Rail Adhesion Management Plan (RAMP)

September 27, 2011

Rail Services
Railway Corridors

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Background – What is Wheelslip?

- The MP40 can generate 78,000 pounds of tractive effort. In order for this power to be used effectively, all eight wheels on the locomotive must be able to apply traction to the rail without any loss of adhesion.
- Wheelslip occurs when Locomotive tractive effort reaches a point where a break or loss in rail adhesive occurs.

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Low Adhesion Situations

- Leaves on the rail during the autumn season are known to bring the lowest levels of adhesion.
- Leaves are normally swept up onto the rails by wind or the train's slipstream.

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How does this effect the track condition?

- When the wheels crush leaves, cullulose material release substances such as sulphur phosphorus, calcium and carbon, and become etched into the rails. These substances are compressed under high pressure causing a hard liginin coating to be applied to the rail-head making the tracks extremely slippery.

- This condition can be observed by a blackish appearance on the rail head.

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Affects on Train Performance

- Can alter train braking and accelerating abilities
- Platform overshoots
- Passenger delays
- Wheel and rail damage
- Reduced customer satisfaction

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Performance History

1) The total wheelslip incidents reported last season is 144.
2) The total wheelslip delays last season were 1,668 minutes with one cancellation. 87% were attributed to trains with locomotive in lead.
3) 50% of the trains effected were delayed after 12:00hrs (PM trains).
   50% of the trains were delayed before 12:00hrs (AM trains).
4) The most affected trips were as follows:

Corridor Delays

Milton	4
Richmond Hill	6
Georgetown	6
Barrie	11
Lincolnville	15
Lakeshore W	19
Lakeshore E	83

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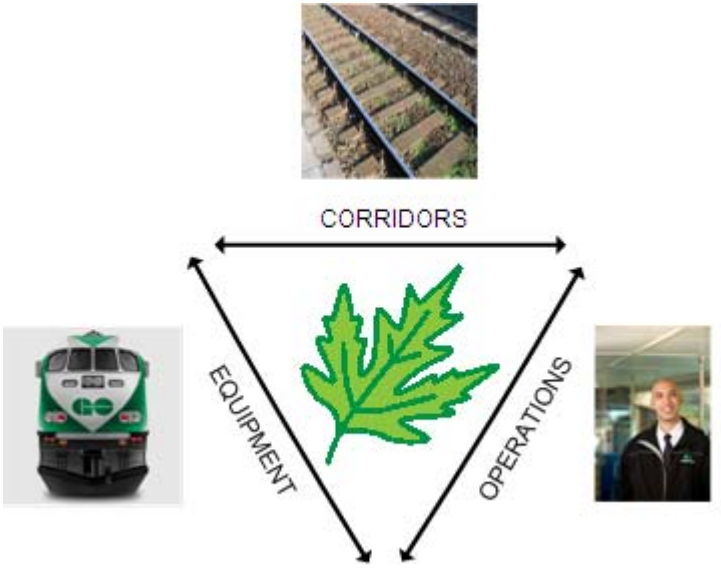
Team Effort

- Formation of the “Low adhesion” working group.
- Joint effort between Rail Equipment, Rail Operations, and Railway Corridors to work together to help mitigate the problem.



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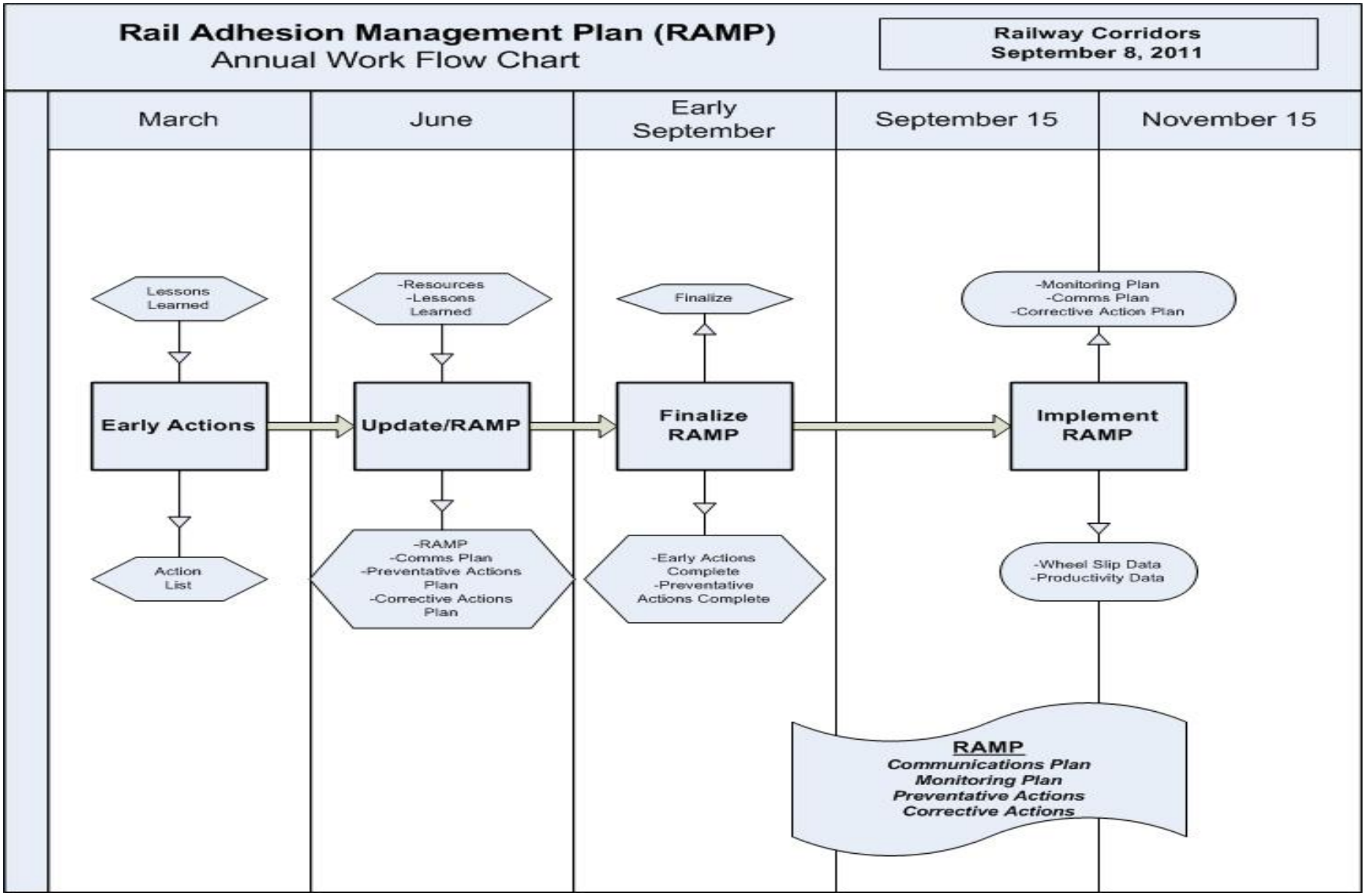
Railway Corridors -
Rail Adhesion Management Plan Process



Railway Corridors
1.Preventative Action Items

1.1 Vegetation Control and Tree Removal

February – October 2011

- Newmarket Subdivision – completed
- Uxbridge Subdivision – late September
- Kingston Subdivision – completed

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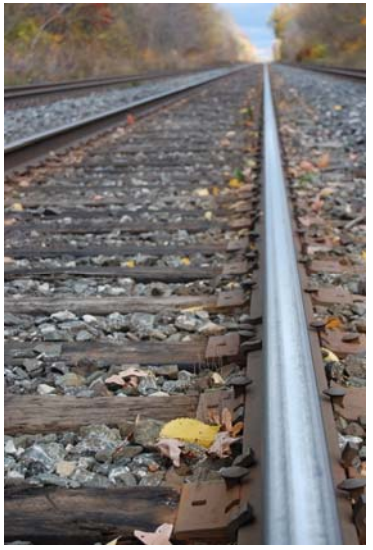
1.2. Traction Gel and Traction Gel Applicator



- 2 locations have been selected on the Kingston subdivision between MP 329.20 to MP 331.70
- 4 Portec traction gel applicators have been delivered and awaiting installation/CSA approval - installation pending approval.
- 600 litres of Alleviate traction gel has been received.
- Operational and performance testing scheduled for Newmarket subdivision - September 17-18, between Mile 7.08 and 8.08
- Further testing on track 4 on Oakville sub scheduled for September 27th.

Railway Corridors
1. Preventative Action Items

1.2. Traction Gel and Traction Gel Applicator

- Testing – September 17, 2011
- Proposed test plan includes:
  - A dynamic brake test
  - PNR to perform some initial signal shunt tests
  - LB Foster-Portec Rail to perform performance tests and will measure changes in the coefficient of friction using a tribometer
  - PNR to perform tests to determine the spread distances of the product
  - PNR and LB Foster to perform proof of concept tests for applicators.
- A washer truck will be on hand to return the rail to its original condition.

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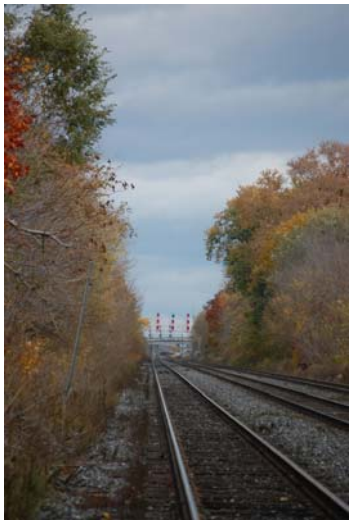
Railway Corridors
1. Preventative Action Items

1.3. Debris Fencing

- Approx. 7,000 linear ft of fencing to be installed west of Danforth GO station
- Cable locates to be completed week of September 12, 2011
- Fence installation immediately following locate activities – September 30, 2011 deadline for installation.

1.4. Blower Truck

- Removal of “on track” leaves once leaves start to fall
- GO owned blower truck being prepared for service
- Requires TTR staff to operate (confirmed)



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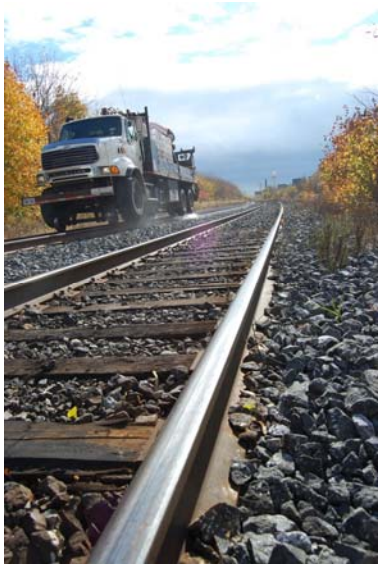
Railway Corridors
2. Corrective Action Items

2.1. High Pressure Washer Truck

- To be provided under new maintenance contract
- Increased pressure to avoid multiple passes – 4,000 lbs psi
- Washing scheduled for every 2nd day - alternating corridors
- Reactive - equipment can be redeployed to problem area as required
- Targeting week of September 12th for testing



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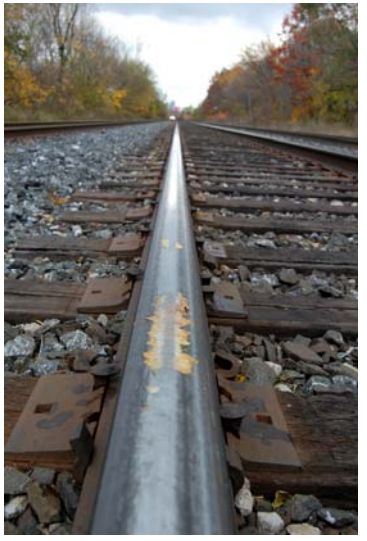
Railway Corridors
2. Corrective Action Items

2.2. Rail Scrubber

- To be provided under new maintenance contract
- Self propelled on track machine to scrub the top of rails
- A Swingmaster D-925 Rail Brush will be used in conjunction with the high rail wash unit
- Delivered and will be testing in conjunction with Washer Truck

2.3. Rail Grinding

- To be provided under new maintenance contract
- Last resort (contingency) for problem areas



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3.1 E4/E5 Speed Increases

- 41% of delays occurred at the Cherry – Danforth Grade
- Increasing eastbound train speeds through LSE from 30 mph to 45 mph
- Goal to counteract impacts of grade on LSE

4. Railway Corridors Management Plan

4. Monitoring, Removal and Communications

- Monitoring Plan
  - Storm Action Plan – react to weather events
  - Redeploy equipment to problem area as required
- Removal Plan
  - Preventative and Corrective actions
- Communications Plan
  - Reporting of wheel slip conditions from train crew
  - Feedback to washing team to adjust removal plan

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RAMP Communications Plan

Phone in wheel slip reports (real time)

A) ROCC

A) ROCC Records Slip/Condition
-Mileage, Sub, Track, Time, Weather

C4IS – Operational Log

B) ROCC Wheel Slip Report
-Mileage, Sub, Track, Time, Weather, Delay Minutes

Run Report: 1. 10:00 A.M.
2. 9:00 P.M.

Rail Corridors Coordination

D) PNR Production Reports & Daily Schedule

E) Wash/Production Database

-Maintained by Railway Corridors

PNR

Wheel Slip Report
Distribution List:

- PNR
- Railway Corridors
- Bombardier
- Railway Equipment

Adjust Rail Wash Program as required (to problem area)

C) ROCC Weekly Wheel Slip Summary Report
C) – include Tot #, Events, Delays (mins)

Rail Services – Operational Strategies

• The track conditions and grades play a large role in adhesion, as an Operator you can become familiar with the grades on the territory you will be operating on.

•Know these areas where wheelslip is more common.

•Report wheelslip occurrences to the GTCC.

•If you are approaching an area of reported wheelslip attempt to plan ahead.

•If you are experiencing wheelslip to such a degree that there is a possibility of your train stalling, or if stopped, you feel that you may not be able to proceed, advise the RTC in order to plan alternate routing to keep your train and following trains moving.

Rail Equipment Initiatives

Actions Already in Place:

1. Increased frequency of sand fills from every two weeks to every five to eight days during lead season.
2. Checked sanders on regular inspection to ensure they are working.
3. Followed up every reported incident by recording and tracking incident details, checking sand level and sander function and reviewing at daily meeting.
4. Began applying Tread Guard shoes on locomotives which keep wheels cleaner.
5. Ongoing dialogue with MPI (locomotive builder) and MED (traction supplier) to resolve any related issues.
6. All units now equip with latest traction control software.
7. Used locomotive on each end on certain specific cycles to improve traction.
8. Verified radar angel set correctly on all units.

Actions Being Implemented or Being Considered:

1. Apply Tread Guard shoes to coaches (initial order received but returned to manufacturer for rework).
2. Trial installation of inboard sanders to be done on unit 610 (presently undergoing repairs from derailment).
3. Flange lubricant will be tried out on units 610 and 624.
4. Investigating “Fat 40” wheels. CAF have 68 wheel minimum order. Valdunes have very high tooling change.
5. Testing to be done to determine optimal sand nozzle configuration (will be done during spring/summer).
6. Magnet valve buttons will be applied for test and monitoring in the fall season.
7. Leafbrake test considered successful. Bombardier to provide proposal for fleet installation to be done in the summer.