Federal Railroad Administration
Office of Safety
Headquarters Assigned
Accident Investigation Report
HQ-2006-59

Canadian Pacific Railway Company
Elbow Lake, MN
June 30, 2006

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report 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.

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

FRA FACTUAL RAILROAD ACCIDENT REPORT

FRA File # HQ-2006-59

1.Name of Railroad Operating Train #1: SOO Line RR Co. [SOO]	1a. Alphabetic Code: SOO	1b. Railroad Accident/Incident No.: 197128
2.Name of Railroad Operating Train #2: N/A	2a. Alphabetic Code: N/A	2b. Railroad Accident/Incident: N/A
3.Name of Railroad Responsible for Track Maintenance: SOO Line RR Co. [SOO]	3a. Alphabetic Code: SOO	3b. Railroad Accident/Incident No.: N/A
4. U.S. DOT_AAR Grade Crossing Identification Number	5. Date of Accident/Incident: Month 06 / Day 30 / Year 2006	6. Time of Accident/Incident: 03:32:00 ☐ AM ☑ PM

7. Type of Accident/Indicent (single entry in code box): 1. Derailment; 2. Head on collision; 3. Rear end collision; 4. Side collision; 5. Raking collision; 6. Broken Train collision; 7. Hwy-rail crossing; 8. RR grade crossing; 9. Obstruction; 10. Explosion-detonation; 11. Fire/violent rupture; 12. Other impacts; 13. Other (describe in narrative): 01

8. Cars Carrying HAZMAT	9. HAZMAT Cars Damaged/Derailed	10. Cars Releasing HAZMAT	11. People Evacuated	12. Division
15	1	00	0	ST PAUL SERVICE AREA

13. Nearest City/Town	14. Milepost (to nearest tenth)	15. State Abbr	15. State Code	16. County
ELBOW LAKE	159.9	N/A	MN	GRANT

17. Temperature (F) (specify if minus)	18. Visibility (single entry) 1. Dawn 2. Day 3.Dusk 4.Dark	Code	19. Weather (single entry) 1. Clear 2. Cloudy 3. Rain 4. Fog 5.Sleet 6.Snow	Code	20. Type of Track 1. Main 2. Yard 3. Siding 4. Industry	Code
93 F		2		1		1

21. Track Name/Number	22. FRA Track Class (1-9, X)	Code	23. Annual Track Density (gross tons in millions)	24. Time Table Direction 1. North 3. East	Code
SINGLE MAIN TRACK		3	32.4		4

OPERATING TRAIN #1

25. Type of Equipment Consist (single entry) 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car	A. Spec. MoW Equip. Code	26. Was Equipment Attended? 1. Yes 2. No	Code	27. Train Number/Symbol
	1		1	295-29

28. Speed (recorded speed, if available) R - Recorded E - Estimated			Code
	39	MPH	R

29. Trailing Tons (gross tonnage, excluding power units): 5675

30. Method(s) of Operation (enter code(s) that apply)

a. ATCS	g. Automatic block	m.Special instructions		
b. Auto train control	h. Current of traffic	n. Other than main track		
c. Auto train stop	i. Time table/train orders	o. Positive train control		
d. Cab	j.Track warrant control	p. Other	(Specify in narrative) Code(s)	
e. Traffic	k. Direct traffic control			
f. Interlocking	l.Yard limits			

j	N/A	N/A	N/A	N/A

30a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable; 2 = Remote control tower; 3 = Remote control transmitter - more than one remote control transmitter: 0

31. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	52	no
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

32. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

33. Was this consist transporting passengers? (Y/N): N

34. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	4	0	0	0	0
(2) Total Derailed	0	0	0	0	0

35. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	29	00	63	00	00
(2) Total Derailed	8	00	19	00	00

36. Equipment Damage This Consist	37. Track, Signal, Way, & Structure Damage	38. Primary Cause Code	39. Contributing Cause Code
355981	170731	M405	N/A

Number of Crew Members				Length of Time on Duty	
40. Engineer/ Operators	41. Firemen	42. Conductors	43. Brakemen	44. Engineer/Operator	45. Conductor
N/A	00	1	00	Hrs 2 Mi 32	Hrs 2 Mi 32

Casualties to:	46. Railroad Employees	47. Train Passengers	48. Other
Fatal	00	00	00
Nonfatal	N/A	00	00

49. EOT Device? 1. Yes 2. No	50. Was EOT Device Properly Armed? 1. Yes 2. No
1	1

51. Caboose Occupied by Crew? 1. Yes 2. No: 2

OPERATING TRAIN #2

52. Type of Equipment Consist (single entry) 1. Freight train 2. Passenger train 3. Commuter train 4. Work train 5. Single car 6. Cut of cars 7. Yard/switching 8. Light loco(s). 9. Maint./inspect.car	A. Spec. MoW Equip. Code	53. Was Equipment Attended? 1. Yes 2. No	Code	54. Train Number/Symbol
	N/A		N/A	N/A

55. Speed (recorded speed, if available) R - Recorded E - Estimated			Code
	N/A	MPH	N/A

57. Method(s) of Operation (enter code(s) that apply)

a. ATCS	g. Automatic block	m.Special instructions
b. Auto train control	h. Current of traffic	n. Other than main track

57a. Remotely Controlled Locomotive? 0 = Not a remotely controlled; 1 = Remote control portable

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56. Trailing Tons (gross tonnage, excluding power units): N/A

c. Auto train stop; d. Cab; e. Traffic; f. Interlocking; i. Time table/train orders; j.Track warrant control; k. Direct traffic control; l.Yard limits; o. Positive train control; p. Other (Specify in narrative)
Code(s): N/A | N/A | N/A | N/A | N/A

2 = Remote control tower
3 = Remote control transmitter - more than one remote control transmitter: N/A

58. Principal Car/Unit	a. Initial and Number	b. Position in Train	c. Loaded (yes/no)
(1) First involved (derailed, struck, etc)	N/A	N/A	N/A
(2) Causing (if mechanical cause reported)	N/A	N/A	N/A

59. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.

Alcohol	Drugs
N/A	N/A

60. Was this consist transporting passengers? (Y/N): N/A

61. Locomotive Units	a. Head End	Mid Train b. Manual	Mid Train c. Remote	Rear End d. Manual	Rear End c. Remote
(1) Total in Train	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

62. Cars	Loade a. Freight	Loade b. Pass.	Empty c. Freight	Empty d. Pass.	e. Caboose
(1) Total in Equipment Consist	N/A	N/A	N/A	N/A	N/A
(2) Total Derailed	N/A	N/A	N/A	N/A	N/A

63. Equipment Damage This Consist: N/A
64. Track, Signal, Way, & Structure Damage: N/A
65. Primary Cause Code: N/A
66. Contributing Cause Code: N/A

Number of Crew Members

67. Engineer/ Operators	68. Firemen	69. Conductors	70. Brakemen
N/A	N/A	N/A	N/A

Length of Time on Duty

71. Engineer/Operator: Hrs N/A Mi N/A
72. Conductor: Hrs N/A Mi N/A

Casualties to:	73. Railroad Employees	74. Train Passengers	75. Other
Fatal	N/A	N/A	N/A
Nonfatal	N/A	N/A	N/A

76. EOT Device? 1. Yes 2. No: N/A
77. Was EOT Device Properly Armed? 1. Yes 2. No: N/A
78. Caboose Occupied by Crew? 1. Yes 2. No: N/A

Highway User Involved

79. Type: A. Auto; B. Truck; C. Truck-Trailer.; D. Pick-Up Truck; E. Van; F. Bus; G. School Bus; H. Motorcycle; J. Other Motor Vehicle; K. Pedestrian; M. Other (spec. in narrative) — Code: N/A

80. Vehicle Speed (est. MPH at impact): N/A

81. Direction geographical) 1.North 2.South 3.East 4.West — Code: N/A

82. Position — Code: N/A
1.Stalled on Crossing 2.Stopped on Crossing 3.Moving Over Crossing 4. Trapped

86a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? — Code: N/A
1. Highway User 2. Rail Equipment 3. Both 4. Neither

Rail Equipment Involved

83. Equipment — Code: N/A
1.Train(units pulling) 2.Train(units pushing) 3.Train (standing) 4.Car(s) (moving) 5.Car(s) (standing) 6.Light Loco(s) (moving) 7.Light(s) (standing) 8.Other (specify in narrative)

84. Position of Car Unit in Train: N/A

85. Circumstance — Code: N/A
1. Rail Equipment Struck Highway User
2. Rail Equipment Struck by Highway User

86b. Was there a hazardous materials release by — Code: N/A
1. Highway User 2. Rail Equipment 3. Both 4. Neither

86c. State here the name and quantity of the hazardous materials released, if any.
N/A

87. Type of Crossing Warning: 1.Gates; 2.Cantilever FLS; 3.Standard FLS; 4.Wig Wags; 5.Hwy. traffic signals; 6.Audible; 7.Crossbucks; 8.Stop signs; 9.Watchman; 10.Flagged by crew; 11.Other (spec. in narr.); 12.None

Code(s)							
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

88. Signaled Crossing Warning (See instructions for codes) — Code: N/A

89. Whistle Ban — Code: N/A
1. Yes
2. No
3. Unknown

90. Location of Warning — Code: N/A
1. Both Sides
2. Side of Vehicle Approach
3. Opposite Side of Vehicle Approach

91. Crossing Warning Interconnected with Highway Signals — Code: N/A
1. Yes
2. No
3. Unknown

92. Crossing Illuminated by Street Lights or Special Lights — Code: N/A
1. Yes
2. No
3. Unknown

93. Driver's Age: N/A

94. Driver's Gender — Code: N/A
1. Male
2. Female

95. Driver Drove Behind or in Front of Train and Struck or was Struck by Second Train — Code: N/A
1. Yes 2. No 3. Unknown

96. Driver — Code: N/A
1. Drove around or thru the Gate
2. Stopped and then Proceeded
3. Did not Stop
4. Stopped on Crossing
5. Other (specify in narrative)

97. Driver Passed Standing Highway Vehicle — Code: N/A
1. Yes 2. No 3. Unknown

98. View of Track Obscured by (primary obstruction) — Code: N/A
1. Permanent Structure
2. Standing Railroad Equipment
3. Passing Train
4. Topography
5. Vegetation
6. Highway Vehicle
7. Other (specify in narrative)
8. Not obstructed

101. Casulties to Highway-Rail Crossing Users	Killed	Injured
	N/A	N/A

99. Driver Was — Code: N/A
1. Killed 2.Injured 3. Uninjured

100. Was Driver in the Vehicle? — Code: N/A
1. Yes 2. No

102. Highway Vehicle Property Damage (est. dollar damage): N/A

103. Total Number of Highway-Rail Crossing Users (include driver): N/A

104. Locomotive Auxiliary Lights? — Code: N/A
1. Yes 2. No

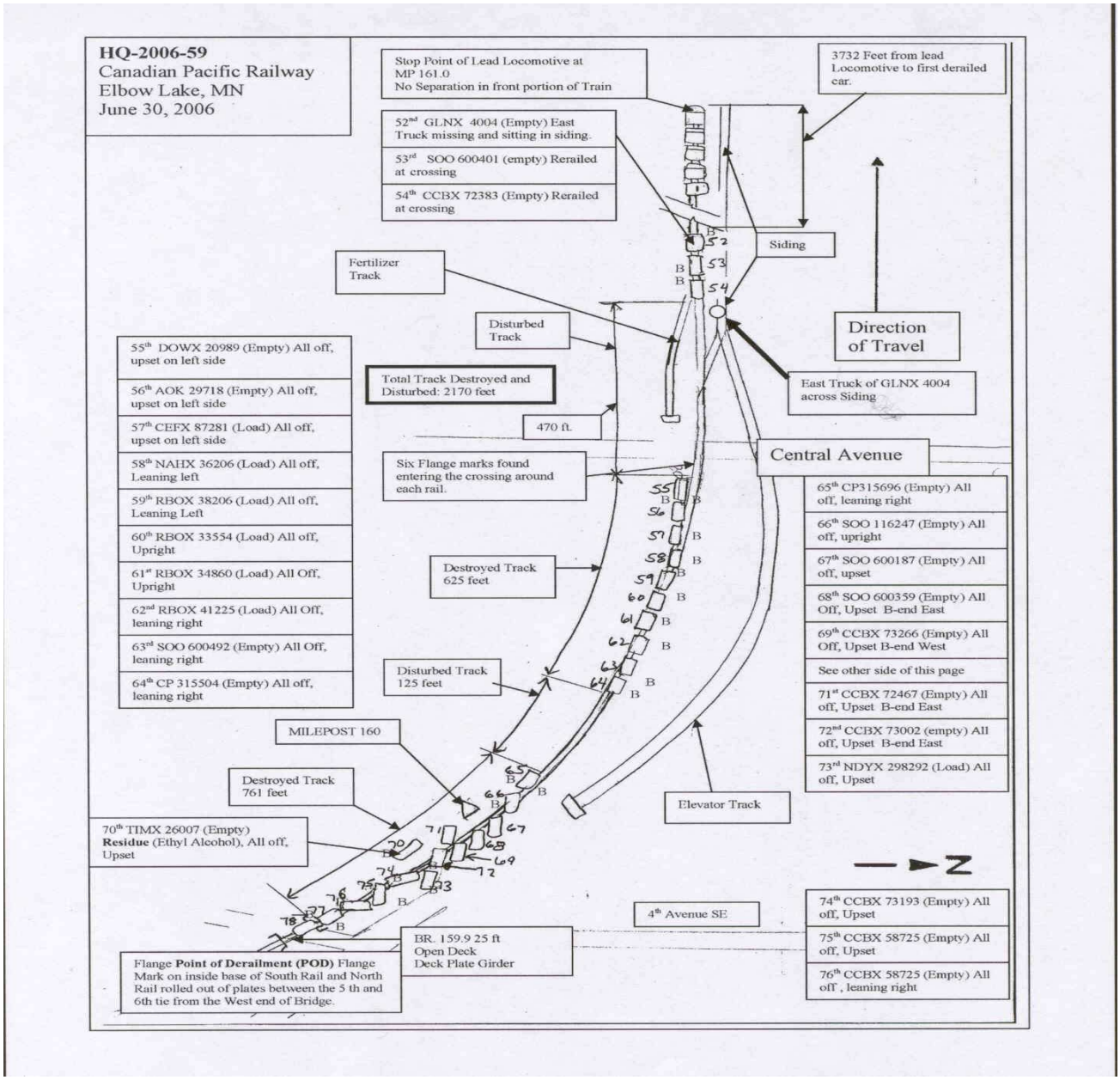
105. Locomotive Auxiliary Lights Operational? — Code: N/A
1. Yes 2. No

106. Locomotive Headlight Illuminated? — Code: N/A
1. Yes 2. No

107. Locomotive Audible Warning Sounded? — Code: N/A
1. Yes 2. No

108. DRAW A SKETCH OF ACCIDENT AREA INCLUDING ALL TRACKS, SIGNALS, SWITCHES, STRUCTURES, OBJECTS, ETC., INVOLVED.

HQ-59-2006 Accident Sketch.jpg



109. SYNOPSIS OF THE ACCIDENT

A westbound Canadian Pacific Railway (CP) freight train derailed on June 30, 2006, at 3:32 p.m., c.d.t. The accident occurred in Elbow Lake, Minnesota, at CP Milepost 159.95, on the Elbow Lake Subdivision.

The train derailed 27 cars including one hazardous material car. No loss of product occurred, and no evacuation was ordered. The derailment costs included $170,731 to track and $355,981 to equipment.

At the time of the accident it was daylight and clear, with a southerly wind of about 7 mph, and the temperature was 93 °F.

The probable cause of the derailment was lateral/vertical forces caused by a combination of minor mechanical, operating, and track anomalies.

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110. NARRATIVE

Circumstances Prior to the Accident

The crew of Train CP 295-29 included a locomotive engineer and a conductor. They first went on duty at 1:00 p.m. on June 30, 2006, at CP Glenwood Yard in Glenwood, Minnesota. This was the away terminal for both crew members. The crew received more than the statutory off duty period, prior to reporting for duty.

Their assigned freight train consisted of four locomotives (the second locomotive not operating) 29 loaded, and 63 empty cars of several varieties. It was 6,291 feet long, with 5,675 trailing tons. The train was scheduled to operate to Enderlin, North Dakota, with no work en route. The train departed Glenwood Yard at 2:15 p.m.

As the westbound train approached the accident area, the locomotive engineer was seated at the controls on the north side of the leading locomotive. The conductor was seated on the south side of the leading locomotive in the second seat, copying a track warrant.

In this area of the railroad, the track is tangent from milepost 158 to 159.8. There is a 3 degree left-hand curve for 2,255 feet, then tangent again for 3,078 feet to milepost 160.85. The track grade ranges from 0.2 and 1.8 percent between milepost 158.2 and milepost 160.2. The point of derailment (POD) was located at milepost 159.95 on a 25-foot, single span, open deck, deck plate girder bridge, 5 feet-6 inches from the west abutment.

The railroad timetable direction of the train was west. The geographic direction at the POD was northwest. Timetable directions are used throughout this report.

The Accident

The train was being operated at a recorded speed of 39.8 mph approaching the accident area. The speed was recorded by the event recorder on the controlling locomotive. The maximum authorized speed for mixed freight trains was 40 mph, as designated in the current CP Timetable No. 5 effective at 0001 Sunday April 3, 2005, Continental Central Time.

As the train approached the POD, the engineer and conductor both noticed a rough spot in the track. Both crew members felt it was not unusual or severe enough to report. The train continued westward for another 4,782 feet past the POD before the end-of-train device (EOT) recorded a drop in air pressure from 90 to 23 psi at 3:32 p.m. The brake pipe pressure began to drop, and the train went into emergency 2.5 seconds later, at 3:32 p.m. The movement stopped at 3:33 p.m., 823 feet after the emergency brake application occurred.

The first car derailed was the 52nd car in the consist, GLNX 4004, an empty hopper car. The first mark of a derailment was on the Bridge at milepost 159.9. The high rail was rolled out and a wheel dropped into the gage of the track on the low rail, making one flange mark on the tie plate. The second wheel dropped into the gage of the track just beyond the west end of the bridge. The track was destroyed for 761 feet from the west bridge approach, disturbed for 125 feet, then destroyed for another 625 feet. The derailed GLNX 4004 was observed by a witness, the driver of an automobile stopped at a highway-rail grade crossing 1,429 feet west of the POD. The witness observed a rail car with the east truck derailed. The north wheels were on the field side of the north rail and the south wheels were in the gage of the track.

The train separated between the 54th and 55th cars. It also separated between the 64th and 65th cars. The GLNX 4004 and two cars behind it continued westward re-railing four wheel sets of six that entered the east end of the crossing flangeway. The east truck of the GLNX 4004 began to follow the curved side of a right-hand turnout about 250 feet west of the crossing. The east wheel set climbed over the curved lead rails and was ejected from beneath the car about 450 feet west of the crossing. This wheel set came to rest on the siding on the north side of the main track. The 55th through the 64th car were derailed in a straight line east of the highway-rail grade crossing. There was a 125-foot gap of disturbed track between the 64th and 65th cars. The 65th through the 76th cars were derailed on both

sides of the main track. The 77th car was derailed in line with the original track, and 78th car had only one wheel derailed.

One placarded tank car was derailed. This car last contained Ethyl Alcohol (residue). It came to rest on its side at the toe of the roadbed on the south side of the curve about 400 feet east of the POD. The initial 911 call was made from a grain elevator at 3:32 p.m. The Elbow Lake volunteer fire department was conducting a drill in the area at the time of the derailment. They responded to the scene at 3:33 p.m., examined the hazardous material car, and determined it safe at 3:50 p.m. No evacuation was ordered.

Analysis and Conclusion

Analysis

The first car derailed, GLNX 4004, and the next car, SOO 600401, were inspected by the CP mechanical department and Federal Railroad Administration (FRA) inspectors in a joint tear down inspection. The results of the inspection found no FRA defects.

The controlling locomotive event recorder download was examined by an FRA Operating Practices Chief Inspector. The event recorder data confirms the engineer had been modulating between the 3rd and 5th notch to maintain the posted 40 mph speed. Examination of the data revealed that the train experienced an undesired application of the air brakes and was operating at 38 mph when the train went into emergency. The examination of the data recorder determined that the train was being operated in a manner consistent with recommended train handling practices and guidelines. No exception was taken to the engineer's train handling procedures.

Track geometry notes were taken at the scene, and showed minor gage, line, and surface variations, but no deviations that exceeded the threshold for FRA Class 3 track. The last CP Track Research Car test dated May 31, 2006, also found no serious track geometry conditions in the area of the derailment.

The bridge at milepost 159.9 had new deck timbers installed in 1998. The rail fasteners, plates, steel girders, and anchorage showed no signs of movement or weakness prior to the derailment.

CP conducted a post-accident Train Dynamics Analysis simulation to evaluate in-train forces. The simulation did not conclude any scenario or combination of forces that could produce a derailment. Track-Car Dynamics Analysis (NUCARS) simulation was performed on the trailing truck of the GLNX 4004, and both trucks of the SOO 600401. Components on each car were found to be within FRA parameters. NUCARS analysis found no track-car dynamics significant enough to have a causal factor in this derailment.

This accident did not meet the criteria for 49 CFR Part 219, Subpart C post accident toxicological testing. The CP elected not to test under their post accident toxicological testing authority, since it also failed to meet their prescribed testing criteria.

Conclusion

The railroad was in compliance with CP operating rules, FRA Track Safety Standards, and FRA Freight Car Safety Standards. No violations of FRA or CP rules were found.

Probable Cause and Contributing Factors

The FRA determined that the probable cause of the derailment was lateral/vertical forces caused by a combination of minor mechanical, operating, and track anomalies.

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