EXHIBIT 2-A

Docket No. DCA-08-MR009

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

Signal Group Factual Report

NATIONAL TRANSPORTATION SAFETY BOARD

OFFICE OF RAILROAD, PIPELINE &

HAZARDOUS MATERIALS INVESTIGATIONS

WASHINGTON, D. C. 20594

DCA-08-MR-009

HEAD ON COLLISION/DERAILMENT OF METROLINK TRAIN No. 111 & UNION PACIFIC TRAIN No. LOF65-12

On Metrolink's Ventura Subdivision

Chatsworth, California

September 12, 2008

SIGNAL GROUP FACTUAL REPORT

Prepared by: Timothy J. DePaepe, Signal Group Chairman

Accident:

NTSB Accident Number:	DCA 08 MR 009
Date of Accident:	September 12, 2008
Time of Accident:	4:22 p.m. Pacific Daylight Time (PDT)
Type of Train:	Metrolink commuter train No.111 & UP freight train LOF65-12
Railroad Owner:	Southern California Regional Rail Authority (Metrolink)
Train Operators:	Metrolink Union Pacific
Crew Members Metrolink:	1 Engineer, 1 Conductor
Crew Members UP:	1 Engineer, 1 Conductor, 1 Brakeman
Location of Accident:	Chatsworth, California

Signal Group:

- Timothy J. DePaepe – Signal Group Chairman – National Transportation Safety Board
- Howard E. Cox – District Communication & Signal Manager – Metrolink
- David L. Reed – Union Pacific RR, Director Signal Mtc. – Western Region
- Ralph Roberts – Signal & Train Control Inspector – Federal Railroad Administration
- John McIntyre – Mass Electric Construction Company – Supervisor
- Gerald Muffley – Associate Signal & Train Control Inspector – California Public Utilities Commission

Synopsis:

On Friday, September 12, 2008, at approximately 4:22 p.m. Pacific Daylight Time (PDT), westbound Metrolink passenger train No. 111 and eastbound Union Pacific freight train No. LOF65-12 collided head-on near Chatsworth, California. The Metrolink train derailed its locomotive and lead passenger car, the UP train derailed two locomotives and 10 cars. As a result of the collision, the Metrolink locomotive was shoved about 50 feet into the lead passenger car. Emergency response agencies reported that 102 injured persons were transported to local hospitals. There were 25 fatalities. Damage is estimated at $10.6 million. Environmental conditions were daylight, clear skies, haze, calm winds and a temperature of 73 degrees Fahrenheit with visibility of four miles.

Parties to the investigation include Metrolink, Union Pacific Railroad (UP), Federal Railroad Administration (FRA), California Public Utilities Commission (CPUC), Brotherhood of Locomotive Engineers and Trainmen (BLET), United Transportation Union (UTU), Bombardier Transportation, Connex (operator of Metrolink trains), Mass Electric Construction Company, Los Angeles Police Department and Los Angeles Fire Department.

The Accident:

At 4:22 p.m., on September 12, 2008, PDT, westbound Metrolink train No. 111, consisting of a locomotive and three passenger cars collided with eastbound UP train LOF65-12, the Leesdale local, consisting of two locomotives (UP 8485 in the lead, and UP 8491 trailing) with 17 cars, 7 loads and 10 empties was about 1,164 feet long with 1,522 tons, including the locomotives. The Metrolink train was 313 feet in length. The accident occurred in Los Angeles County in the town of Chatsworth, California, which is approximately 30 miles northwest of downtown Los Angeles.

The head-on train accident occurred west of Metrolink's CP Topanga at about milepost 444.123, which is located in the full body of a 6 degree curve. The westbound Metrolink train was routed and signaled to stop on the main track east of CP Topanga clear of the No. 20 turnout. The eastbound UP freight train, the Leesdale local, was routed from the main track into CP Topanga and through the No. 20 turnout onto the siding. Metrolink 111 proceeded westbound through CP Topanga onto the single track main and met the UP train near the middle of the 6 degree curve on single track. The collision resulted from the two trains operating on the same track in opposite directions. The trains collided at milepost (MP) 444.123 located 1,384 feet west of the CP Topanga switch.

Metrolink designates the maximum authorized timetable speed on their single main track between CP Topanga and tunnel No. 28 as 40 mph which would be Federal Railroad Administration (FRA) Class 3 track. The speed is restricted due the curvature of the track.

Although the UP freight train contained hazardous materials, no product was released as a result of the collision.

Weather:

At about 3:51 PDT, the Van Nuys surface weather station, which is about 5.4 nautical miles east of Chatsworth, California, recorded that the environmental conditions were daylight, clear skies, haze, calm winds and a temperature of 73 degrees F with visibility of four miles.

Description of Railroad Signal System:

The Metrolink Ventura Subdivision, runs in a timetable east/west direction. The Metrolink track structure in the vicinity of the accident consists of single track main territory. The maximum timetable speed on the Ventura Subdivision is 60 mph for freight trains and 79 mph for passenger trains.

Train movements on the Ventura Subdivision are governed by operating rules, General Orders, timetable instructions and the signal indications of a Centralized Traffic Control (CTC) system utilizing four aspect signaling. CP Topanga is equipped with a General Electric Transportation Services (GETS) Vital Harmon Logic Controller (VHLC) processor and

intermediate signals are equipped with GETS Electro-code 4 (EC-4) processors. The Automatic Train Control System (ATCS) protocol are via lease line and microware base station to control point communications path from the Metrolink Operations Center (MOC) to field control point locations.

The grade crossing warning systems between CP Davis and CP Bernson utilize CPUC standard #9 and #9A warning devices in conjunction with GETS HXP-3R2 and Safetran 3000D2 constant warning processors.

The Metrolink CTC system between CP Davis and CP Bernson utilizes Safetran V-20 Colorlight signals and GRS Sentinel signals. The CTC system also uses US&S M-23A low voltage power switch machines and signal track circuits are controlled by Electro Code 4 electronic coded track circuits (Control Point to Control Point) and DC track circuits within Control Point On Station (OS) sections. Signals are arranged for movement in either direction.

Railroad Signal Event Recorders:

Information from the signal data logs[1] were downloaded at CP Topanga, CP Bernson, Intermediate Signal 4451 and Intermediate Signal 4426.

- At 4:07:23 the CP Topanga switch was requested reverse.
- At 4:07:23 codes 1, 5, and 6 received from track west of CP Topanga (track clear, block clear, tumbled block).
- At 4:07:36 CP Topanga switch indicates reverse.
- At 4:07:38 the eastbound CP Topanga signal is requested for the Union Pacific (UP) train.
- At 4:07:47 eastbound CP Topanga signal displays a red over yellow for the UP train.
- At 4:16:23 Metrolink 111 occupies westbound approach circuit to CP Bernson
- At 4:17:45 Metrolink 111 passes CP Bernson westbound signal and occupies OS circuit.
- At 4:17:53 Metrolink 111 is off the CP Bernson OS circuit and occupies the main track between CP Bernson and Intermediate signal 4451.
- At 4:17:55 UP train passes CP Davis westbound signal and occupies eastbound approach to Signal 4426.
- At 4:18:41 Metrolink 111 passes intermediate signal 4451.

[1] The event recorder data download at CP Topanga indicated a collision time and date as 02:18:23 PDT on September 13, 2008. Information was recorded from multiple sources, i.e., UP train video and event recorders, Metrolink 111 event recorders, cell phone text and messaging, signal event recorders from four separate locations, and the Dispatch Center Digicon system. These systems record their information with respect to time, but these recorder times are not synchronized. To use these data sources together, their times were synchronized to a common reference time, which was determined to be the UP locomotive event recorder GPS time as point of collision time as 4:22:23 PDT.

- At 4:20:25 UP train passes intermediate automatic signal 4426. The eastbound CP Topanga signal upgrades from red over yellow to red over green.
- At 4:21:56 Metrolink 111 occupies CP Topanga OS circuit.
- At 4:21:56 eastbound CP Topanga signal goes to red over red.
- At 4:21:58 OS circuit at CP Topanga indicates occupied and eastbound CP Topanga signal at stop.
- At 4:22:02 CP Topanga switch indicates it is not reverse.
- At 4:22:00 The track circuit between Intermediate 4451 and CP Topanga indicates unoccupied.
- At 4:22:14 CP Topanga OS track circuit indicates energized and the CP Topanga eastbound signal timer starts running.
- At 4:22:23 Metrolink 111 and UP freight train impact.

The last time the CP Topanga westbound main signal was clear prior to the accident was at 3:30:57. The westbound CP Topanga signal went to stop at 3:45:06 (37 minutes and 17 seconds prior to the accident) and was not cleared again until signal tests were performed on September 15, 2008.

The signal team visited the Dispatch Center and post accident data was obtained from the Digicon logs. Dispatch Digicon screen snapshots provide details of the UPLOF65-12 and ML111 movements. The logs indicate the Metrolink dispatcher requested the switch at CP Topanga to the reverse position and lined the signal for an eastbound train movement from the main track to diverge into the siding at CP Topanga. Field data recorders were downloaded and the information was in accordance with the logs from the dispatch centers.

Train detection data for the Metrolink 111 movement was also obtained from the Harmon Crossing Processor, HXP-3R2 units at Devonshire and Chatsworth highway rail grade crossings.

CHATSWORTH STREET – MP 444.70	DEVONSHIRE AVENUE – MP 445.20
Detection Time – 32 seconds	Detection Time – 32 seconds
Detection Speed – 42 mph	Detection Speed – 13 mph
Average Speed – 52 mph	Average Speed – 24 mph
Island Speed – 48 mph	Island Speed – 36 mph

Post Accident Inspection/Testing Of Signal System:

On September 13, 2008, representatives from the California Public Utilities Commission, Metrolink, the Federal Railroad Administration, Union Pacific Railroad, Mass Electric Construction Company and NTSB began inspecting and testing the signal system. The post accident inspection found all signal units and the signal cases at the intermediate signals and at

the control points CP Topanga, CP Bernson and CP Davis locked and sealed with no indications of tampering or vandalism to any of the signal equipment.

Upon arrival the signal team inspected the power switch machine at CP Topanga. The switch was found with points split in mid-stroke, **indicative of being run through in the trailing position**. Visual inspection showed that the throw-rod, basket rod and internal switch machine throw-rod were bent and damaged. Due to the damage, Metrolink signal personnel replaced the switch machine.

The following tests were performed at CP Topanga: switch lock rod and point detector tests; switch overload; route locking; time locking; signal indication locking; switch indication locking; switch contact breaks; loss of shunt timers; track circuit verification; switch and signal cables were meggered; ground tests; operating characteristics of relays and signal lamp voltages were recorded. The CP Topanga westbound signal (designation 2WA) on the main track voltages were as follows: Red lamp, 8.60 volts; Yellow lamp, 8.85 volts; and Green lamp, 8.91 volts. . The CP Topanga westbound signal (designation 2WB) on the side track voltages were as follows: Red lamp, 8.90 volts; Yellow lamp, 8.90 volts; and Green lamp, 8.65 volts.

After the Dispatch Center lined up the same signal routes that were selected during the time of the accident, the signal team simulated the movements of the Metrolink 111 and the UP LOF65-12 trains by utilizing rolling shunts[2]. During the simulation signal personnel were stationed at the following locations: CP Davis; intermediate signal 4426; eastbound signal at CP Topanga; westbound signals at CP Topanga; intermediate signal 4451; and CP Bernson. Signal aspects were observed and the signal system functioned as designed and intended.

Metrolink maintenance test and inspection records were collected. Examination of the signal data log, and inspection of the maintenance records did not identify any condition that would prevent the signal system from operating as designed.

Signal trouble reports for CP Topanga on the Ventura Subdivision were reviewed and no exceptions were noted.

On November 3 through November 6, 2008, the NTSB worked with representatives from Metrolink and Mass Electric in an effort to further refine the event recorder time lines at CP Bernson, CP Davis, Intermediate Signal 4451 and Intermediate Signal 4426.

Post Accident Testing Of Communication System:

On September 17, 2008, radio tests were conducted with Motorola HT-1250 handheld radios. There were three tests performed. The first was on eastbound train #114 from the engine of the train to the last cab car. It was a time based test conducted roughly every 2 minutes as the train travelled from Simi Valley Station to the Northridge Station.

[2] Signal personnel place shunts on the track deactivating track circuits simulating the movement of a train from one location to another.

The second test was from westbound train #109, from the engine to the last cab car and time based between the same stations. The dispatcher office confirmed the radio tests with the only exception being loss of communication with the handheld radio inside of tunnel #26.

The final test was done on the ground east and west of CP Topanga until arriving at the tunnel. The ground test was distance based and it was between the handheld radio and the dispatcher office using the Oat Mountain VHF radio. The only failed communications noted were within 100 feet of tunnel 28.

The handheld radio that was utilized by the conductor of the Metrolink 111 was hand delivered to High Desert Communication for testing on Tuesday, September 23, 2008. Test results determined that the handheld radio was fully functional.

Signal Damages

The Metrolink engineering personnel estimated the total signal and switch damages and at $133,028.00. This figure included costs for the installation of a US&S switch machine. After the track damaged was repaired signal personnel replaced all bonded electrical connections.

Party to the Investigation - Acknowledgment Signatures

The undersigned designated *Party to the Investigation* representatives attest that the information contained in this report is a factually accurate representation of the information collected during the investigation, to the extent of their best knowledge and contribution in this investigation.

_____ Date 1-20-09
/s/ Timothy J. DePaepe, NTSB

_____ Date 1-20-09
/s/ Howard E. Cox, Metrolink

_____ Date 1-20-09
/s/ David L. Reed, Union Pacific RR

_____ Date 1-20-09
/s/ Ralph Roberts, FRA

_____ Date 1-20-09
/s/ John McIntyre, Mass Electric

_____ Date 1-20-09
/s/ Gerald Muffley, CPUC