Memorandum

U.S. Department of Transportation

Federal Railroad Administration

Date: JUL 10 2015

Subject: Technical Bulletin R-15-01, Guidance Regarding the Application of Rail Integrity Safety Standards, Part 213, Track Safety Standards, Classes 1–5

From: Ron Hynes
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To: Regional Administrators, Deputy Regional Administrators, Track Specialists, Chief Inspectors, Railroad System Oversight Managers, State Program Managers, and Federal and State Track Inspectors

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This technical bulletin is intended to provide guidance to all Federal and State inspectors who perform inspections of track Classes 1 to 5.

Background: On January 24, 2014, the Federal Railroad Administration (FRA) published a final rule in the Federal Register titled, "Track Safety Standards; Improving Rail Integrity" (Vol. 79, 4234–4260). The rule became effective on March 25, 2014. The final rule requires track owners to adopt performance-based methods for rail flaw testing and corresponding remedial actions. It also codifies current best practices, including self-adaptive scheduling procedures, which focus primarily on maintaining low defect rates per mile of track, and generally involve more frequent rail flaw testing.

The final rule includes requirements that rail flaw detection equipment operators are properly trained and qualified to conduct enhanced inspections and interpret their results, while also enabling railroads to improve the quality of their inspections by providing a 4-hour window to verify non-significant defects found during testing. It further requires that railroads' inspection reports document any defects found and corrective actions taken to address the defects, and removes the requirement for the railroads to generate a joint bar fracture report for every cracked or broken joint bar discovered during the course of an inspection.

As a result of the final rule, the current Track and Rail and Infrastructure Integrity Compliance Manual (Compliance Manual) needs to be updated and republished. In the interim, this technical bulletin provides guidance for the provisions of the Rail Integrity Final Rule that have been changed.

For ease of reference, this technical bulletin is written in a style similar to the current Compliance Manual. However, only the applicable sections of Title 49 Code of Federal Regulations (CFR) Part 213, Subparts A–F, that have been modified under this rule change are shown.

Subpart D - Track Structure

§ 213.113 Defective rails.

(a) When an owner of track learns that a rail in the track contains any of the defects listed in the table contained in paragraph (c) of this section, a person designated under 49 CFR § 213.7 must determine whether the track may continue in use. If the designated person determines that the track may continue in use, operation over the defective rail is not permitted until:

(1) The rail is replaced or repaired; or
(2) The remedial action prescribed in the table contained in paragraph (c) of this section is initiated.

(b) When an owner of track learns that a rail in the track contains an indication of any of the defects listed in the table contained in paragraph (c) of this section, the track owner must verify the indication. The track owner must verify the indication within four hours, unless the track owner has an indication of the existence of a defect that requires remedial action A, A2, or B identified in the table contained in paragraph (c) of this section, in which case the track owner must immediately verify the indication. If the indication is verified, the track owner must:

(1) Replace or repair the rail; or
(2) Initiate the remedial action prescribed in the table contained in paragraph (c) of this section.

(c) A track owner who learns that a rail contains one of the following defects must prescribe the remedial action specified if the rail is not replaced or repaired, in accordance with this paragraph's table:

REMEDIAL ACTION TABLE

Defect	Length of defect (inches)		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.....	5.....	B.
	.....	.....	100.....	70.....	A2.
	.....	.....	.....	100.....	A.
Transverse Fissure	.....	.....	25.....	5.....	C.
Detail Fracture	.....	.....	60.....	25.....	D.
Engine Burn Fracture	.....	.....	100.....	60.....	A2, or [E and H].
Defective Weld	.....	.....	.....	100.....	A, or [E and H].
Horizontal Split Head					
Vertical Split Head	1.....	2.....	.....	.....	H and F.
Split Web	2.....	4.....	.....	.....	I and G.
Piped Rail	4.....	.....	.....	.....	B.
Head-Web Separation	(1).....	(1).....	.....	.....	A.
Defective Weld (Longitudinal)					
Bolt Hole Crack	½.....	1.....	.....	.....	H and F.
	1.....	1½.....	.....	.....	H and G.
	1½.....	.....	.....	.....	B.
	(1).....	(1)	.....	.....	A.
Broken Base	1.....	6.....	.....	.....	D.
	6 (2).....	.....	.....	.....	A, or [E and I].
Ordinary Break	.....	.....	.....	.....	A or E.
Damaged Rail	.....	.....	.....	.....	C.
Flattened Rail	Depth ≥ ⅜ and	.....	.....	.....	H.
Crushed Head	Length ≥ 8.....				

(1) Break out in rail head.

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

Notes:

A. Assign a person designated under § 213.7 to visually supervise each operation over the defective rail.

A2. Assign a person designated under § 213.7 to make a visual inspection. After a visual inspection, that person may authorize operation to continue without continuous visual supervision at a maximum of 10 miles per hour (mph) for up to 24 hours prior to another such visual inspection or replacement or repair of the rail.

B. Limit operating speed over the defective rail to that as authorized by a person designated under § 213.7(a), who has at least 1-year of supervisory experience in railroad track maintenance. The operating speed cannot be over 30 mph or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower).

C. Apply joint bars bolted only through the outermost holes to the defect within 10 days after it is determined to continue the track in use. In the case of Class 3–5 track, limit the operating speed over the defective rail to 30 mph until joint bars are applied; thereafter, limit the speed to 50 mph, or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower). When a search for internal rail defects is conducted under § 213.237, and defects are discovered in Class 3–5 track that require remedial action C, the operating speed must be limited to 50 mph, or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower), for a period not to exceed 4 days. If the defective rail has not been removed from the track or a permanent repair made within 4 days of the discovery, limit operating speed over the defective rail to 30 mph until joint bars are applied; thereafter, limit speed to 50 mph, or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower). 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 the defect within 7 days after it is determined to continue the track in use. In the case of Class 3–5 track, limit operating speed over the defective rail to 30 mph or less as authorized by a person designated under § 213.7(a), who has at least 1-year of supervisory experience in railroad track maintenance, until joint bars are applied; thereafter, limit speed to 50 mph, or the maximum allowable speed under § 213.9 for the class of track concerned, (whichever is lower). When joint bars have not been applied within 7 days, the speed must be limited to 10 mph until the joint bars are applied.

E. Apply joint bars to the defect and bolt in accordance with § 213.121(d) and (e).

F. Inspect the rail within 90 days after it is determined to continue the track in use. If the rail remains in the track and is not replaced or repaired, the re-inspection cycle starts over with each successive re-inspection unless the re-inspection reveals the rail defect to have increased in size and therefore become subject to a more restrictive remedial action. This

process continues indefinitely until the rail is removed from the track or repaired. If not inspected within 90 days, limit speed to that for Class 2 track or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower), until it is inspected.

G. Inspect rail within 30 days after it is determined to continue the track in use. If the rail remains in the track and is not replaced or repaired, the re-inspection cycle starts over with each successive re-inspection unless the re-inspection reveals the rail defect to have increased in size and therefore become subject to a more restrictive remedial action. This process continues indefinitely until the rail is removed from the track or repaired. If not inspected within 30 days, limit speed to that for Class 2 track or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower), until it is inspected.

H. Limit operating speed over the defective rail to 50 mph or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower).

I. Limit operating speed over the defective rail to 30 mph or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower).

As used in this section—

(1) Bolt hole crack means a crack across the web, originating from a bolt hole, and progressing on a path either inclined upward toward the rail head or inclined downward toward the base. Fully developed bolt hole cracks may continue horizontally along the head/web or base/web fillet, or they may progress into and through the head or base to separate a piece of the rail end from the rail. Multiple cracks occurring in one rail end are considered to be a single defect. However, bolt hole cracks occurring in adjacent rail ends within the same joint must be reported as separate defects.

(2) Broken base means any break in the base of the rail.

(3) Compound fissure means a progressive fracture originating from a horizontal split head that turns up or down, or in both directions, in the head of the rail. Transverse development normally progresses substantially at a right angle to the length of the rail.

(4) 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 three-eighths of an inch or more below the rest of the rail head and 8 inches or more in length. Unlike flattened rail where the depression is visible on the rail head only, the sagging or drooping is also visible in the head/web fillet area.

(5) Damaged rail means any rail broken or otherwise damaged by a derailment, broken, flat, or unbalanced wheel, wheel slipping, or similar causes.

(6) Defective weld means a field or plant weld containing any discontinuities or pockets, exceeding 5 percent of the rail head area individually or 10 percent in the aggregate, oriented in or near the transverse plane, due to incomplete penetration of the weld metal between the rail ends, lack of fusion between weld and rail end metal, entrainment of slag or sand, under-bead or shrinkage cracking, or fatigue cracking. Weld defects may originate in the rail head, web, or base, and in some cases, cracks may progress from the defect into either or both adjoining rail ends. If the weld defect progresses longitudinally through the weld section, the defect is considered a split web for purposes of remedial action required by this section.

(7) Detail fracture means a progressive fracture originating at or near the surface of the rail head. These fractures should not be confused with transverse fissures, compound fissures, or other defects which have internal origins. Detail fractures may arise from shelled spots, head checks, or flaking.

(8) Engine burn fracture means a progressive fracture originating in spots where driving wheels have slipped on top of the rail head. In developing downward these fractures frequently resemble the compound or even transverse fissures with which they should not be confused or classified.

(9) Flattened rail means a short length of rail, not at a joint, which has flattened out across the width of the rail head to a depth of three-eighths of an inch or more below the rest of the rail and 8 inches or more in length. Flattened rail occurrences have no repetitive regularity and thus do not include corrugations, and have no apparent localized cause such as a weld or engine burn. Their individual length is relatively short, as compared to a condition such as head flow on the low rail of curves.

(10) Head and web separation means a progressive fracture, longitudinally separating the head from the web of the rail at the head fillet area.

(11) Horizontal split head means a horizontal progressive defect originating inside of the rail head, usually one-quarter of an inch or more below the running surface and progressing horizontally in all directions, and generally accompanied by a flat spot on the running surface. The defect appears as a crack lengthwise of the rail when it reaches the side of the rail head.

(12) Ordinary break means a partial or complete break in which there is no sign of a fissure, and in which none of the other defects described in this paragraph (d) is found.

(13) Piped rail means a vertical split in a rail, usually in the web, due to failure of the shrinkage cavity in the ingot to unite in rolling.

(14) Split web means a lengthwise crack along the side of the web and extending into or through it.

(15) Transverse fissure means a progressive crosswise fracture starting from a crystalline center or nucleus inside the head from which it spreads outward as a smooth, bright, or dark round or oval surface substantially at a right angle to the length of the rail. The distinguishing features of a transverse fissure from other types of fractures or defects are the crystalline center or nucleus and the nearly smooth surface of the development which surrounds it.

(16) Vertical split head means a vertical split through or near the middle of the head, and extending into or through it. A crack or rust streak may show under the head close to the web or pieces may be split off the side of the head.

Guidance:

In paragraph (a), FRA explains that only a person qualified under § 213.7, *Designation of qualified persons to supervise certain renewals and inspect track*, is able to determine that a track may continue to be used once a defective condition is identified in a rail. The option "or repaired" is added to paragraph (a)(1) to allow railroads to use recently developed processes to remove the defective portion of the rail section, used normally to remove transverse defects or defective welds, and replace that portion of the rail section by using recently developed weld technologies commonly referred to as "slot welds" or "wide gap welds." These processes allow the remaining portion of non-defective rail to remain in the track.

FRA redesignated former paragraph (b) (as used in this section) as paragraph (d) and added a new paragraph (b). Paragraph (b) provides that track owners have up to a 4-hour period in which to verify that certain suspected defects exist in a rail section, once they learn that the rail indicates any of the defects identified in paragraph (c)'s remedial action table. This 4-hour, deferred verification period applies only to suspected defects that may require remedial action Notes "C" through "I," found in the remedial action table. This 4-hour period does not apply to suspected defects that may require remedial action Notes "A," "A2," or "B," which are more serious and must continue to be verified immediately.

The 4-hour timeframe provides flexibility to allow the rail flaw detector car to continue testing in a nonstop mode, without requiring verification of less serious, suspected defects that may require remedial action under Notes "C" through "I." This flexibility also helps to avoid the need to operate the detector car in a non-test, "run light" mode over a possibly severe defective rail condition that could cause a derailment, when having to clear the track for traffic movement. However, any suspected defect encountered that may require remedial action Notes "A," "A2, "or "B" requires immediate verification. Overall, the 4-hour, deferred-verification period is intended to help to improve rail flaw detector car usage, allow for operation of the chase car rail inspection method of operation, increase the opportunity to detect more serious defects, and ensure that the entire rail that a detector car is intended to

travel over while in service is inspected. The option of "or repaired" is added to paragraph (b)(1) for clarification as stated in the paragraph (a) guidance.

FRA added a new paragraph (c) to contain both the remedial action table and its notes, as revised, which formerly were included under paragraph (a). In paragraph (d), three rail defect types are redefined (compound fissure, defective weld, and flattened rail), one is added (crushed head), and all rail flaw definitions are enumerated in alphabetical order.

The remedial actions required for defective rails specify definite time limits and speeds. The remedial actions also allow certain discretion to the track owner for the continued operation over certain defects. Inspectors should consider all rail defects dangerous and care should be taken to determine that proper remedial actions have been accomplished by the track owner or railroad. When more than one defect is present in a rail, the defect requiring the most restrictive remedial action must govern. (Note: In this technical bulletin, FRA's use of "track owner" or "railroad" is intended to be interchangeable where the railroad is the track owner or otherwise assigned responsibility for compliance under § 213.5).

The remedial action table and specifications in the rule address the risks associated with rail failure. These risks are primarily dependent upon defect type and size and should not be dependent upon the manner or mechanism that reveals the existence of the defect. Failure of the track owner to comply with the operational (speed) restrictions, maintenance procedures, and the prescribed inspection intervals specified in this section and § 213.237 (Defective rails, and Inspection of rail, respectively), may result in a violation of the Track Safety Standards (TSS).

Specifically, FRA revised the remedial action table as follows:

- Transverse defects. FRA placed the "transverse fissure" defect in the same category as detail fracture, engine burn fracture, and defective weld because they all normally fail in a transverse plane.

- Compound fissure remains with the same remedial action classifications. This type of defect has an increased potential to fail in an oblique plane and is considered a more serious defect.

- FRA changed the heading of the remedial action table for all transverse-type defects (i.e., compound fissures, transverse fissures, detail fractures, engine burn fractures, and defective welds) to refer to the "percentage of existing rail head cross-sectional area weakened by defect," to indicate that all transverse defect sizes are related to the actual rail head cross-sectional area. Additionally "or repaired" is added to the heading in the table.

- FRA reduced the cross-sectional area of the rail head which requires remedial action Notes "A2" or "E and H" to 60 percent from the prior limit of 80 percent.

- FRA added a required remedial action and definition for a longitudinal defect that is

associated with a defective weld—longitudinal.

- FRA added "crushed head" to the remedial action table and defect definition.

- Footnote 1 reminds inspectors that a chipped rail end is not a designated rail defect under this section and is not, in itself, an FRA-enforceable defective condition. Inspectors are reminded that a chipped rail end is not to be considered as a "break out in rail head."

- Footnote 2 provides that remedial action Note "D" applies to a moon-shaped breakout, resulting from a derailment, with a length greater than 6 inches but not exceeding 12 inches and a width not exceeding one-third of the rail base width. FRA also recommends that track owners conduct a special visual inspection of the rail pursuant to § 213.239, before the operation of any train over the affected track. A special visual inspection pursuant to § 213.239, which requires that an inspection be made of the track involved in a derailment incident, should be done to assess the condition of the track associated with these broken base conditions before the operation of any train over the affected track.

Note "A" clarifies that a person qualified to supervise certain renewals and inspect track as designated in § 213.7 must visually supervise each operation over the defective rail.

Note "A2" addresses mid-range transverse defect sizes. This remedial action allows for train operations to continue at a maximum of 10 mph up to 24 hours, following a visual inspection by a person designated under § 213.7. If the rail is not repaired or replaced, another 24-hour cycle begins.

Note "B" limits speed to that as authorized by a person designated under § 213.7(a) who has at least 1-year of supervisory experience in track maintenance. The qualified person has the responsibility to evaluate the rail defect and authorize the maximum operating speed over the defective rail based on the size of the defect and the operating conditions; however, the maximum speed over the rail may not exceed 30 mph or the maximum speed under § 213.9 for the class of track concerned (whichever is lower).

Notes "C," "D," and "H" limit the operating speed, following the application of joint bars, to 50 mph or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower). When the maximum speed specified in Notes "B," "C," "D," and "H" exceeds the current track speed, the railroad is required to record the defect. For example, when a railroad determines that remedial action Note "B" is required and the track speed already is 30 mph or less, the railroad must record the defect. This indicates that the railroad is aware of the characteristics of the defective rail and has designated a permissible speed in compliance with the regulation.

Note "C" applies specifically to detail fractures, engine burn fractures, transverse fissures, and defective welds, and addresses defects that are discovered during an internal rail inspection required under § 213.237 and whose size is determined not to be in excess of 25 percent of the rail head cross-sectional area. For these specific defects, a track owner formerly had to apply

joint bars bolted only through the outermost holes at the defect location within 20 days after it had determined to continue the track in use.

Note "C" is revised for these specific defects and now requires a track owner to apply joint bars bolted only through the outermost holes to the 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 track speed must be limited to 10 mph until joint bars are applied. This addition allows the railroads alternative relief from remedial action for these types of defects in Class 1 and 2 track.

Note "D" applies specifically to detail fractures, engine burn fractures, transverse fissures, and defective welds, and addresses defects that are discovered during an internal rail inspection required under § 213.237 and whose size is determined not to be in excess of 60 percent of the rail head cross-sectional area. Formerly, for these specific defects, a track owner had to apply joint bars bolted only through the outermost holes at the defect location within 10 days after it is determined that the track should continue in use.

Note "D" is revised for these specific defects and now requires a track owner to apply joint bars bolted only through the outermost holes to the defect within 7 days after it is determined to continue the track in use. The allowance of 7 days provides the track owner with additional time for remediation when the defect is identified just prior to the start of weekend shutdown. When joint bars have not been applied within 10 days, the track speed must be limited to 10 mph until joint bars are applied. As mentioned in Note "C," this addition also allows the railroads alternative relief from remedial action for these types of defects in Classes 1 and 2 track.

When an FRA inspector discovers a defective rail that requires the railroad representative to determine whether to continue the track in use and to designate the maximum speed over the rail, the inspector should inquire as to the representative's knowledge of the defect and remedial action. If the railroad was not aware of the defect prior to the FRA inspection, the FRA inspector should observe the actions taken by the railroad representative to determine compliance. If the railroad had previously found the defective rail, the FRA inspector should confirm the proper remedial action was taken. During records inspections, the FRA inspector should confirm that the defects were recorded and proper remedial actions were taken.

The remedial action table for defects failing in the transverse plane (transverse and compound fissures, detail and engine burn fractures, and defective welds) specifies a lower limit range base of 5 percent of the railhead cross-sectional area. If a transverse condition is reported to be less than 5 percent, the track owner is not legally bound to provide corrective action under the TSS. Conditions reported to be less than 5 percent are not consistently found during rail breaking routines and, therefore, defect determination within this range is not always reliable.

Compound fissure conditions that weaken between 5 and 70 percent of the cross-sectional area of the rail head are defects requiring remedial action (Note B). Defects in the range between 70 and less than 100 percent of cross-sectional head area require remedial action (Note A2), as prescribed. Defects that affect 100 percent of the cross-sectional head area require remedial action (Note A) as prescribed, the most restrictive remedial action. Inspectors should be aware

that compound fissures are defects that can fail in the transverse or oblique plane and are characteristic of rail that has not been control-cooled (normally rolled prior to 1936).

Defects identified and grouped as detail fractures, engine burn fractures, transverse fissures, and defective welds, will weaken and will normally fail in the transverse plane. Detail fractures are characteristic of control-cooled rail [usually indicated by the letters CC or CH on the rail brand (i.e., 1360 RE CC CF&I 1982 1111)]. Their prescribed remedial action relates to a low range between 5 and 25 percent and a mid-range between 25 and 60 percent, for Notes "C" and "D," respectively. Those defects require joint bar applications and operational speed restrictions within certain time frames. Defects extending less than 100 and more than 60 percent require a visual inspection. If the rail is not replaced, effectively repaired, or removed from service, an elective would be to restrict operation to a maximum of 10 mph for up to 24 hours, then perform another visual inspection.

The second sentence in remedial action Note "C" addresses defects that are discovered in Classes 3 through 5 track during an internal rail inspection required under § 213.237, and which are determined not to be in excess of 25 percent of the rail head cross-sectional area. For these specific defects, a track owner may operate for a period not to exceed 4 days, at a speed limited to 50 mph or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower). If the defective rail is not removed or a permanent repair is not made within 4 days of discovery, the speed is limited to 30 mph, until joint bars are applied or the rail is replaced.

The requirements specified in this second paragraph are intended to promote better usage of rail inspection equipment and therefore maximize the opportunity to discover rail defects which are approaching service failure size. The results of FRA's research indicate that defects of this type and size range have a predictable slow growth life. Research further indicates that even on today's most heavily used trackage in use today, defects of this type and size are unlikely to grow to service failure size in 4 days.

In the remedial action table, all longitudinal defects are combined within one group subject to identical remedial actions based on their reported size. These types of longitudinal defects all share similar growth rates and the same remedial actions are appropriate to each type.

Defective rails categorized as horizontal split head, vertical split head, split web, piped rail, and head-web separation, and defective weld (longitudinal) are longitudinal in nature. When any of this group of defects is more than 1inch, but not more than 2 inches, the remedial action initiated, under Note "H," is to limit train speed to 50 mph, and Note "F" requires re-inspecting the rail in 90 days, if deciding operations will continue. If not inspected within 90 days, limit speed to that for Class 2 track or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower), until it is inspected. Defects in the range of more than 2 inches, but not more than 4 inches, require complying with Notes "I" and "G"; speed is limited to 30 mph and the rail re-inspected in 30 days, if they decide operations will continue. If not inspected within 30 days, speed is limited to that for Class 2 track or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower), until it is inspected. When any of the six

defect types exceeds a length of 4 inches, a person designated under § 213.7(a) must limit the operating speed to 30 mph, under Note "B."

Another form of head-web separation, often referred to as a "fillet cracked rail," is the longitudinal growth of a crack in the fillet area, usually on the gage side of the outer rail of a curve. The crack may not extend the full width between the head and the web, but it is potentially dangerous. Evidence of fillet cracking is a hairline crack running beneath the head of rail with "bleeding" or rust discoloration. Fillet cracks often result from improper super-elevation or from stress reversal as a result of transposing rail. The use of a mirror is an effective aid in examining rail and the determination of head-web cracks or separation in the body of the rail.

A "bolt hole crack" is a progressive fracture originating at a bolt hole and extending away from the hole, usually at an angle. It develops from high stress risers, usually initiating as a result of both dynamic and thermal responses of the joint bolt and points along the edge of the hole, under load. A major cause of this high stress is improper field drilling of the hole. Excessive longitudinal rail movement can also cause high stress along the edge of the hole. When evaluating a rail end, which has multiple bolt hole cracks, inspectors will determine the required remedial action based on the length of the longest individual bolt hole crack.

Under Notes "H" and "F," the remedial action for a bolt hole crack that is more than one-half of an inch but not more than 1 inch, if the rail is not replaced, is to limit speed to 50 mph, or the maximum allowable under § 213.9 for the class of track concerned (whichever is lower), then re-inspect the rail in 90 days, if operations will continue.

For bolt hole cracks greater than 1 inch, but not exceeding one and one-half inches, Notes "H" and "G" apply. These rails are required to be limited to 50 mph and re-inspected within 30 days. For a bolt hole crack exceeding one and one-half inches, a person qualified under § 213.7(a) may elect to designate a speed restriction, which cannot exceed 30 mph, or the maximum allowable under § 213.9 for the class of track concerned (whichever is lower).

Under Notes "F" and "G," where corrective action requires rail to be re-inspected within a specific number of days after discovery, several options for compliance may be exercised depending on the nature of the defect. For those defects that are strictly internal and are not yet visible to the naked eye, the only option would be to perform another inspection with rail flaw detection equipment, either rail-mounted or hand-held. For defects that are visible to the naked eye and therefore measurable, a visual inspection or an inspection with rail flaw detection equipment are acceptable options. For certain defects enclosed within the joint bar area, such as bolt hole cracks and head-web separations, the joint bars must be removed if a visual re-inspection is to be made.

The re-inspection prescribed in Notes "F" and "G" must be performed prior to the expiration of the 30- or 90-day interval. If the rail remains in the track and is not replaced or repaired, the re-inspection cycle starts over with each successive re-inspection unless the re-inspection reveals that the rail defect increased in size, and has become subject to a more restrictive remedial action

as a consequence. This process continues indefinitely until the rail is removed from track or repaired.

Where corrective action requires rail to be re-inspected within a specific number of days after discovery, the track owner may exercise several options for compliance. One option would be to perform another inspection with rail flaw detection equipment, either rail-mounted or hand-held.

Another option would be to perform a visual inspection where the defect is visible and measurable. In the latter case, for certain defects enclosed within the joint bar area such as bolt hole breaks, removal of the joint bars will be necessary to comply with the re-inspection requirement. If not inspected within 30- or 90-day timelines, limit speed to that for Class 2 track or the maximum allowable speed under § 213.9 for the class of track concerned (whichever is lower), until it is inspected. This change defines the re-inspection cycle and requires the track owner to continue the re-inspection or apply a reduction in speed.

If defects remain in track beyond the re-inspection interval, the railroad must continue to monitor the defects and take the appropriate actions as required in the remedial action table.

A broken base can result from improper bearing of the base on a track spike or tie plate shoulder, and from over-crimped anchors, or it may originate in a manufacturing flaw. With today's higher axle loads, inspectors can anticipate broken base defects in 75-pound, and smaller, rail sections with an irregular track surface, especially on the field side. For any broken base discovered that is more than 1 inch, but less than 6 inches in length, the remedial action (Note D) is to apply joint bars bolted through the outermost holes to the defect within 10 days, if operations will continue. In Classes 3 through 5 track, the operating speed must be reduced to 30 mph or less, as authorized by a person under § 213.7(a), until joint bars are applied. After that, operating speed is limited to 50 mph or the maximum allowable under § 213.9 for the class of track concerned (whichever is lower).

Under Note "D," there are several acceptable "outermost hole" bolting arrangements for joint bars centered on a rail defect. *See* Figure 1, for an illustration of acceptable bolting arrangements. In all cases, railroads may not drill a bolt hole next to a defect that is being remediated with the application of joints bars (pursuant to Note D). The reason for not drilling next to the defect is to prevent the propagation of the crack into the hole closest to the defect.

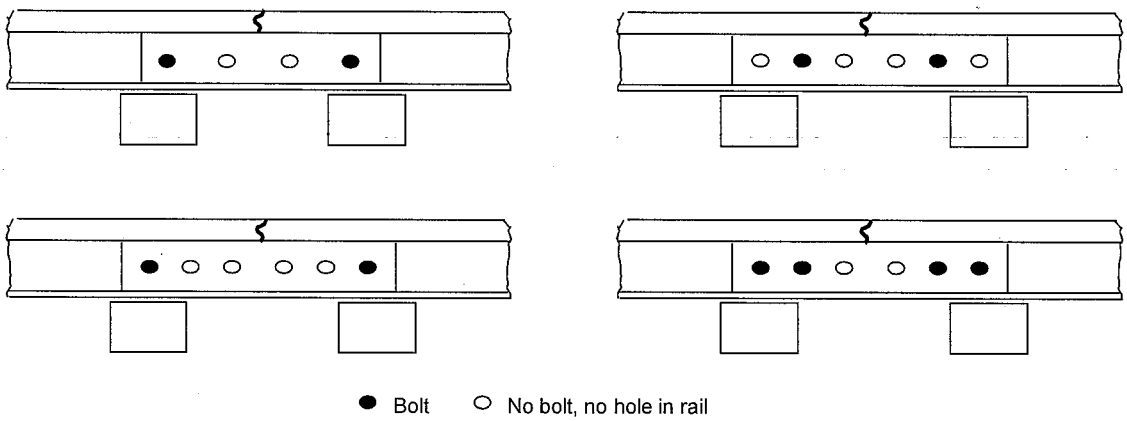

Figure 1

A broken base in excess of 6 inches requires the assignment of a person designated under § 213.7 to visually supervise each train operation over the defective rail. The railroad may apply joint bars to the defect and bolt them in accordance with §§ 213.121(d) and (e), and thereafter must limit train operations to 30 mph or the maximum allowable under § 213.9 for the class of track concerned (whichever is lower). As reference, the dimensions between the outermost holes of a 24-inch joint bar vary between approximately 15 and 18 inches, and for a 36-inch joint bar approach 30 inches.

Inspectors should point out to the track owner that broken bases nearing these dimensions may negate the purpose for which the joint bars are applied. A broken base rail may be caused by damage from external sources, such as rail anchors being driven through the base by a derailed wheel. It is improper to consider them "damaged rail," as this defect is addressed by more stringent provisions applicable to broken base rails, under Note "A" or "E" and "I."

Damaged rail can result from flat or broken wheels, incidental hammer blows, or derailed or dragging equipment. Reducing the operational speed in Classes 3 through 5 track to 30 mph until joint bars are applied, lessens the impact force imparted to the weaken area. Applying joint bars under Note "D" ensures a proper horizontal and vertical rail end alinement in the event the rail fails.

Flattened rails and crushed rails (localized collapsed head rail) are also caused by mechanical interaction from repetitive wheel loadings. FRA and industry research indicate that these occurrences are more accurately categorized as rail surface conditions, not rail defects, as they do not, in themselves, cause service failure of the rail. Although it is not a condition shown to affect the structural integrity of the rail section, it can result in less than desirable dynamic vehicle responses in the higher speed ranges. The flattened rail condition is identified in the table, as well as in the definition portion of § 213.113(b), as being three-eighths of an inch or more in depth below the rest of the rail head and 8 inches or more in length. As the defect becomes more severe by a reduced rail head depth, wheel forces increase.

The rule addresses flattened rail in terms of a specified remedial action for those of a certain depth and length. Those locations meeting the depth and length criteria must be limited to an operating speed of 50 mph or the maximum allowable under § 213.9 for the class of track concerned (whichever is lower).

"Break out in rail head" is defined as a piece that has physically separated from the parent rail. Rail defects meeting this definition are required to have each operation over the defective rail visually supervised by a person designated under § 213.7. Inspectors need to be aware that this definition has applicability across a wide range of rail defects, as indicated in the Remedial Action Table. Where rail defects have not progressed to the point where they meet the definition of a break out, but due to the type, length, and location of the defect, they present a hazard to continued train operation, inspectors should determine what remedial actions, if any, the track owner should institute.

The following are two rail head break out examples where the Note "A" corrective action would be necessary:

- Example One: A bolt hole break where the head of the rail is totally separated from the parent rail (either tight or loose), but that piece of rail will not physically lift out of the joint bars by hand. The inspector might determine that the separation was total because the separated piece rattled when tapped. It is important that railroads take the appropriate remedial action in this situation, because it is potentially very unsafe. It is impossible to know what will happen when the next train operates over this defect. That train could cause the piece to become so loose that it comes out of the place, cocks at an angle and causes a wheel to ramp up, derailing the train.

- Example Two: A vertical split head defective rail where rail head separation is apparent because the inspector can determine that a physical separation has occurred through the rail head, but the rail head has not entirely separated over the entire length of the defect.

The following is an example where the Note "A" corrective action would not be necessary:

- Example: At rail joints, a chipped rail end, which is not considered a rail defect according to the current § 213.113 table, and should not be considered as a break out in the rail head.

The issue of "excessive rail wear" continues to be evaluated by the Rail Integrity Task Force. FRA believes that insufficient data exists at this time to indicate that parameters for this condition should be proposed as a minimum standard.

Some railroads apply safety "weld straps" to thermite-type field welds. These straps do not provide the same support of a joint bar. They would provide only limited support if a weld were to break under a train movement and as such, they do not comply with the provisions of corrective actions C, D, or E (installation of joint bars). Only a joint bar having full contact with

the bottom of the rail head and rail base [*see* § 213.121 (a)] and with a manufactured relief for the weld material would comply with corrective actions C, D, or E.

When an FRA inspector finds a rail defect that appears to originate from fatigue at a bond wire attachment weld, the inspector should cite the railroad using part 213 defect code 0113B. Inspectors must also identify in their narrative the type of the rail defect (e.g., defective weld, detail fracture, etc.). FRA added this defect code based on a National Transportation Safety Board (NTSB) recommendation arising from the NTSB investigation of a February 9, 2003, Canadian National Railway (CN) derailment in Tamaroa, IL. The NTSB determined that the probable cause of this accident was CN's placement of bond wire welds on the head of the rail just outside the joint bars, where untempered martensite associated with the welds led to fatigue cracking that, because of increased stresses associated with known soft ballast conditions, rapidly progressed to rail failure.

FRA provides the "Track Inspector Rail Defect Reference Manual" on the e-library in its Web site. Inspectors are expected to be conversant with rail defect types, appearance, growth, hazards, and methods of detection.

§ 213.119 Continuous welded rail (CWR); plan contents.

* * * * *

(h) * * *

(7) * * *

(ii) [Reserved]

* * * * *

Guidance: Section 213.119 (h)(7)(ii) is removed. This eliminates the requirement for the railroad to send a copy of the joint bar fracture report to FRA. This also includes removal of paragraphs (A), (B) and (C).

§ 213.237 Inspection of rail.

(a) In addition to the inspections required by § 213.233, each track owner must conduct internal rail inspections sufficient to maintain service failure rates per rail inspection segment in accordance with this paragraph (a) for a 12-month period, as determined by the track owner and calculated within 45 days of the end of the period. These rates must not include service failures that occur in rail that has been replaced through rail relay since the time of the service failure. Rail used to repair a service failure defect is not considered relayed rail. The service failure rates must not exceed—

(1) 0.1 service failure per year per mile of track for all Class 4 and 5 track;
(2) 0.09 service failure per year per mile of track for all Class 3, 4, and 5 track that carries regularly-scheduled passenger trains or is a hazardous materials route; and,
(3) 0.08 service failure per year per mile of track for all Class 3, 4, and 5 track that carries regularly-scheduled passenger trains and is a hazardous materials route.

Guidance: The changes to this section codify standard industry good practices. With the implementation of the self-adaptive performance-based rail inspection scheduling method in the 1990s, track owners have generally tested more frequently than they have been required to, and the test intervals align more closely with generally accepted maintenance practices. The frequency of rail inspection cycles varies according to the total detected defect rate per test; the rate of service failures, as defined in paragraph (j) below, between tests; and the accumulated tonnage between tests—all of which are factors that the railroad industry's rail quality managers generally consider when determining inspection schedules.

Paragraph (a) requires track owners to maintain service failure rates of no more than 0.1 per year per mile of track for all track Classes 4 and 5; no more than 0.09 per year per mile of track for all Class 3, 4, and 5 track that carries regularly scheduled passenger trains or is a hazardous materials route; and no more than 0.08 per year per mile of track for all Class 3, 4, and 5 track that carries regularly-scheduled passenger trains and is a hazardous materials route.

The required inspection frequency can be verified by using the FRA Self-Adaptive Scheduling Algorithm. This performance-based method will normally require an increase in the inspection frequency when the railroad exceeds the service failure rate. For track owners without access to a sophisticated, self-scheduling algorithm to determine testing frequencies, FRA posted an algorithm program designed by the Volpe National Transportation Systems Center (Volpe) on the FRA Web site at www.fra.dot.gov. The algorithm requires five inputs:

1. Service failures per mile in the previous year;
2. Detected defects per mile in the previous year;
3. Annual tonnage;
4. Number of rail tests conducted in the previous year; and
5. Targeted number of service failures per mile.

Once the input is complete, the algorithm takes the average of two numbers when it calculates

the number of rail tests. The first number is based on the service failure rate. The second is based on the total defect rate, which is the service defect rate plus the detected defect rate. This rate of designated tests per year for the designated segment is the number required under the regulation and enforced by FRA for the segment.

The output from the program is the annual number of rail tests that should be conducted over the segment in order to maintain an acceptable or tolerable level of risk. In this context, risk is the number of service failures per mile in a segment of track for a 1-year period. The designated 1-year period may be a calendar year or fiscal year, depending on the normal internal engineering practice of the railroad.

(b) Each rail inspection segment must be designated by the track owner no later than March 25, 2014, for track that is Class 4 or 5 track, or Class 3 track that carries regularly-scheduled passenger trains or is a hazardous materials route and is used to determine the milepost limits for the individual rail inspection frequency.

(1) To change the designation of a rail inspection segment or to establish a new segment pursuant to this section, a track owner must submit a detailed request to the FRA Associate Administrator for Railroad Safety/Chief Safety Officer (Associate Administrator). Within 30 days of receipt of the submission, FRA will review the request. FRA will approve, disapprove, or conditionally approve the submitted request, and will provide written notice of its determination.

(2) The track owner's existing designation must remain in effect until the track owner's new designation is approved or conditionally approved by FRA.

(3) The track owner must, upon receipt of FRA's approval or conditional approval, establish the designation's effective date. The track owner must advise in writing FRA and all affected railroad employees of the effective date.

Guidance: No uniform segment length is required to be applied by all track owners. Track owners use their own designated segment lengths in place by the effective date of the final rule, March 25, 2014, and the designated segments have been reported to FRA. It is not considered practical for a railroad to utilize segments that are too small. The level of detail involved with determining inspection frequencies on so many individual segments would be too burdensome for the track engineers to manage properly. It is also not advisable to have segments that are too large because localized areas of defect development and rail failure may go unrecognized. Therefore, it is advisable that the railroads utilize reasonable lengths for their designated segment. Most railroads have identified and currently utilize a designated segment in their engineering plans. Some segments are designated by mileage and track limits and others by subdivision limits. FRA Inspectors should be able to capture rail failure data and identify problematic areas, even in the larger segment areas, by simply looking at rail failure records and comparing milepost locations.

Although each rail inspection segment is designated by the track owner, if a track owner wishes to change, or deviate, from its designated segment lengths, the track owner must receive FRA approval to make any such change. To change the designation of a rail inspection segment or to establish a new segment pursuant to this section, a track owner must submit a detailed request to the FRA Associate Administrator for Railroad Safety/Chief Safety Officer (Associate Administrator). Within 30 days of receipt of the submission, FRA will review the request. FRA will then approve, disapprove, or conditionally approve the submitted request, and will provide written notice of its determination.

(c) Internal rail inspections on Class 4 and 5 track, or Class 3 track with regularly-scheduled passenger trains or that is a hazardous materials route, must not exceed a time interval of 370 days between inspections or a tonnage interval of 30 million gross tons (mgt) between inspections, whichever is shorter. Internal rail inspections on Class 3 track that is without regularly-scheduled passenger trains and 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, but in no case may inspections be more than 5 years apart.

(1) Any rail used as a replacement plug rail in track that is required to be tested in accordance with this section must have been tested for internal rail flaws.

(2) The track owner must verify that any plug rail installed after March 25, 2014, has not accumulated more than a total of 30 mgt in previous and new locations since its last internal rail flaw test, before the next test on the rail required by this section is performed.

(3) If plug rail not in compliance with this paragraph (c) is in use after March 25, 2014, trains over that rail must not exceed Class 2 speeds until the rail is tested in accordance with this section.

Guidance: FRA requires that internal rail inspections on Class 4 and 5 track, or Class 3 track with regularly scheduled passenger trains or that is a hazardous materials route, not exceed a time interval of 370 days between inspections or a tonnage interval of 30 mgt between inspections (whichever is shorter). Paragraph (c) also provides that internal rail inspections on Class 3 track that is without regularly scheduled passenger trains and 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), but in no case may inspections be more than 5 years apart.

Note that the maximum tonnage interval for testing internal rail defects on Class 4 and 5 track, and certain Class 3 track, has decreased from 40 mgt in former paragraph (a) of this section to 30 mgt.

This section also includes additional requirements for inspection of rail intended for reuse, or "plug rail." Plug rail must be inspected at the same frequency as conventional rail. This requirement supersedes FRA Safety Advisory 2006-02 and codifies current industry practice by allowing the use of rail that has been previously tested to be placed in track and retested at the

normal frequency for that track segment. The track owner should know the date that the rail was last tested and ensure that the 30 mgt maximum tonnage accumulation is not exceeded prior to retesting the rail. As stated in (c)(2), the track owner is required to be able to verify that any plug installed after the effective date of the final rule, March 25, 2014, has not accumulated more than a total of 30 mgt in previous and new locations since its last internal rail flaw test, before the next test on the rail required by this section is performed. Thereafter, the rail must be tested in accordance with the test frequency of the designated segment in which it is installed. Re-inspection of plug rails installed prior to this rule is not required.

The inspection frequency requirements stated in this paragraph consider both the passage of time and the accumulated tonnage since the last inspection. Several methods are employed by railroads to estimate tonnage, but they are only estimates and cannot be considered as precisely accurate. In addition, scheduling of rail defect detection cars is influenced by many factors such as the availability of equipment if the service is contracted, equipment failures, or various other scheduling problems that may arise.

For Class 3 track over which only non-hazmat freight operations are conducted, the date of the most recent inspection will define the beginning of a new inspection cycle, and before the expiration of time or tonnage limits (whichever is longer), an inspection for internal rail defects must be conducted. For Class 4 and 5 track, and Class 3 track over which passenger trains or hazmat trains operate, the date of the most recent inspection will define the beginning of a new inspection cycle, and before the expiration of time or tonnage limits (whichever is shorter), an inspection for internal rail defects must be conducted.

Language in § 213.237(a) refers to § 213.233 (Track inspections) indicating that many rail defects, as well as conditions caused by wear or damage, cannot be visually discovered. These require an internal search by a detector car or other specialized detection equipment.

Some railroads elected to perform more internal rail inspections than required under the TSS, with intervals between tests typically ranging from 20 to 30 million gross tons or between 20 and 30 days. These typical intervals define a good baseline for generally accepted maintenance practices, and the industry's rail quality managers consider these limits as points of departure for adjustment of test schedules to account for the effects of specific track characteristics, maintenance, traffic, and weather.

Selecting an appropriate frequency of rail testing is a complex task involving many different factors which include, but are not limited to, temperature differential, curvature, residual stresses, rail sections, cumulative tonnage, and past rail test results. Taking into consideration all of the above factors, FRA's research suggests that 30 million gross tons is the maximum tonnage that should be hauled between rail tests and still allow a safe window of opportunity for detection of an internal rail flaw before it propagates in size to a service failure. Furthermore, FRA's accident/incident data points to a need for inclusion of all Class 3 trackage in a railroad's rail testing program. The requirement states that Class 3 track over which passenger or hazmat trains do not operate, should be tested once a year or once every 30 million gross tons (whichever is longer).

(d) If the service failure rate target identified in paragraph (a) of this section is not achieved, the track owner must inform FRA of this fact within 45 days of the end of the defined 12-month period in which the performance target is exceeded. In addition, the track owner may provide to FRA an explanation as to why the performance target was not achieved and provide a remedial action plan.

(1) If the performance target rate is not met for two consecutive years, then for the area where the greatest number of service failures is occurring, either:

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

(2) In cases where a single service failure would cause the rate to exceed the applicable service failure rate as designated in paragraph (a) of this section, the service failure rate will be considered to comply with paragraph (a) of this section unless a second such failure occurs within a designated 12-month period. For the purposes of this paragraph (d)(2), a period begins no earlier than January 24, 2014.

Guidance: Paragraph (d) contains restrictions that apply if the service failure target rate identified in paragraph (a) is not achieved on a segment of track for two consecutive 12-month periods. After the first 12-month period is exceeded, it is expected that the railroad will increase rail inspections to decrease the service failure rate. If the service failure target rate is exceeded for two consecutive 12-month periods, the track owner must comply with the requirements in paragraph (d) for either a minimum rail test frequency or a speed restriction on the offending track segment. Rail integrity or designated specialists will review service failure data on a regular basis and seek to identify any instances where shorter lengths of track have high failure rates.

(e) Each defective rail must 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 inaccessible because of permanent features, the highly visible marking may be placed on or next to the head of the rail.

Guidance: Paragraph (e) requires that each defective rail 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 inaccessible because of permanent features, the highly visible marking may be placed on or next to the head of the rail. This option to mark the rail head in certain situations provides an alternative to the railroad in areas where the web and base may not be accessible.

Each defective rail must be marked on both sides of the web and base to prevent reuse of the rail. A defect's identity and control numbers are not required on the web and base, but may be used by a railroad for inventory purposes. Inspectors should be aware that rail with certain defects, such as a bolt hole crack, may have the defective portion "cropped" and the remaining portion placed

back in service. The track owner may remove defect markings from the non-defective portion of such rail.

(f) Inspection equipment must be capable of detecting defects between joint bars, in the area enclosed by joint bars.

Guidance: The equipment used must be capable of detecting defects in the joint area and the body of the rail. Two separate systems may be used to meet this requirement, provided that each is used before the expiration of the time or tonnage limits as required by this section.

(g) If the person assigned to operate the rail defect detection equipment (i.e., the qualified operator) determines that a valid search for internal defects could not be made over a particular length of track, that particular length of track may not be considered as internally inspected under paragraphs (a) and (c) of this section.

Guidance: Paragraph (g) addresses a situation where a valid search for internal rail defects cannot be made because of rail surface conditions, equipment issues, or other factors. Several types of technologies are presently employed to continuously search for internal rail defects, some with varying means of displaying and monitoring search signals. A continuous search is intended to mean an uninterrupted search by whatever technology is being used, so that there are no segments of rail that are not tested. If the test is interrupted (e.g., as a result of rail surface conditions that inhibit the transmission or return of the signal), then the test over that segment of rail is not valid because it was not continuous. Therefore, a non-test is not defined in absolute technical terms. Rather, the provision leaves this determination to the qualified operator, as defined in § 213.238, who is uniquely qualified on that equipment.

(h) If a valid search for internal defects could not be conducted, the track owner must, before expiration of the time or tonnage limits in paragraph (a) or (c) of this section—

(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.

Guidance: This paragraph specifies the three options available to a railroad following a non-test due to rail surface conditions. These options must be exercised prior to the expiration of time or tonnage limits specified in paragraph (a) or (c) of this section. If doubts exist concerning a defective rail's disposition, inspectors should review the track owner's records, under § 213.241(c). When conducting a records inspection, inspectors will determine whether the requirements of § 213.113(a)(2) and § 213.237(h) are in compliance and whether valid inspections have occurred. The expiration of time and tonnage limits must be determined before any compliance action is taken.

Broken rails continue to be one of the leading causes of train accidents. Inspectors should examine records to ensure railroad internal rail inspection frequency compliance, and should be

alert during track inspections to any rail that is marked as defective. During accident investigations where a broken rail is a factor, inspectors should provide complete information on types of defects, results of the last rail inspection, type of inspection equipment used, track usage since last inspection, and accumulated tonnage on that rail. *See* the guidance under § 213.237(g) for a discussion of the situation where a valid search for internal rail defects could not be made because of rail surface conditions.

(i) 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 for each type of equipment the operator is assigned.

Guidance: The rail flaw detector car operator must be qualified as defined in new § 213.238 (Qualified operator), which prescribes minimum training, evaluation, and documentation requirements for personnel performing in this occupation.

(j) As used in this section—

(1) Hazardous materials route means track over which a minimum of 10,000 car loads or intermodal portable tank car loads of hazardous materials as defined in 49 CFR 171.8 travel over a period of one calendar year; or track over which a minimum of 4,000 car loads or intermodal portable tank car loads of the hazardous materials specified in 49 CFR 172.820 travel, in a period of one calendar year.
(2) Plug rail means a length of rail that has been removed from one track location and stored for future use as a replacement rail at another location.
(3) 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.
(4) Valid search means a continuous inspection for internal rail defects where the equipment performs as intended and equipment responses are interpreted by a qualified operator as defined in § 213.238.

§ 213.238 Qualified operator.

(a) Each provider of rail flaw detection shall have a documented training program in place and shall identify the types of rail flaw detection equipment for which each equipment operator it employs has received training and is qualified. A provider of rail flaw detection may be the track owner. A track owner shall not utilize a provider of rail flaw detection that fails to comply with the requirements of this paragraph.

Guidance: Any provider of rail flaw detection must have a documented training program to ensure that a rail flaw detection equipment operator is qualified to operate each of the various types of equipment currently used in the industry for which he or she is assigned, and that proper training is provided when new rail flaw detection technologies are used.

It is the responsibility of the track owner to reasonably ensure that any operator of rail flaw detection equipment over its track is qualified to conduct an inspection in accordance with the training and qualification requirements in this section, because the track owner is ultimately responsible for the conformance of its track and rail with the requirements of the Track Safety Standards.

(b) A qualified operator must be trained and have written authorization from his or her employer to:

(1) Conduct a valid search for internal rail defects utilizing the specific type(s) of equipment for which he or she is authorized and qualified to operate;
(2) Determine that such equipment is performing as intended;
(3) Interpret equipment responses and institute appropriate action in accordance with the employer's procedures and instructions; and
(4) Determine that each valid search for an internal rail defect is continuous throughout the area inspected and has not been compromised due to environmental contamination, rail conditions, or equipment malfunction.

Guidance: Each operator of rail flaw detection equipment must have documentation from his or her employer that designates his or her qualifications to perform the various functions associated with the flaw detection process. Specifically, the requirements help ensure that each operator is able to conduct a valid search for internal rail flaws, determine that the equipment is functioning properly at all times, properly interpret the test results, and understand test equipment limitations.

(c) To be qualified, the operator must have received training in accordance with the documented training program and a minimum of 160 hours of rail flaw detection experience under direct supervision of a qualified operator or rail flaw detection equipment manufacturer's representative, or some combination of both. The operator must demonstrate proficiency in the rail defect detection process, including the equipment to be utilized, prior to initial qualification and authorization by the employer for each type of equipment.

Guidance: The operator must receive a minimum amount of documented, supervised training according to the rail flaw detection equipment provider's training program. FRA understands that this training may not be entirely held within the classroom environment and is in agreement that the employer should have the flexibility to determine the training process that is appropriate for demonstrating compliance. The operator is required to demonstrate proficiency for each type of equipment the employer intends the operator to use, and documentation must be available to FRA to verify the qualification.

(d) Each employer must reevaluate the qualifications of, and administer any necessary recurrent training for, the operator as determined by and in accordance with the employer's documented program. The reevaluation process must require that the employee successfully complete a recorded examination and demonstrate proficiency to the employer on the specific equipment type(s) to be operated. Proficiency may be determined by a periodic review of test data submitted by the operator.

Guidance: Operator reevaluation and, as necessary, refresher training is required in accordance with the documented training program. The employer is provided flexibility to determine the process used in reevaluating qualified operators, including the frequency of operator reevaluation. The reevaluation process must require that the employee successfully complete a recorded examination and demonstrate proficiency to the employer on the specific equipment types to be operated. The reevaluation and recurrent training may also consist of a periodic review of test data submitted by the operator.

(e) Each employer of a qualified operator must maintain written or electronic records of each qualification in effect. Each record must include the name of the employee, the equipment to which the qualification applies, date of qualification, and date of the most recent reevaluation, if any.

Guidance: The employer must maintain a written or electronic record of each operator's qualification. The record must include the operator's name, type of equipment qualification, date of initial qualification, and most recent reevaluation of his or her qualifications, if any.

(f) Any employee who has demonstrated proficiency in the operation of rail flaw detection equipment prior to January 24, 2014, is deemed a qualified operator, regardless of the previous training program under which the employee was qualified. Such an operator must be subject to paragraph (d) of this section.

Guidance: All rail flaw detection equipment operators who had demonstrated proficiency in the operation of rail flaw detection equipment prior to publication of the final rule, January 24, 2014, are considered qualified to operate the equipment as designated by the employer. Such an operator must thereafter undergo reevaluation in accordance with paragraph (d) of this section. Any employee that is considered for the position of qualified operator on or after the final rule's publication must be qualified in accordance with paragraph (c) of this section.

(g) Records concerning the qualification of operators, including copies of equipment-specific

training programs and materials, recorded examinations, demonstrated proficiency records, and authorization records, must be kept at a location designated by the employer and available for inspection and copying by FRA during regular business hours.

Guidance: Records specifically associated with the operator qualification process must be maintained at a designated location and made available to FRA as requested, to assist in verifying compliance.

Subpart F - Inspection

§ 213.241 Inspection records.

- 241(a) Each owner of track to which this part applies must keep a record of each inspection required to be performed on that track under this subpart.

Guidance. Each track owner is required to keep a record of each track inspection according to the requirements under §§ 213.4, 213.119, 213.233, and 213.235. Each inspection report under these sections must be prepared on the day of inspection and signed by the person making the inspection.

The track owner may develop any form that meets the requirements of the TSS. If the owner finds it necessary to conduct inspections at more frequent intervals than specified by § 213.233(c), then the only requirement is to prepare and maintain an inspection record to comply with the minimum inspection frequency. This section is explicit concerning the required information contained in the inspection records. They must specify the track inspected [including the provisions under § 213.233(b)(3)], date of inspection, location and nature of any defect, and the remedial action taken by the person making the inspection. Railroad inspection reports are required to reflect the actual conditions, as they exist in the track structure. The railroad inspector must include the specific measurement of the track parameter, whenever appropriate, when describing the nature of the defect per § 213.241(b). For example: "wide gage exceeds allowable for Class 4 track - 58 inches - track slow ordered to 10 mph." When defects are discovered, the track owner's inspectors must immediately initiate remedial action, in accordance with § 213.5. If a speed restriction is used as remedial action, the reduced speed should be shown in the inspection records.

Railroad track inspectors are required to list all deviations from the TSS on their inspection record. FRA inspectors should review railroad inspection records to determine if the reported data accurately reflects the track conditions, as they exist in the field. Railroad inspectors are not limited to recording deviations from the TSS (e.g., railroad maintenance items). FRA inspectors should compare the defects they find with the railroad inspectors' reports to determine the level of compliance with the railroad's inspection program. If multiple tracks are being inspected, the records must designate the tracks traversed and any tracks not inspected due to visibility, obstruction, or excessive distance as required under § 213.233.

When two qualified persons inspect multiple tracks in accordance with § 213.233(b), one report or two reports may be optionally prepared. If one report is used, the report must include a notation such as signature, initials, or printed name of the second inspector.

Rail inspection records must be maintained by the track owner for at least 2 years after the inspection and for 1 year after the last remedial action is taken. The record must specify the location and nature of any rail defects found through internal inspection, and the remedial action taken and the date thereof. This record may consist of log sheets combined with a standard rail defect and change out report, computer records, or other data kept by the track owner and

containing all the required information.

The rail inspection records must specify the locations of any rail that, due to rail surface conditions, prohibit the railroad from conducting a valid search for internal defects at the required frequency. If a valid search cannot be conducted before the time or tonnage frequency expires, the remedial action and date of remedial action must be recorded on the inspection records.

- 241(b) Each record of an inspection under §§ 213.4, 213.119, 213.233, and 213.235 must be prepared on the day the inspection is made and signed by the person making the inspection. Records shall specify the track inspected, date of inspection, location and nature of any deviation from the requirements of this part, and the remedial action taken by the person making the inspection. The owner must designate the location(s) where each original record must be maintained for at least one year after the inspection covered by the record. The owner must also designate one location, within 100 miles of each state in which they conduct operations, where copies of record which apply to those operations are either maintained or can be viewed following 10 days' notice by the Federal Railroad Administration.

Guidance. FRA added § 213.119 to the list of sections in paragraph (b), thereby requiring that inspections of joints made pursuant to § 213.119 comply with the inspection record requirements found in § 213.241(b).

In reviewing compliance with this section, inspectors should determine if the track owner is properly recording the location and date when each switch that is held in position only by the operating mechanism and a connecting rod are operated in every 3-month period (§ 213.235(c)). In addition, the record should reflect when each siding was actually traversed by a vehicle or on foot at the required frequency (§ 213.233(c)).

The regulation allows railroads to designate a location within 100 miles of each state (designated locations) where inspectors can view records. Inspectors are required to give 10 days' advance notice before conducting the record keeping inspection of designated locations. The regulation does not require the railroads to maintain the records at these designated locations, only to be able to provide viewing of them at the locations within 10 days after notification. The TSS stipulates locations within 100 miles of each State, rather than locations in each State, to accommodate those railroads whose operations may cross a State's line by only a few miles. In those cases, the railroad could designate a location in a neighboring State, provided the location is within 100 miles of that State's border. Records must be kept for at least 1 year after the inspection covered by the report. It is appropriate for the inspector to expect all records will be available for inspection up to the date of notification.

(c) Records of internal rail inspections required by § 213.237 must specify the—

(1) Date of inspection;
(2) Track inspected, including beginning and end points;

(3) 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) Initial remedial action taken and the date thereof; and
(6) Location of any track not tested pursuant to § 213.237(g).

Guidance: Internal rail inspection records are now required to include the date of inspection, track identification and milepost for each location tested, type of defect found and size, and initial remedial action as required by § 213.113. However, if the defect is repaired or removed prior to the next train movement, the size of the defect is not required.

Paragraph (c) also requires that the records document any track that does not receive a valid test pursuant to § 213.237(g). Section § 213.237(g) specifies that if rail surface conditions prohibit the railroad from conducting a proper search for rail defects during a test, that test will not fulfill the requirements of § 213.237(a) and (c), which requires a search for internal defects at specific intervals.

(d) The track owner must retain a rail inspection record under paragraph (c) of this section for at least two years after the inspection and for one year after initial remedial action is taken.

Guidance: This information is vital for FRA to determine compliance with the rail integrity and inspection requirements in § 213.113 and § 213.237.

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

Guidance: Rail inspection records must be maintained to demonstrate compliance with § 213.237(a) and (c). This requirement is intended to provide sufficient information to determine that accurate data concerning detected defects is used by the railroads as input into the performance-based test frequency formula. FRA requests for records of rail inspections demonstrating compliance with required test frequencies must be made by a designated FRA Rail Integrity specialist; each track owner must designate a person within its organization whom the Rail Integrity Specialists contact when requesting records of rail inspections.

(f) Each track owner required to keep inspection records under this section must make those records available for inspection and copying by FRA upon request.

(g) For purposes of complying with the requirements of this section, a track owner may maintain and transfer records through electronic transmission, storage, and retrieval provided that—

(1) The electronic system is designed so that the integrity of each record is maintained through appropriate levels of security such as recognition of an electronic signature, or another means, which uniquely identifies the initiating person as the author of that record. No two persons must have the same electronic identity;
(2) The electronic storage of each record must be initiated by the person making the inspection within 24 hours following the completion of that inspection;
(3) The electronic system must ensure that each record cannot be modified in any way, or replaced, once the record is transmitted and stored;
(4) Any amendment to a record must be electronically stored apart from the record which it amends. Each amendment to a record must be uniquely identified as to the person making the amendment;
(5) The electronic system must provide for the maintenance of inspection records as originally submitted without corruption or loss of data;
(6) Paper copies of electronic records and amendments to those records that may be necessary to document compliance with this part must be made available for inspection and copying by FRA at the locations specified in paragraph (b) of this section; and
(7) Track inspection records must be kept available to persons who performed the inspections and to persons performing subsequent inspections.

Guidance: This paragraph contains requirements for maintaining and retrieving electronic records of track inspections. This allows each railroad to design its own electronic system as long as the system meets the specified criteria to safeguard the integrity and authenticity of each record. The provision also requires that railroads make available paper copies of electronic records, when needed by the FRA inspector or by railroad track inspectors.

A track owner may elect to maintain and transfer records through electronic transmission, storage, and retrieval procedures. Each record must have sufficient security to maintain the integrity of the record. Levels of security must identify the person making the inspection as the author of the record. No two individuals will have or share the same electronic signature or identity. If individuals use an electronic signature or identity other than their own, violations or personal liability action should be considered for all parties involved. The integrity of electronic inspection record systems is an extremely sensitive issue. Should the system integrity be compromised, an inspector should immediately contact the appropriate regional track specialist. Should the regional Track specialist be unavailable, the inspector will notify the appropriate Regional Administrator. FRA Headquarters Track Division will also be notified.

The system must ensure that no record can be replaced, deleted, or modified in any way, once the record has been transmitted and stored. Each amendment to a record must be stored separately from the record it amends. Each amendment must identify the person making the amendment and have sufficient security to maintain the integrity of the amendment.

For electronic records, inspection records must be completed the day of the inspection either on computer or temporarily on paper. The electronic record must then be uploaded to the permanent

electronic storage system where the record will be maintained for 1 year. The uploading of each inspection record must be completed within 24 hours following the completion of the inspection.

An advantage of an electronic system is the associated reduction in paperwork. Therefore, inspectors must rely on viewing records on a terminal or monitor screen whenever it is made available for viewing by the railroad. Although printouts of records must be made available to FRA inspectors, inspectors are discouraged from requesting paper copies of electronic records unless necessary to document noncompliance. A paper copy of an electronic record may be marked "original" and included in the documentation necessary for a violation report when recommending civil penalties.

The railroad inspection records will be furnished upon request at the location specified by the railroad as required in paragraph (b) of this section. A paper copy of any electronic inspection record or amendment will be made available to the railroad inspector or any subsequent railroad inspectors performing inspections of the same territory upon request.