National Transportation Safety Board

Office of Railroad, Pipeline, and Hazardous Materials Investigations
Washington, D.C. 20594

Signal & Train Control Group–
Factual Report

Derailment of CSX train B813-18 in
Ellicott City, Maryland on
August 20, 2012

A. EVENT

Location:	Ellicott City, Maryland, milepost BAC 12.9
Date:	August 20, 2012
Time:	11:56 p.m. eastern daylight time (EDT)[1]
Carrier:	CSX
Trains:	Eastbound Freight Train B813-18

B. GROUP

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C. SUMMARY

On August 20, 2012, at approximately 11:56 pm, EDT, an eastbound CSX Transportation (CSX) coal train, identification number B813-18, with two locomotives and 80 cars derailed the lead 21 cars at milepost BAC-12.9 on their Old Main Line Subdivision near Ellicott City, Maryland. The derailed cars included 21 cars loaded with coal, six of which that fell into a public parking area, positioned about 12-15 feet below the main line to the north of the tracks. Other coal cars involved in the derailment were overturned, spilling their content along the north side of the main line as well as on the overpass. There were two civilian fatalities associated with this accident. The two individuals were local citizens sitting on the north side of the overpass and were not authorized to access the main track.

The initial damage estimates provided by CSX are $2.2 million, which includes environmental remediation. The weather at the time of the incident was cloudy skies with 65 degree Fahrenheit temperature and calm winds. Parties to the investigation include: CSX, Federal Railroad Administration and the Brotherhood of Maintenance-of-Way Employes Division.

D. DETAILS OF THE INVESTIGATION

1. Description of Railroad Signal System

The CSX Baltimore Division, Old Main Line Subdivision runs in a timetable east-west direction between control point (CP) St. Denis at milepost (MP) BAC-6.5 and Point

[1] All time is eastern daylight time unless otherwise noted.

of Rocks, MP BAC-64.7. The maximum timetable[2] speed for trains operating in the vicinity of the accident is 25 mph for freight trains.

Train movements on the CSX Old Main Line Subdivision are governed by operating rules, timetable instructions and the signal indications of a traffic control system (TCS). The "BC" train dispatcher located at the CSX Baltimore Division Operations Center in Halethorpe coordinates train movements with the signal system. Between CP East Davis at MP BAC-20.0 and CP West Avalon at MP BAC-9.8, the CSX TCS consists of an Invensys (Safetran) Geographic Signaling System (GEO), which is a vital microprocessor-controlled signal system with electronic coded track circuits and four-aspect colorlight type signals.

2. CSX Operations Center Data Logs

Postaccident data was downloaded from the Ansaldo Computer Aided Dispatch (CAD) System logs at the CSX Baltimore Division Operations Center. Table 1 summarizes signal and train control events recorded between CP East Davis and CP West Avalon on the data log.

Table 1 *Recorded events from CSX Operations Center diagnostic log.*

Time[3]	Location	Event
Train B813-18		
11:16:44	East Davis	Signal requested by CAD system
11:16:54	East Davis	Signal indicates clear
11:27:51	West Davis	Track segment 003 indicates occupied
11:33:06	West Davis	OS indicates occupied (track segment 002) Signal indicates at stop
11:33:32	West Davis	Track segment 007 indicates occupied (between West & East Davis)
11:35:22	West Davis	Track segment 003 indicates unoccupied
11:35:44	West Davis	OS indicates unoccupied
11:37:44	East Davis	OS indicates occupied
11:38:04	East Davis	Track segment 001 indicates occupied
11:40:06	West Davis	Track segment 007 indicates unoccupied
11:40:15	East Davis	OS indicates unoccupied
11:43:45	East Davis	Track segment 013 indicates occupied (accident track segment)
11:45:18	East Davis	Track segment 001 indicates unoccupied

3. CSX Field Signal System Data Logs

Additional postaccident data was downloaded from signal equipment located in the field along the railroad right-of-way. Hot bearing and dragging equipment detector logs were downloaded from the two defect detectors that the accident train went by prior to the accident. Table 2 summarizes the information from the defect detector logs.

[2] CSX, Baltimore Division Timetable No. 8, effective August 15, 2011.
[3] Time based on CSX Baltimore Division Operations Center system clock which is synchronized to UTC.

Table 2 *Defect detector log for Train B813-18.*

Time[4]	Location	Axle Count	Defects
11:55	Ridgeville - MP BAC-38.9	332 axles	No defects
11:16	Daniels - MP BAC-18.1	332 axles	No defects

Signal system data logs from the two CP locations and the three intermediate signal locations were downloaded. The data logs record track circuit codes transmitted and received between signal locations.

4. Postaccident Inspection/Testing of Signal System

On August 21, representatives from CSX, the Federal Railroad Administration and NTSB began conducting a field inspection and investigation of the railroad signal system between CP East Davis and CP West Avalon. The postaccident inspection found the signal light units and the signal cases locked and secured with no indications of tampering or vandalism to any of the signal equipment at the two CP locations and the three intermediate signal locations.

All signal indications were found to be in accordance with the physical location of the accident train. The signal light units at the two CP locations were configured to be constantly lit and the three intermediate signal locations were configured to be approach lit for all train movements.

Track connections and insulated joints were inspected and no exceptions were noted. No terrain or physical structures were found to impede the preview to the eastbound signals between CP East Davis and CP West Avalon. Track circuits were verified and no failures were identified. Ground tests were performed.

CSX signal maintenance, inspection, and test records for all signal locations between CP East Davis and CP West Avalon indicate the equipment was in working condition and listed no exceptions that would prevent the signal equipment from operating as intended. Table 3 is a summary of maintenance, inspection and testing performed on the signal equipment in the vicinity of the accident.

Table 3 *Signal Maintenance, Inspection and Test Dates.*

Location	Inspection/Test	Date
CP East Davis (BAC-20.0)	Timing Relays	June 29, 2012
	Grounds	June 29, 2012
	Switch, Lock Rod Obstruction	July 30, 2012
	Switch, Shunt Fouling	May 31, 2012
	Insulation Resistance	April 24, 2011
	Locking	April 14, 2012
	Relays	April 12, 2011
Daniels Defect Detector	Dragging Equipment & Hot Bearing	August 9, 2012

[4] Time based on defect detector clock and has not been synchronized with signal system clock.

(BAC-18.10)		
Daniels Signal (BAC-17.9)	Grounds	July 10, 2012
Union Dam Signal (BAC-15.3)	Grounds	July 11, 2012
Ellicott City Signal (BAC-15.3)	Grounds	July 10, 2012
Webbers Switch & Derail (BAC-12.0)	Switch, Shunt Fouling	June 5, 2012
Ilchester Defect Detector (BAC-10.7)	Dragging Equipment & Hot Bearing	July 25, 2012
CP West Avalon (BAC-9.8)	Timing Relays	July 9, 2012
	Grounds	July 9, 2012
	Switch, Lock Rod Obstruction	August 7, 2012
	Switch, Shunt Fouling	August 7, 2012
	Insulation Resistance	March 30, 2010
	Locking	April 17, 2011
	Relays	April 17, 2011

All maintenance, inspectiona and tests were in accordance with FRA requirements.

5. Damages

The CSX signal system did not sustain any damage to the signal equipment and appurtenances as a result of the train collision. Repair damages to track connections and bonding were necessary to restore track circuits.

E. ADDITIONAL INFORMATION

1. Verizon Network Operations Center Data

A Verizon cable located along the CSX right-of-way was severed as a result of the derailment. The Verizon Network Operations Center (NOC) maintains an event log that records alarms affecting their system. The event log is time stamped and recorded. The time stamp is acquired from the NOC clock which is synchronized to Greenwich Mean Time (GMT).

The NOC event log recorded a loss of signal alarm on August 21, 2012 at 03:56:13 GMT.

END OF SIGNAL & TRAIN CONTROL FACTUAL REPORT