

**Federal Railroad Administration
Office of Safety Assurance and Compliance
Track Division**



Railroad Safety Advisory Committee
Track Safety Standards Working Group
Task 08-03
September 23, 2010

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Task 08-03 (first item): Factors that can and should be included in determining the frequency of internal rail flaw testing and a methodology for taking those factors into consideration with respect to mandatory testing intervals;

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TSWG reached consensus on a Performance Based Frequency requirement to address NTSB Damage Tolerance recommendations:

Consensus Reached on Volpe Recommended Model Driven by
Minimum Criteria of:

- Fatigue Service Failure Rate
- Detected Defect Rate
- Annual Tonnage
- Performance Target (Risk Factor)

Additionally: Minimum once a year or every 30 MGT test frequency .

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RR's to comply with rail test output for each segment.
Volpe model will be provided to RR's on FRA website:

SELF-ADAPTIVE SCHEDULING ALGORITHM

INPUT: Enter your data in yellow cells. Click button to calculate. Output appears in green cells below.

Service failures per mile performance target:	0.10	SF/mile for this segment
Annual tonnage for this segment:	50	MGT
Number of inspections in previous year:	4	
Detected defects per mile in previous year:	0.250	
Service failures per mile in previous year:	0.090	

Click to Calculate

OUTPUT

Number of rail tests for this segment next year:

January, 2010

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TSWG Consensus §213.237 Inspection of rail (Key Components)

(a) The fatigue service failure rates shall be –

(1) No more than **0.1** fatigue service failures per year per mile of track for all class 4 and 5 track;

(2) No more than **0.09** fatigue service failures per year per mile of track for all class 3,4, and 5 track which carries **regularly scheduled passenger trains or is a hazardous material route**; and

(3) No more than **0.08** fatigue service failures per year per mile of track for all class 3,4, and 5 track which carries **regularly scheduled passenger trains and is a hazardous material route**.

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TSWG Consensus §213.237 Inspection of rail (Key Components)

- (b) Internal rail inspections on class 4 and 5 track, or class 3 track with regularly scheduled passenger trains or which is a hazardous materials route, shall not exceed a time interval of **370** days between inspections or a tonnage interval of **30** mgt between inspections whichever is shorter. Internal rail inspections on class 3 track without regularly scheduled passenger trains and which is not a hazardous materials route must be inspected **at least once each calendar year, with no more than 18 months between inspections, or at least once every 30 mgt, whichever interval is longer, with the additional provision that inspections cannot be more than 5 years apart.**

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TSWG Consensus §213.237 Inspection of rail (Key Components)

(c) If the fatigue service failure rate target identified in paragraph (a) is not achieved.....

(1) If the performance target rate is not met for two consecutive years, then in the area which is driving the fatigue service failure rate, either:

- (i) The inspection tonnage interval between tests must be reduced to 10 MGT; or
- (ii) The class of track shall be reduced to class 2 until the fatigue service failure rate target is achieved.

(2) In cases where a single fatigue service failure would cause the rate to exceed the applicable fatigue service failure rate, the fatigue service failure rate will be considered as achieved unless a second such failure occurs within a designated 12-month period.

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TSWG Consensus §213.237 Inspection of rail (Key Components)

(d) Each defective rail shall be marked with a highly visible marking on both sides of the web and base except that, **where a side or sides of the web and base are not accessible because of permanent features**, the highly visible marking will be placed on or next to the head of the rail.

(e) Becomes current (b);

(f) Becomes current (d);

(g) If a valid search for internal defects cannot be conducted, the track owner will, before expiration of time or tonnage limits in (b) or (c)—

(1) Conduct a valid search for internal defects;

(2) Reduce operating speed to a maximum of 25 mph until such time as a valid search can be made; or

(3) Replace the rail that had not been inspected.

(h) The person assigned to operate the rail defect detection equipment must be a qualified operator as defined in §213.238 and have demonstrated proficiency in the rail flaw detection process on each type of equipment the operator is assigned.

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TSWG Consensus §213.237 Inspection of Rail (Key Components)

(i) As used in this section –

Hazardous materials route means a track over which a minimum of 10,000 car loads or intermodal portable tank car loads of material defined in 49 CFR 171.8 “hazardous material,” or a minimum of 4,000 car loads or intermodal portable tank car loads of material defined in 49 CFR 172.820(a) on class 3, 4 or 5 of track over a period of one year.

**** ONLY NON-CONSENSUS ITEM (FRA to define SEGMENT in NPRM for comment) ****

Example: Segment means a track owner’s designated segment, which is class 4 or 5 track, or class 3 track that carries regularly scheduled passenger trains or is a hazardous material route.

Fatigue Service failure means a broken rail occurrence, the cause of which is determined to be a compound fissure, transverse fissure, detail fracture, or vertical split head.

Valid search means a continuous inspection for internal rail defects where the equipment is performing as intended and equipment responses are interpreted by a qualified operator as defined in § 213.238. The operator shall determine that the test has not been compromised due to environmental contamination, rail conditions, or equipment.

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Task 08-03 (second item): Whether the quality and consistency of internal rail flaw testing can be improved and how;

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TSWG Consensus

- Consensus reached on definition of a “valid test”. Definition added to 213.237.
- Consensus reached on minimum criteria for a “qualified operator”. To be added to CFR 49; Part 213 as new 213.238.
- Guideline to sizing transverse oriented defects reflecting rail head wear applies in 213.113 Remedial Action Table.

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Task 08-03 (third item): Whether adjustments to current remedial action criteria are warranted;

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TSWG Consensus § 213.113 Defective rails. (Key Components)

(a)operation over the defective rail is not permitted until –

The rail is replaced **or repaired**

The remedial action prescribed in the table is initiated

(b) When an owner of track learns, through a rail inspection, that a rail contains an indication of any of the defects listed in the table in paragraph (c), the track owner shall verify the indication within 4 hours.

If the track owner has an indication that any of the defects that require remedial action A, A2 or B in the following table exist, the track owner shall immediately verify the indication.

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Remedial Action Table

Defect	Length of defect (inch)		Percentage of existing rail head cross-sectional area weakened by defect		If the defective rail is not replaced or repaired, take the remedial action prescribed in note
	More than	But not more than	Less than	But not less than	
Compound Fissure			70 100	5 70 100	B A2 A
Transverse Fissure Detail Fracture Engine Burn Fracture Defective Weld			25 60 100	5 25 60 100	C. D. [A2] or [E and H]. [A] or [E and H].
Horizontal Head Vertical Head Web Piped Rail Head Web Separation Defective Weld (Longitudinal)	1 2 4 (1)	2 4 (1)		(1)	H and F. I and G. B A.
Bolt Hole Crack	1/2 1 1 1/2 (1)	1 1 1/2 (1)		(1)	H and F. H and G. B A.
Broken Base	1 6 (2)	6			D. [A] or [E and I].
Ordinary Break					A or E.
Damaged Rail					C
Flattened Rail Crushed Head	Depth > 3/8 and Length > 8				H.

(1) Break out in rail head [Chipped rail end will be handled in compliance manual].

(2) Remedial action D applies to moon-shaped breakout, resulting from a derailment, with length greater than 6 inches but not exceeding 12 inches and width not exceeding 1/3 the rail base width.

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TSWG Consensus Remedial Action Notes (Key Components)

(C) Apply joint bars bolted only through the outermost holes to defect within **10** days after it is determined to continue the track in use.**When joint bars have not been applied within 10 days, the speed must be limited to 10 mph until joint bars are applied.**

(D) Apply joint bars bolted only through the outermost holes to defect within **7** days after it is determined to continue the track in use.....**When joint bars have not been applied within 10 days, the speed must be limited to 10 mph until joint bars are applied.**

(F) Inspect rail within 90 days after it is determined to continue the track in use.**If not inspected within 90 days, limit speed to Class 2 or the maximum allowable speed under 213.9 for the class of track concerned, whichever is lower, until inspected.**

(G) Inspect rail within 30 days after it is determined to continue the track in use. ...**If not inspected within 30 days, limit speed to Class 2 or the maximum allowable speed under 213.9 for the class of track concerned, whichever is lower, until inspected.**

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TSWG Consensus § 213.113 Defective rails.

(c) As used in this section—

Compound fissure (Deleted last sentence from current definition – “Compound fissures require examination of both faces of the fracture to locate the horizontal split head from which they originate.”)

(New) Crushed Head means a short length of rail, not at a joint, which has drooped or sagged across the width of the rail head to a depth of $\frac{3}{8}$ inch or more below the rest of the rail head. Unlike the flattened (rail) head where the depression is visible on the rail head only, the sagging or drooping is also visible in the head web fillet area.

Defective weld If the weld defect progresses longitudinally through the weld section, the track owner must remediate as if it were a split web.

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Task 08-03 (fourth item): The effect of rail head wear, surface conditions and other relevant factors on the acquisition and interpretation of internal rail flaw test results.

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TSWG Consensus

- TSWG "Loss of Bottom" study was completed in 2008 that concluded it is common to find rail defects where there is "loss of bottom" present.
- Extensive presentations and discussion on equipment limitation concerning flaw detection systems and future developments.
- TSWG determined that recent developments in flaw detection technologies improve detection capabilities in worn rail head and rail surface conditions.
- Track Standard Working Group has addressed rail head wear in 213.113, sizing of transverse defects to existing rail head, and does not recommend regulation concerning industry maximum rail wear limitations at this time.

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TSWG action item that FRA revise its track safety regulation § 213.241(c) Rail inspection records to require the railroads to report all track locations (milepost numbers or track miles) covered during internal rail flaw testing.

TSWG Consensus § 213.241 Inspection records. (Key Component)

(c) Records of internal rail inspections performed under § 213.237 shall specify:

- 1) the date of inspection;**
- 2) the track inspected, including beginning and end points;**
- 3) the location and type of defects found under § 213.113;**
- 4) size of defects found under § 213.113 if not removed prior to the next train movement;**
- 5) the initial remedial action taken and the date thereof; and**
- 6) the location of any intervals of track not tested per § 213.237(f).**

(d) The owner shall retain a rail inspection record under § 213.241(c) for at least two years after the inspection and for one year after initial remedial action is taken.

(e) The owner must maintain records sufficient to demonstrate the means by which it computes the fatigue service failure rate on all track segments subject to the requirements in § 213.237(a) for the purpose of determining compliance with the applicable fatigue service failure rate target.

Current (d) and (e) become (f) and (g).

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Track Standards Working Group requests
RSAC accept recommended regulatory
changes and consider Task 08-03 complete.

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Track Standards Working Group Open Items:

- Review controls applied to reuse of rail in CWR ("plug rail").
- Continue RR Joint Bar Fracture reports?

Meeting scheduled for October 26-27, 2010.

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The End