



***Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch***

***Accident Investigation Report
HQ-2013-27***

***Southwestern Railroad Company (SW)
Bayard, NM
November 30, 2013***

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 Southwestern Railroad Company, Incorporated	1a. Alphabetic Code SW	1b. Railroad Accident/Incident No. SW1130-03
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GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance Southwestern Railroad Company, Incorporated		1a. Alphabetic Code SW	1b. Railroad Accident/Incident No. SW1130-03	
2. U.S. DOT Grade Crossing Identification Number		3. Date of Accident/Incident 11/30/2013	4. Time of Accident/Incident 12:30 PM	
5. Type of Accident/Incident Derailment				
6. Cars Carrying HAZMAT 0	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0	9. People Evacuated 0	10. Subdivision Santa Rita
11. Nearest City/Town BAYARD		12. Milepost (to nearest tenth) 1.2	13. State Abbr. NM	14. County GRANT
15. Temperature (F) 55 °F	16. Visibility Day	17. Weather Clear		18. Type of Track Main
19. Track Name/Number Cobre Ind Spur		20. FRA Track Class Freight Trains-25, Passenger Trains-30		21. Annual Track Density (gross tons in millions)
				22. Time Table Direction East

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train				2. Was Equipment Attended? Yes		3. Train Number/Symbol RSWC91-30					
4. Speed (recorded speed, if available) R - Recorded E - Estimated		Code E	5. Trailing Tons (gross excluding power units) 1148		6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter					Code 0	
6. Type of Territory											
Signalization: <u>Not Signaled</u>											
Method of Operation/Authority for Movement: <u>Yard/Restricted Limits</u>											
Supplemental/Adjunct Codes: <u>L, E, M</u>											
7. Principal Car/Unit		a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. If railroad employee(s) tested for drug/ alcohol use, enter the number that were positive in the appropriate box.			Alcohol	Drugs		
(1) First Involved <i>(derailed, struck, etc.)</i>		SW 3000	1					0	0		
(2) Causing <i>(if mechanical, cause reported)</i>		0	0		9. Was this consist transporting passengers?			No			
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)	a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)	Loaded		Empty		
		b. Manual	c. Remote	d. Manual	e. Remote		a. Freight	b. Pass.	c. Freight	d. Pass.	e. Caboose
(1) Total in Train	1	0	0	0	0	(1) Total in Equipment Consist	8	0	0	0	0
(2) Total Derailed	1	0	0	0	0	(2) Total Derailed	6	0	0	0	0
12. Equipment Damage This Consist 325000			13. Track, Signal, Way & Structure Damage 55137								
14. Primary Cause Code H603 - Train on main track inside yard limits, excessive speed											
15. Contributing Cause Code H509 - Improper train inspection											
Number of Crew Members					Length of Time on Duty						
16. Engineers/Operators	17. Firemen		18. Conductors		19. Brakemen	20. Engineer/Operator		21. Conductor			
1	0		1		0	Hrs: 5 Mins: 30	Hrs: 5 Mins: 30				
Casualties to:	22. Railroad Employees		23. Train Passengers		24. Others	25. EOT Device?		26. Was EOT Device Properly Armed?			
Fatal	2		0		1	No		No			
Nonfatal	0		0		0	27. Caboose Occupied by Crew?		No			
28. Latitude 32.000000000			29. Longitude -109.000000000								

CROSSING INFORMATION

Highway User Involved

Rail Equipment Involved

1. Type		5. Equipment	
2. Vehicle Speed (<i>est. mph at impact</i>)	3. Direction (<i>geographical</i>)	6. Position of Car Unit in Train	
4. Position of Involved Highway User		7. Circumstance	
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? N/A		8b. Was there a hazardous materials release by N/A	
8c. State here the name and quantity of the hazardous material released, if any.			
9. Type of Crossing Warning 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (<i>spec. in narr.</i>) 3. Standard FLS 6. Audible 9. Watchman 12. None N/A		10. Signaled Crossing Warning	11. Roadway Conditions N/A
12. Location of Warning N/A		13. Crossing Warning Interconnected with Highway Signals N/A	14. Crossing Illuminated by Street Lights or Special Lights N/A
15. Highway User's Age	16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train	18. Highway User
19. Driver Passed Standing Highway Vehicle		20. View of Track Obscured by (<i>primary obstruction</i>)	
Casualties to:	Killed	Injured	21. Driver was
23. Highway-Rail Crossing Users	0	0	22. Was Driver in the Vehicle?
24. Highway Vehicle Property Damage (<i>est. dollar damage</i>)		25. Total Number of Vehicle Occupants (<i>including driver</i>)	
26. Locomotive Auxiliary Lights? N/A		27. Locomotive Auxiliary Lights Operational? N/A	
28. Locomotive Headlight Illuminated? N/A		29. Locomotive Audible Warning Sounded? N/A	

SYNOPSIS

A eastbound Southwestern Railroad (SW) train (RSWC91-30) traveling on single main track, governed by yard limit rules, derailed during a switching movement on November 30, 2013, at 12:30 pm MST. The train consist included one locomotive and eight loaded hopper cars. The derailment occurred near Bayard, New Mexico at SW Milepost 1.2 on the SW Whitewater Division, Santa Rita Subdivision. The locomotive engineer, conductor, and an unauthorized civilian riding in the cab were killed. The locomotive, SW 3000, sustained major damage of approximately \$200,000. Six of the eight cars derailed with five sustaining major damage of approximately \$125,000.

At the time of the accident it was daylight and clear. The temperature was approximately 55° F.

The probable cause of the accident was (H603) train on main track inside yard limits, excessive speed, due to the crew performing a (H509) improper train inspection. There were also other contributing factors that caused the accident. SW's management accepted a safety culture that in effect fostered an environment for non-compliance with respects to even the most fundamental elements of a railroad operation. Specifically, contributing factors to this accident were as follows:

1. The failure of SW's Operational Testing Program to provide operating rules compliance oversight of its operating employees.
2. The failure of SW's senior management to provide its operating, track, and mechanical employees with proper training in the performance of their duties.

NARRATIVE

Circumstances Prior to the Accident

Method of Operations

Train movements are governed by Yard Limits Rule. A train crew must contact the American Rail Dispatch Center (ARDC) and verify receipt of the Daily Operating Bulletin (DOB) for the day. Main track yard limit rule, monitoring for broken rail and switch points were in effect on SW's territory, specifically at milepost 1.2 on the SW Whitewater Division, Santa Rita Subdivision, which also had a maximum authorized speed of 10 mph on the day of the accident.

Railroad operations in the accident area are conducted on one main track with rail car set-outs and pick-ups enroute. This allowed for bidirectional movement to and from the Cobre Mine loading dock. SW's Whitewater Division Timetable dated October 2012 indicates the main tracks run east and west.

The railroad timetable direction for the derailling train is east. The geographic direction was west. Timetable direction and Mountain Standard Time (MST) is used throughout this report.

The portion of the track where the accident took place the railroad the track is, in succession, a tangent of 480 feet, followed by a 7.25-degree curve to the right for 233 feet to the point of the derailment. This is followed by the continuation of the 7.5-degree curve to the right for an additional 132 feet, followed by 60 feet of tangent track. There is a descending grade in the derailment area. According to the SW's Roadmaster, there are no engineering track charts for the Cobre main track. As of this report, there are neither accurate track charts nor recorded land surveys of the Cobre mine or main track.

SW maintains the main track to and from the Cobre Mine at FRA Class 1 Standards (10 MPH).

Train RSWC91-30

SW's Train Symbol RSWC91-30 crew included a locomotive engineer and a conductor. The crew first went on duty at 7:00 am MST November 30, 2013 at Hurley, NM. This is the crew's home terminal. Both employees received more off-duty time than required by regulations. Both the engineer and conductor received 14 hours prior to reporting for duty.

SW Train RSWC91-30 (per SW's Daily Operating Plan) originally consisted of two locomotives (SW 3000 and SW 2468) and 32 empty hopper cars. The train crew was scheduled to work from Hurley Yard to Hanover Junction, switching empty and loaded hopper cars between Hanover Junction, the Cobre Mine Loading Dock, and the Cobre Mine Siding. Upon completion of the switching moves, the train would return to Hurley Yard.

After the conductor verified receipt of the DOB with the ARDC at approximately 7:04 am, the crew proceeded to put their train together in Hurley Yard. At approximately 7:45 am the crew had completed placing the train together and proceeded to perform an air brake test. As the crew departed Hurley Yard, smoke began to appear from the cab of locomotive SW 2468. The conductor called and informed the operations manager that SW 2468 was experiencing mechanical issues and they were returning to Hurley Yard. The operations manager instructed the crew to place the empty hopper cars back in Hurley Yard and await further instructions. After speaking with the locomotive mechanical foreman, the operations manager instructed the crew of RSWC91-30 with one locomotive, to travel to the Cobre Mine and switch eight loaded hopper cars at the Cobre Mine's loading dock and place the eight empty hopper cars from the Cobre Mine Siding to the loading dock. Before hanging up the phone, the operations manager and the crew performed a safety briefing to include instructions to bring four loaded hopper cars from the Cobre Mine's loading dock to the Cobre siding track since the crew was using one locomotive to complete the work assignment.

The crew of train RSWC91-30 departed Hurley Yard enroute to Cobre Mine on a single locomotive, SW 3000. The crew stopped at Bayard, NM where an unauthorized civilian boarded the locomotive.

The crew and the unauthorized civilian traveled on SW 3000 to the Cobre Mine and coupled to the eight loaded hopper cars. They were to drop the eight loaded hopper cars off at Cobre Mine Siding, then spot eight empty rail cars that were on the siding at the mine loading dock. SW Train RSWC91-30 was 433 feet long and weighed 1148 tons. The train crew did not perform a train inspection before departing Cobre Mine's loading dock.

Shortly after departing the Mine's loading dock, the train crew lost control of the movement.

The Accident

After Train RSWC91-30 departed the Cobre Mine, the train crew immediately lost control. Train RSWC91-30 traveled approximately 5.3 miles where locomotive SW 3000 uncoupled from the first head car and derailed. The locomotive derailed, landed on its side, and slid down an embankment. After another 400 feet, the first six head cars derailed. Estimated speed at the time of the derailment was 45 mph. The maximum authorized speed is 10 mph. The locomotive engineer, conductor, and the unauthorized civilian suffered fatal injuries and were transported to Baca's Funeral Home in Bayard, NM.

The Cobre Mine Gate Security Guard stated that he thought the train departing the mine was traveling too fast when it went past his location. Another eyewitness, the initiator of the 911 call, stated that he saw Train RSWC91-30 as it traversed the highway grade crossing at New Mexico State Highway 152. He said that the train was traveling too fast. He states that he got in his truck and began following the train and shortly after saw a lot of smoke. From the road, he saw the locomotive in the creek and the derailed cars. He stated that he went down to the locomotive, looked inside and saw one body. He then called 911.

The three fatalities were reported to the FRA as required by law.

SW supervisors arrived at the accident site and assessed the damage. The following parts of train RSWC91-30 were damaged or derailed:

SW 3000, Locomotive, Derailed
UP 38843, First Head Car, Derailed
UP 39773, Second Head Car, Derailed
UP 38557, Third Head Car, Derailed
UP 40381, Fourth Head Car, Derailed
UP 38260, Fifth Head Car, Derailed
UP 40369, Sixth Head Car, Derailed

Analysis and Conclusions

Analysis - Post Accident Toxicological Tests:

This triple fatality train derailment qualified as a major train accident with a fatality. The members of the train crew were post accident toxicologically tested under Federal authority.

Conclusion:

Federal Railroad Administration post-accident forensic toxicology result reports indicate that the two employees who perished in the accident had negative test results. Impairment was not a factor.

Analysis - Fatigue:

FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis, which is equivalent to blood alcohol content (BAC) of 0.05. At or above this baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does

baseline, we do not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings. FRA obtained fatigue related information, including a 10-day work history, for the locomotive engineer and conductor involved in this derailment.

Conclusion:

FRA concluded fatigue was neither probable for the locomotive engineer or the conductor.

Analysis – Cell Phone Use:

Conclusion:

Although personal cell phone use by the conductor occurred on the day of the derailment, there is no evidence that personal cell phones were used on a moving train or any other circumstances where prohibited by FRA regulations. Use of cell phones was not a factor in the accident.

Analysis - Post Accident Train Air Brake and Locomotive Inspections:

On December 1, 2013, FRA began an investigation of the derailment of SW Train RSWC91-30 located at milepost 1.2 on the White Water Division, Santa Rita Subdivision, Southwestern Railroad.

Upon arrival at the accident site, FRA observed a SW Railroad Locomotive SW 3000 in a dry creek bed. The locomotive was facing timetable direction east and was resting on its left side. The locomotive cab was crushed with very little room to navigate

Upon entry into the cab of the SW 3000, FRA observed the following position of various locomotive appurtenances:

1. The 26C automatic brake valve handle on the brake valve quadrant was in the running release position;*
2. The brake pipe cutout cock on the 26C automatic brake valve was in the cut-out position;
3. The application handle on the SA-26 independent brake valve was in the fully applied position;
4. The reverser was in the forward position;
5. The selector handle was in the “B” position for braking (Note: “B” selection indicates dynamic braking);
6. The MU 2A valve was in the lead or dead position;
7. The throttle handle was in idle mode;
8. And the isolation switch was in the start/stop/isolate position.

*Note: A photograph provided by the New Mexico Office of the Medical Investigator, one of the first at the derailment scene, revealed the position of the handle on the quadrant of the 26C Automatic Brake Valve was in the emergency position or to the extreme right of the quadrant. When inspectors of the FRA and the New Mexico Public Utilities Commission first arrived at the accident scene the automatic brake valve handle was observed in the running release position on the quadrant of the 26C automatic brake valve. It is possible the responding emergency personnel might have moved the handle to the released position for use as a step when going in and out of the locomotive cab to look for the bodies.

A general inspection of the exterior of SW 3000 and the running gear indicated extreme heat on the wheels of the locomotive, as all wheels were blue in color. Numerous thermal cracks were evident on the wheels. Both locomotive left and right number one wheels were observed to be in non-compliance due to the flanges being more than one and half inches from the tread to the top of the flange. The majority of the composition brake shoes were worn to the backing plate. This can be attributed to the brakes having remained applied from the departure at the Cobre Mine until the derailment.

Following the inspection of the locomotive, the FRA inspected the eight 100 ton Union Pacific hopper cars.

These observations revealed the following:

1. The first hopper car closest to the locomotive was UP 38843. This car was observed to have the brake retainer valve in the SD - slow direct position. The coupler at the B-end of the car, a bottom shelved type “E” coupler, was observed to have the bottom shelved portion missing. This occurred during the separation from the rear coupler of the SW 3000 locomotive. Also, and most critically, the A-end ball type angle cock, which connects the brake pipe hoses between the locomotive and the remainder of the train, was perpendicular to the train line hose. This indicates that there was no airflow between the rear of the locomotive and the first car thru the eighth and last car in the train. This car was lying on its side. There was no indication of an applied hand brake.
2. The second hopper car, UP 39773, was observed to have the brake retainer valve in the HP - high-pressure position. There was no indication of an applied hand brake. This hopper car was lying on its side.
3. The third hopper car, UP 38557, was observed to have the brake retainer valve in the HP -high-pressure position. There was no indication of an applied hand brake. This hopper car was lying on its side.
4. The fourth hopper car, UP 40381, was observed to have the brake retainer valve in the HP- high-pressure position, the L3 brake shoe was worn into the backing plate, and there was a slight indication the hand brake was set. This was indicated by a slight tension in the hand brake chain. This hopper car was lying on its side.
5. The fifth hopper car, UP 38260, was observed to have the brake retainer valve in the HP- high-pressure position and the R1 brake shoe was worn into the backing plate. There was no indication of an applied hand brake. This hopper car was lying on its side.
6. The sixth hopper car, UP 40369, was observed to have the brake retainer valve in the HP - high pressure position, the R1, R2, and L3 brake shoes were worn into the backing plate, and the 10 inch by 12-inch brake cylinder was observed to have 11.5 inches of piston travel and considered excessive. There was no indication that the hand brake was set. This hopper car was upright and the A-end truck assembly was derailed. The B-end trucks were on the rail.
7. The seventh hopper car, UP 37645, was observed to have the brake retainer valve in the HP - high-pressure position, the piston travel was within Federal requirements and none of the brake shoes were worn. Although there was an indication that the hand brake was applied, FRA could not determine whether the handbrakes were applied prior to departing the mine or after the derailment to secure the car in place. The hopper car remained upright and did not derail.
8. The eighth and last car of the derailed equipment was UP 41029, a hopper car was observed to have the brake retainer valve in the HP - high-pressure position, the piston travel was within Federal requirements and none of the brake shoes was worn. Although there was an indication that the hand brake was applied, FRA could not determine whether the handbrakes were applied prior to departing the mine or after the derailment to secure the car in place. The hopper car remained upright and did not derail.

Note: Retainer Valves

Retainer valves are utilized on long steep grades to control a train’s acceleration while a train air brake system recharges following an application of the train air brakes. Since the advent of dynamic braking there are very few locations where retainer valves are used on a regular basis. However, the mines in and around Hurley, NM is one of them as not all locomotives in that area are equipped with dynamic braking. The use of retainers in this area is directed by timetable special Instructions due to the approximate two to four percent descending grades.

Retainer valves are mounted on the exhaust pipe of the brake cylinders and in the high pressure or “HP” position. This restricts the venting of brake cylinder pressure and

Retainer valves are mounted on the exhaust pipe of the brake cylinders and in the high pressure or "HP" position. This restricts the venting of brake cylinder pressure and thereby retains the brake application against the treads of the wheels for a longer period of time. While this is happening the air brake system recharges and awaits further brake pipe reductions and subsequent applications of the train air brakes.

Conclusion:

By all indications, it appears Locomotive SW 3000, along with eight hopper cars loaded with magnetite, departed the Cobre Mine at approximately 12:06 pm on November 30, 2013. The angle cock was closed on the A-end of first car UP 38843, which is the end nearest the locomotive. The closed angle cock at the A-end of UP 38843 indicates that eight trailing hopper cars had no air brakes from their departure at Cobre Mine until the derailment in the vicinity of milepost 1.2. This suggests that no air brake test was performed on the cars prior to their departure from the mine. This also implies that there was no rail car inspection performed prior to departure of the cars from the Cobre Mine.

The inspection of Locomotive SW 3000 resulted in Federal violations for left number one and right number one wheel flanges 1 1/2" or more from the tread to top of flange.

Analysis - Engineer and Conductor Certificate and Training:

Locomotive engineer and conductor certificates, hearing & vision testing, driver license checks, and other required training events were current and in compliance with 49 CFR part's 240 and 242. The engineer of RSWC91-30 current certificate was issued on March 8, 2014, with his latest monitored ride on November 26, 2013. The conductor of RSWC91-30 current certificate was issued on January 1, 2013, with his latest annual training event occurring on September 30, 2013.

Conclusion:

Engineer and conductor training, monitoring rides, and certification were current and not a factor in the collision.

Analysis - Locomotive Engineer and Conductor Operating Performance:

The event recorder from SW 3000 was not functioning and the National Transportation Safety Board was unable to develop any data. The position of the A-end ball type angle cock of UP 38843, which connected the brake pipe hoses of locomotive SW 3000 and UP 38843 to the remainder of the train, was perpendicular to the train line hose. This indicates that the valve was closed and there was no airflow from the rear of the locomotive to the first car thru the eighth and last car in the train. Damage of SW 3000 and location of the locomotive after the derailment indicates RSWC91-30 was operating at an estimated speed of 45 mph.

Conclusion:

The data and resulting derailment demonstrate that the locomotive engineer and the conductor failed to properly conduct a transfer train airbrake test. The train crew lost control of the train as soon as it departed from the loading dock of Cobre Mine.

Analysis - SW Operating Rules and Efficiency Testing Data for the Whitewater Division 6/1/13 – 11/30/13:

SW operational rules and efficiency testing data were limited to only three tests that the railroad provided. FRA was neither able to determine the number of tests conducted nor the number of rules tests passed or failed. The SW did provide three testing records for members of train crew RSWC91-30. Those records included a stop bannertest and two alcohol and drug signs and symptoms observations.

Conclusion:

FRA recommends the SW become compliant with 49 CFR part 217. SW is required to develop and instruct its supervisors and employees on its operating and safety rules, and the conduct of its required regulatory Part 217 Operating Efficiency Rules tests and observations program.

Analysis – Track Condition, Inspection and Programs:

FRA inspections revealed that the SW does not have any general railroad safety rules for its track and maintenance of way employees. The SW timetable milepost designations, field markings and signage do not match (Example: Station Hurley is shown as MP 8.3 and New Mexico State Highway 180, which is less than one mile south, is marked as MP 11.7).

According to interviews, the SW has no track profiles for the railroad.

The SW failed to have in place any of the FRA required programs track and maintenance of way safety, roadway worker protection, continuous welded rail, nor bridge management program.

Conclusion:

FRA recommends that the SW adopt maintenance of way rules and related safety rules for track and maintenance of way employees in order to comply with Federal regulations.

With no track profiles and inaccurate timetable information, FRA strongly suggests that the railroad be surveyed and the timetable be updated. The required Federal safety programs need to be developed and implemented as soon as possible.

Analysis - Recent FRA Inspection Activity

The FRA has conducted numerous inspections prior to this accident and three multi-discipline audits after this accident.

Conclusion

Prior to this accident, FRA, along with the New Mexico Public Regulation Commission Railroad Inspector (NMPRC), conducted 15 separate inspections of the SW's railroad operations and programs. A total of 23 violations were filed as a result of Improper locomotive engineer certification procedures, improper operational rules efficiency testing procedures, failure to comply with CFR Part 218 Subpart F procedures and Rail Accident Injury reporting.

After this accident, FRA, along with the NMPRC, conducted three multi-discipline audits in December 2013, February and March 2014. A total of 100 violations were noted during these audits. Violations noted during the inspection involved:

1. Operating practices discipline was eight violations total; six for Part 218 Subpart F and two for Part 232, Securement.
2. Track discipline was 46 violations total; 40 programs and records violations, five track violations (two of which were for Part 218 Subpart F for locks not being locked on derails), and one track violation written as a result of an uncorrected re-inspection.
3. Mechanical discipline was four violations; all for Part 229 locomotives.
4. Signal & train control discipline was four violations; three for grade crossing safety appliances and one for Part 218 Subpart F.

During the week of February 10-14, 2014 a team of 14 FRA Region Five inspectors from each discipline conducted a follow-up inspection on the SW railroad to determine what remedial action had been taken for the Federal violations and defects that were found during the December 2013 inspection. During this inspection a total of 21 additional violations were written in three discipline's, one for grade crossing interference, four for 218 Subpart F (all of which occurred on the Whitewater Division), and 16 for track violations.

During the week of March 24-28, 2014 a team of 11 FRA Region Five inspectors from each discipline conducted a second follow-up inspection on the SW railroad to determine what remedial action had taken place for the Federal violations and defects found during the February 2014 inspection. During this inspection, 16 additional

determine what remedial action had taken place for the Federal violations and defects found during the February 2014 inspection. During this inspection, 16 additional violations were written in four disciplines: ten track violations, two MP&E violations, three operating violations and one S&TC, grade crossing violation. Six of the track violations and one S&TC grade crossing violation were written for the railroad's failure to take remedial action on those seven significant defects written during FRA's February inspection.

Overall Conclusion

Based on the observation of the hopper car nearest the locomotive (UP 38843), and the position of the appurtenances inside the cab of SW 3000 (the lead and controlling locomotive), FRA can ascertain the following chain of events occurred immediately prior to the derailment.

At approximately 12:01 pm, SW 3000 makes a rearward movement and couples into the A-end of UP 38843, a 100 ton open top hopper car loaded with magnetite. This is the first car of an eight car switching movement.

After the coupling, the angle cock on the rear of the locomotive is cut in. However, the angle cock on the A-end of UP 38843 is not. This indicates that air could not flow through the eight cars for the brakes to function as intended. This was caused by a lack of airflow continuity throughout the train due to the angle cocks being cut out between the locomotive and the trailing eight loaded hopper cars. It also shows that a brake test was not conducted before the crew departed with the eight loaded cars. All eight loaded hopper cars are equipped with retainers and seven of the eight cars have the retainers set in the high-pressure (HP) position and one is in the slow direct (SD) position. The 87.5% retainer valves set in the HP position (which assist train crews operating in heavy mountainous grades control the speed of their train by minimizing exhaust and retaining brake cylinder pressure), meets the minimum requirement of 75% set in the Whitewater Division Timetable.

As eastward movement begins down an estimated two to four percent grade, apparently without the engineer or conductor knowing that no brake pipe airflow from the rear of the locomotive thru the eighth and last car. The locomotive and the train has eight cars begin to increase speed.

The Cobre Mine security guard on duty stated during a telephonic conversation that he had noticed the train was departing the facility at a higher rate of speed than normal and the blowing of the horn at crossings were out of the ordinary. He states that the horn was sounded four times as opposed to the usual two times. The security guard also stated that when the train finally went by the security gate, he felt relieved.

As the train continued to accelerate, the engineer, in an attempt to reduce the train speed, initiates dynamic braking and may or may not have fully applied the independent air brakes on the locomotive at this time. The train continues to accelerate and the engineer places the train in an engineer induced emergency application of the air brakes. When placing the train in "emergency" the engineer loses all electrical power including but not limited to dynamic braking. After placing the train in emergency, the engineer places the brake pipe cut out cock on the automatic brake valve in the cut out position in an attempt to retain braking effort on the rear eight cars.

Note: After placing the train in emergency the electrical system is not able to recover electrical power, (i.e. dynamic braking, throttle speeds, load meter, etc.) for approximately one minute. In order to recover from an emergency application, the automatic brake valve handle on the quadrant must be placed in the running release position. This may have further exacerbated the problem as the air brake must be released in order to be able to recover and begin charging the air brake system.

According to an eye witness that observed the train going by the gated rail grade crossing at New Mexico Highway 152, the train went by the gated rail grade crossing before the gates went down. The eye witness stated there was a lot smoke coming from the wheels and turned his vehicle around as he was sure there was going to be a wreck. The aforementioned eye witness was also the individual that called 911 at 12:11 pm after seeing a smoke or dust cloud.

The train continued eastward for approximately one to two miles where the locomotive and six of the eight trailing car derailed. As the train approached a fairly sharp right-hand curve, the SW 3000 separated from the couplers. This was evidenced by markings at the bottom of the rear coupler knuckle on the SW 3000 and the breakage of the bottom shelf of the coupler on the A-end of UP 38843.

Upon separation at the curve, SW 3000 appears to have gone airborne as evidenced by a lack of distinct wheel marks on the rails, and at that location the rail remained intact. The eight loaded cars continued for approximately 375 feet until finally derailed the first six cars with the last two remaining upright and on the rail. The locomotive continued down an embankment, ripping out two mature juniper trees at an approximate 30 degree angle, before coming to rest on its left side.

The FRA has documented a total of 123 violations from before and after this accident, which indicates a trend of non-compliance and an unsafe environment at SW.

Probable Cause and Contributing Factors

The probable cause of the accident was (H603) train on main track inside yard limits, excessive speed, due to the crew performing a (H509) improper train inspection. There were also other contributing factors that caused the accident. SW's management accepted a safety culture that in effect fostered an environment for non-compliance with respects to even the most fundamental elements of a railroad operation. Specifically, contributing factors to this accident were as follows:

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