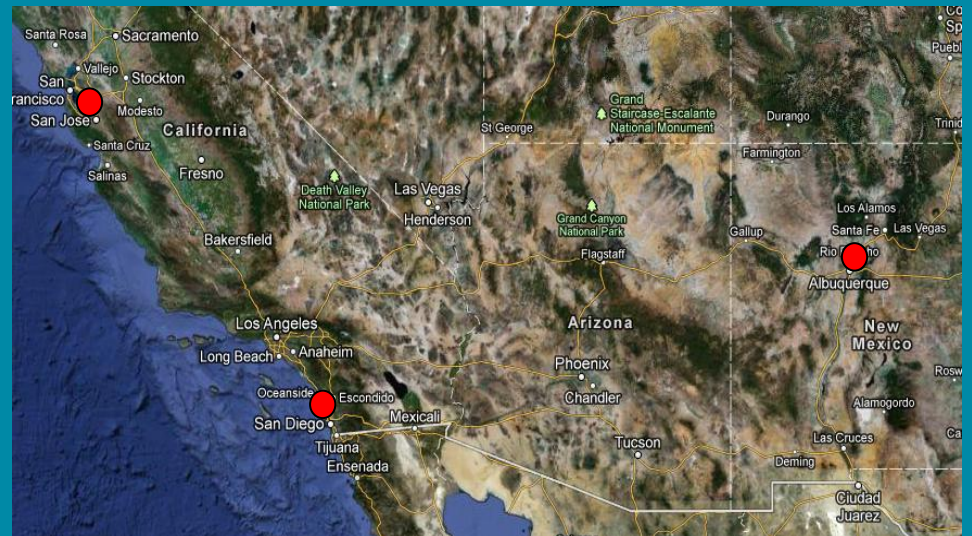
Transit America Services inc.

HERZOG

ENSCO

Transit America Services Background

Transit America Services Inc., currently provides track maintenance and services for multiple transit properties across the US

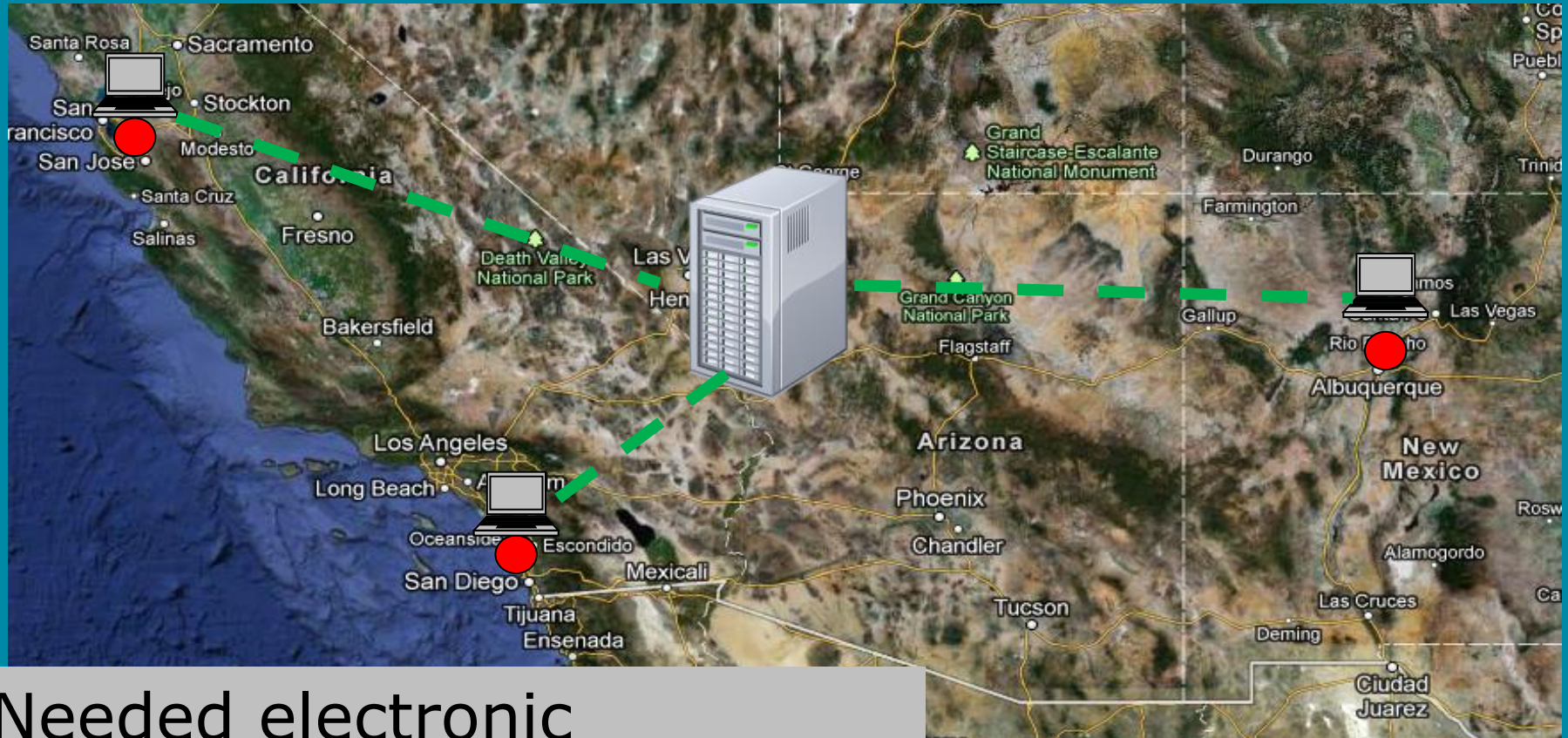


ENSCO Background

For more than 40 years, ENSCO's team of engineers has led the rail industry in developing new, advanced technologies for transportation. ENSCO technology and services help customers improve the quality of their operations while making travel safer



Why Paperless Track Inspection?

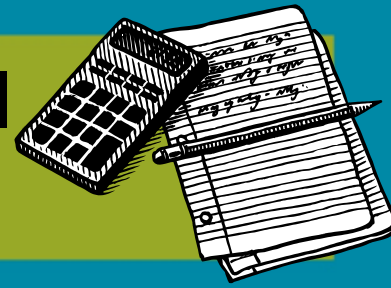


Needed electronic inspection method to support multiple properties

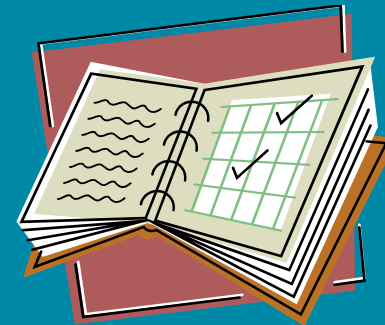
Goals/Requirements for Paperless System

- Manage inspection activities at multiple properties
- Improve/Ensure Regulatory Compliance
- Easy to Use
- Work in Offline or Online Mode
- Obtain Performance Metrics
- Streamline/Improve Inspection process

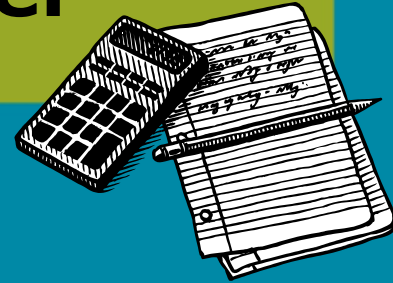
Challenges with Traditional Paper Inspections



- Regulatory Compliance
 - Scheduling
 - Reporting
 - Defect Tracking
- Fraudulent Activity
- Performance Metrics
- Managing Multiple Properties



Regulatory Scheduling - Paper



- Frequency
 - The FRA has many different inspection frequencies depending upon asset type. This includes minimum days between inspections maximum wait times
- Detailed requirements
- Observe/Traverse



Inspection Scheduling - Paperless



Inspection Window

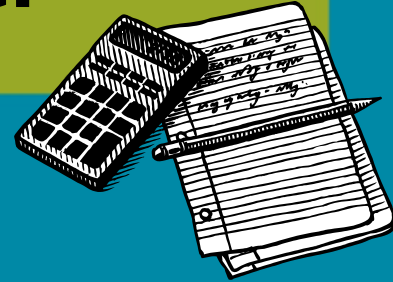
Automatic Scheduled Inspections													
		Subdivision/Yard	Asset Type	Asset	Scheduled Start MP	Scheduled End MP	Earliest Date	Latest Date	Saved Date	Traverse/Switch/Detailed	Status	Asset Number	Calendar Code
	●	ASHCROFT	Main Track	TRACK TEST M1_20 1	16	19	04/10/2012	04/30/2012			Overdue	750000001	M1_20
	●	ASHCROFT	JointBar Main	JOINTBAR TEST 1	18	25.5	04/30/2012	06/30/2012			Due	56525334	Y4_60
	●	ASHCROFT	Main Track	TRACK TEST M1_20 2	20	30	04/09/2012	04/30/2012			Overdue	750000002	M1_20
	●	ASHCROFT	JointBar Main	JOINT BAR TEST 2	25.5	50	04/29/2012	06/30/2012			Due	56525335	Y4_60
	●	ASHCROFT	Main Track	TRACK TEST M1_20 3	30	31	04/08/2012	04/30/2012			Overdue	750000003	M1_20
	●	ASHCROFT	Main Track	TRACK TEST M1_20 3	31	32	04/25/2012	04/30/2012			Overdue	750000003	M1_20
	●	ASHCROFT	Main Track	TRACK TEST M1_20 3	32	32.5	04/08/2012	04/30/2012			Overdue	750000003	M1_20

Traverse/Detailed Requirements

Red: Overdue
 Green: Available
 Yellow: Due for inspection on that day



Reporting Challenges - Paper



- Data can be located in Multiple Places
- Was it filed correctly?
- Am I missing any information?
- Time Consuming \$\$



Reporting - Paperless



DTN Report

Report Type: FRA Inspection Report

Completed Date: From 05/14/2012 To 05/14/2012

Region-Division: All CHARLOTTEVILLE GREENVILLE STRATFORD

Subdivision/Yard: [Empty]

Asset Type: All Main Track Siding Spur Yard Track

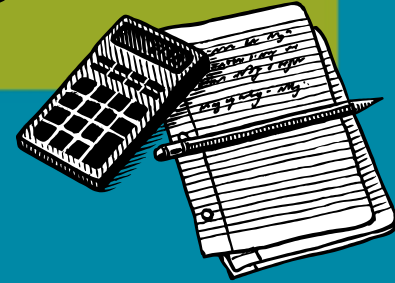
Regulation Type: Federal Railroad Administration

Generated: 05/14/2012 Service Area: CHARLOTTEVILLE Subdivision/Yard: Multiple Inspector: Multiple From Date: 2012-03-01 To Date: 2012-05-14

Completed Date	Service Area	Subdivision/Yard	Asset Type	Asset	Start MP	End MP	Inspector	Insp Mode	Defects																																																
03/18/2012	CHARLOTTEVILLE	ASHCROFT	MAIN_TRACK	TRACK TEST M1_20_3	30.0	31.0	deg2222	T-Vehicle	1																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>920</td> <td>213.057.03</td> <td>30.0</td> <td>Open</td> <td>Immediate Repair</td> <td></td> <td></td> <td></td> <td></td> <td>N</td> <td>deg2222</td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	920	213.057.03	30.0	Open	Immediate Repair					N	deg2222																									
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
920	213.057.03	30.0	Open	Immediate Repair					N	deg2222																																															
03/18/2012	CHARLOTTEVILLE	ASHCROFT	MAIN_TRACK	TRACK TEST M1_20_3	32.0	32.5	deg2222	T-Walking	1																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>921</td> <td>213.033.01</td> <td>32.0</td> <td>Closed</td> <td>Immediate Repair</td> <td></td> <td>Adjusted</td> <td>03/19/2012</td> <td>DEG</td> <td>N</td> <td>deg2222</td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	921	213.033.01	32.0	Closed	Immediate Repair		Adjusted	03/19/2012	DEG	N	deg2222																									
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
921	213.033.01	32.0	Closed	Immediate Repair		Adjusted	03/19/2012	DEG	N	deg2222																																															
03/19/2012	CHARLOTTEVILLE	ASHCROFT	MAIN_TRACK	TRACK TEST M1_20_2	20.0	30.0	mk2222	T-Vehicle	3																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>929</td> <td>213.053.02</td> <td>20.5</td> <td>Closed</td> <td>Immediate Repair</td> <td></td> <td>Gauged</td> <td>03/19/2012</td> <td>DEG</td> <td>N</td> <td>deg2222</td> <td></td> </tr> <tr> <td>930</td> <td>213.103.02</td> <td>23.0</td> <td>Closed</td> <td>Immediate Repair</td> <td></td> <td>Ground</td> <td>03/19/2012</td> <td>123</td> <td>Y</td> <td>deg2222</td> <td></td> </tr> <tr> <td>931</td> <td>213.013.01</td> <td>22.0</td> <td>Open</td> <td>213.9 b Authority</td> <td>Test</td> <td></td> <td></td> <td></td> <td>N</td> <td></td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	929	213.053.02	20.5	Closed	Immediate Repair		Gauged	03/19/2012	DEG	N	deg2222		930	213.103.02	23.0	Closed	Immediate Repair		Ground	03/19/2012	123	Y	deg2222		931	213.013.01	22.0	Open	213.9 b Authority	Test				N		
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
929	213.053.02	20.5	Closed	Immediate Repair		Gauged	03/19/2012	DEG	N	deg2222																																															
930	213.103.02	23.0	Closed	Immediate Repair		Ground	03/19/2012	123	Y	deg2222																																															
931	213.013.01	22.0	Open	213.9 b Authority	Test				N																																																
03/19/2012	CHARLOTTEVILLE	ASHCROFT	SIDING	SIDING TEST 2	11.5	11.85	deg2222	T-Walking	1																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>922</td> <td>213.053.01</td> <td>11.6</td> <td>Closed</td> <td>Place Slow Order Class 1</td> <td>Test</td> <td>Anchored</td> <td>05/08/2012</td> <td>Test</td> <td>Y</td> <td>deg2222</td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	922	213.053.01	11.6	Closed	Place Slow Order Class 1	Test	Anchored	05/08/2012	Test	Y	deg2222																									
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
922	213.053.01	11.6	Closed	Place Slow Order Class 1	Test	Anchored	05/08/2012	Test	Y	deg2222																																															
03/19/2012	CHARLOTTEVILLE	ASHCROFT	MAIN_TRACK	MAIN TRACK TEST	100.0	110.0	mk2222	T-Vehicle	1																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>932</td> <td>213.013.01</td> <td>100.0</td> <td>Open</td> <td>Immediate Repair</td> <td></td> <td></td> <td></td> <td></td> <td>N</td> <td></td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	932	213.013.01	100.0	Open	Immediate Repair					N																										
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
932	213.013.01	100.0	Open	Immediate Repair					N																																																
03/20/2012	CHARLOTTEVILLE	ASHCROFT	MAIN_TRACK	TRACK TEST M1_20_1	10.0	19.0	bob2222	T-Walking	1																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>936</td> <td>213.013.01</td> <td>19.5</td> <td>Closed</td> <td>Immediate Repair</td> <td></td> <td>Other-See Comments</td> <td>03/20/2012</td> <td>deg</td> <td>N</td> <td>deg2222</td> <td>retested</td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	936	213.013.01	19.5	Closed	Immediate Repair		Other-See Comments	03/20/2012	deg	N	deg2222	retested																								
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
936	213.013.01	19.5	Closed	Immediate Repair		Other-See Comments	03/20/2012	deg	N	deg2222	retested																																														
03/20/2012	CHARLOTTEVILLE	ASHCROFT	MAIN_TRACK	TRACK TEST M1_20_3	32.5	40.0	bob2222	Observe	1																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>937</td> <td>213.135.12</td> <td>38.5</td> <td>Open</td> <td>Immediate Repair</td> <td></td> <td></td> <td></td> <td></td> <td>N</td> <td></td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	937	213.135.12	38.5	Open	Immediate Repair					N																										
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
937	213.135.12	38.5	Open	Immediate Repair					N																																																
03/22/2012	CHARLOTTEVILLE	ASHCROFT	STORAGE_TRACK	HASTINGS TRACK #1-WHAS1	1.25	1.45	deg2222	T-Walking	2																																																
<table border="1"> <thead> <tr> <th>Defect Number</th> <th>Reg. Code</th> <th>MP</th> <th>Status</th> <th>Immediate Action</th> <th>Defect Comments</th> <th>Corrective Action</th> <th>Corrected Date</th> <th>Corrected By</th> <th>Repeated</th> <th>Entered By</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>941</td> <td>213.057.08</td> <td>1.3</td> <td>Closed</td> <td>Place Slow Order Class 1</td> <td>Test</td> <td>Adjusted</td> <td>04/12/2012</td> <td>DEG</td> <td>N</td> <td>deg2222</td> <td></td> </tr> </tbody> </table>										Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments	941	213.057.08	1.3	Closed	Place Slow Order Class 1	Test	Adjusted	04/12/2012	DEG	N	deg2222																									
Defect Number	Reg. Code	MP	Status	Immediate Action	Defect Comments	Corrective Action	Corrected Date	Corrected By	Repeated	Entered By	Comments																																														
941	213.057.08	1.3	Closed	Place Slow Order Class 1	Test	Adjusted	04/12/2012	DEG	N	deg2222																																															

- Automated Reports can be generated anywhere at anytime

Defect Tracking Challenges



- Defect Notification
- Tracking Closure
- How long as a defect been open?
- How many Defects are Open?
- How do I send information to appropriate people?

Defect Tracking Paperless



- At a glance view of defects
- Sortable, query able
- PDF Generation allows for simple email generation

Automatic Defects															
		Subdivision/Yard	Asset Type	Asset	MP	Defect Number	Defect Date	Comment	Reg Rule	Status	Action	Before Date	Corrected Date	Corrected By	Asset Number
		BILLINGS	Turnout	DETROIT SUB JCT SWITCH GLENWOOD	121.65	426	09/26/2011		213.033.02	Open	Immediate Repair				15144812
		BILLINGS	Turnout	GAS SPUR SWITCH GLENWOOD	121.69	602	10/26/2011		213.033.01	Open	Immediate Repair				576846999
		BILLINGS	Main Track	MAIN-MAIN	122	430	09/26/2011		213.033.01	Open	Immediate Repair				75194
		BILLINGS	Main Track	MAIN-MAIN	125	796	11/22/2011		213.033.04	Open	Immediate Repair				75194
		BILLINGS	Turnout	EAST FMR SDG SWITCH LOWRY	128.82	432	09/26/2011		213.037.01	Open	Immediate Repair				6275194
		BILLINGS	Turnout	WEST FMR SDG SWITCH LOWRY	129.88	427	09/26/2011		213.013.01	Open	Immediate Repair				6275195

Defect Tracking Paperless



- Defects can be queried by type, date, asset, etc., and exported to various formats for email or other electronic communication

Schedule Inspection Defect Logout English Français

Switch to Automatic List ^

Date Range From 05/07/2012 To 05/14/2012

Region-Division	Subdivision/Yard	Asset Type	Asset	Defect Number
All	BELMONT SPUR	All	All	
CHARLOTTESVILLE	BILLINGS	Main Track	MAIN-MAIN	
GREENVILLE	BOXCAR	Siding	SIDING FAIRMOUNT-	
STRATFORD	BREDENBURY	Spur	SIDING HANKINSON-	
	CABOOSE	Yard Track	SIDING HOFFMAN-H	

Inspection Type All Regulatory Special

Defect Type All Regulatory Defect Non-Regulatory Defect

Status All Open Closed Invalid

Immediate Action All 213.9 b Authority Immediate Repair No Action Taken Other-See Comments Place Slow Order Class 1 Place Slow Order Class 2 Place Slow Order Class 3 Place Slow Order Class 4 Place Slow Order Class 5 Remove from Service Scheduled Repair Transport Canada 6.2 Authority

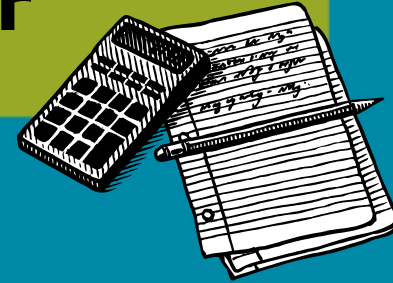
Submit

Fraudulent Activity -Paperless



- All Inspections are time stamped
 - Prevents Back Dating
- Amending Inspection only
 - Creates an electronic Paper Trail
- Restricted to Authorized Users/Inspectors
- Electronic Signature

Performance Metrics - Paper



- Not Easy
- Requires significant manual effort
- Not practical with paper



Performance Metrics - Paperless



Reports are available in 'real time' from pull down menus

The screenshot shows a software window titled 'DTN' with a 'Report' tab. A dropdown menu is open, listing several report types: FRA Inspection Report, TC Inspection Report, Oversight Inspection Report, Oversight Inspection Count Report (highlighted), Oversight Defect Report, Subdivision Performance Report, Dashboard Performance Report, No Assignment Report, and Subdivision Assignment Report. To the left, there are other dropdowns for 'Report Type' (set to FRA Inspection Report), 'Completed D' (with a date of 05/14), and 'Region-D' (with options: All, CHARLOTTE, GREENVILLE, STRATFORD).

- Advanced Queries available for additional reports or information

The screenshot shows a software window titled 'DTN' with a 'Report' tab and sub-tabs for 'Schedule', 'Inspection', and 'Defect'. It features a 'Date Range' filter set from 05/07/2012 to 05/14/2012. Below are several dropdown menus for filtering: 'Region-Division' (All, CHARLOTTEVILLE, GREENVILLE, STRATFORD), 'Subdivision/Yard' (All, 2 - TEST, ALBANY RUNNING T, ASHCROFT, BELMONT SPUR), 'Asset Type' (All, Main Track, Siding, Spur, Yard Track), 'Asset' (All, MAIN-MAIN, SIDING FAIRMOUNT-SIDING HANKINSON-SIDING HOFFMAN-H), and 'Completed By' (All, BOB, BOB B., DICK, MATTHEW1, DICK, MATTHEW2, GRAVES, DAVE - LE). At the bottom, there are checkboxes for 'Status' (All, Late, On Time), 'Inspection Reason' (All, Regulatory, Special), 'Amendment Type' (All, Non-Amended, Amending), and 'Inspection Type' (All, Regular, Detailed).

Implementation

- Change is Hard
 - We've Always Done it This Way
 - If it Aint broke, don't' fix it
 - I'm not good with computers
- Keys to Success:
 - Ease of Use
 - User Training
 - Transition Process

Implementation - Ease of Use

Defect Details

Select Defect: Defect MP3.00

1. Subpart*: B-Roadbed

2. Section*: 213.037 - Vegetation

3. Reg Code*:
09 - Vegetation brushing sides of rolling stock.

Defect Value:

MP*: 3 (2.6 - 3.15)

Repeated:

Defect Date*: 09/15/2011

Immediate Action*: Scheduled Repair

Correct Before Date: 09/17/2011

Defect Comments:

Status*: Open

- Pull-Down Inputs wherever possible (Including Regulatory Codes)

Switch Throw*: --

Switch Points

Gauge*: 4 1/2"

Length: 4 5/8"

Height of Switch Point Above Stock: 4 3/4"

Rail*: 4 7/8"

Frog

Type*: --

Main Track: --

Flangeway Width*: --

Main Track: --

Flangeway Depth*: --

Turnout Flangeway Width: --

Turnout Flangeway Depth: --

- Required fields indicated by *, ensures correct entry

Implementation - Training

- Utilized “Train the Trainer” approach
 - Developed an internal expert
 - Inspectors have a comfort with an internal resource
- Customer Assets were used
 - Helps with transition since the same assets that will be used in production

Implementation - Pilot

- 'Live' Training Period
 - Inspectors input both Paper and Electronic Inspections and Defects
- Advantages:
 - Creates 'Comfort Level' with product
 - Supports more gradual transition to Production

Summary of Implementation

- Over 6500 Electronic Inspection records have been entered
- The inspection process has been streamlined and is expected to ensure regulatory compliance
- The process for repairing defects has been dramatically improved
- The time to track territory performance has been reduced from 1 day to less than 1 hour

Thank You

