

**DEPARTMENT OF TRANSPORTATION****Federal Railroad Administration****49 CFR Parts 209 and 230**

[Docket No. RSSL-98-1, Notice No. 3]

**Inspection and Maintenance Standards for Steam Locomotives**

**AGENCY:** Federal Railroad Administration (FRA), Department of Transportation (DOT).

**ACTION:** Final rule.

**SUMMARY:** FRA is issuing new Steam Locomotive Inspection and Maintenance Standards in order to update and enhance its steam locomotive regulatory program. In recognition of the reduced frequency of use of steam locomotives in today's transportation system, the revised standards—which incorporate consensus recommendations of the Railroad Safety Advisory Committee's Tourist and Historic Working Group—relax certain inspection requirements and tighten others. Significant changes include: the creation of a "service-day" inspection system that directly relates inspection time periods to the actual use of the steam locomotive; the elimination, with certain exceptions, of waivers for steam boilers, steam locomotives and their appurtenances; the inclusion of allowances which encourage the use of new technologies, such as non-destructive testing, for boiler testing and inspections; and the imposition of qualification requirements for individuals making certain repairs to steam locomotives, steam locomotive boilers, and steam locomotive appurtenances. Certain of the 1978 inspection standards remain substantively intact but are being relocated to new sections and given new section numbers. Due to the magnitude of the changes made, these newly issued standards replace the 1978 standards in their entirety.

**DATES:** This regulation is effective January 18, 2000.

**ADDRESSES:** Any petition for reconsideration should reference FRA Docket No. RSSL-98-1, and be submitted in triplicate to the Docket Clerk, Office of Chief Counsel, Federal Railroad Administration, 400 Seventh Street, SW, Mail Stop 10, Washington, DC 20590.

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Seventh Street, SW, Washington, DC, 20590, (telephone 202-493-6063); or John Megary, Regional Administrator, Federal Railroad Administration, 8701 Bedford-Eules Road, Suite 425, Hurst, TX 76053, (telephone 817-284-8142).

**SUPPLEMENTARY INFORMATION:****I. Historical Background**

The Locomotive Boiler Inspection Act was passed by a Congress concerned over the ever-increasing rate of serious injury and death on the nation's railroads in the early 1900s. In his annual message to Congress in 1910, President Taft noted the need for regulation of the steam locomotive industry:

The protection of railroad employees from personal injury is a subject of the highest importance and demands continuing attention \* \* \*. It seems to me that with respect to boilers a bill might well be drawn requiring and enforcing by penalty a proper system of inspection.

Congressional Record, December 6, 1910, p. 33. At that time, the only rule or regulation governing the inspection and maintenance of steam locomotives was the Ash Pan Act, 45 U.S.C. S. 17 (1908), repealed Pub. L. 97-468 (1983), which prescribed the method for attaching ash pans to steam locomotive boilers. Acting in response to President Taft's speech, Congress passed the Locomotive Boiler Inspection Act (LBIA) on February 17, 1911. The LBIA, enactment of which was initially opposed by locomotive owners and operators, brought all steam locomotive boilers under Federal jurisdiction and established the Bureau of Locomotive Inspections.

The LBIA, which became effective on July 1, 1911, was limited in scope to steam locomotive boilers. Despite its restricted coverage, the LBIA had an immediate, positive impact on safety with the number of incidents caused by the failure of the boiler or any of its appurtenances declining sharply after its passage. However, the number of incidents involving failures of locomotive parts other than boilers and related appurtenances continued to increase, and railroad labor soon appealed to Congress to expand the LBIA to cover the entire steam locomotive and tender and all its parts and appurtenances. Although the railroad owners and operators were strongly opposed to this expansion in the Act's coverage, a bill amending the LBIA to incorporate the requested changes was passed by Congress and signed into law by President Woodrow Wilson on March 4, 1915.

When the LBIA became effective in 1911, it required each railroad subject to

the Act to file copies of its rules and instructions for the inspection of locomotive boilers. A review of the 170 rules and instructions submitted (out of approximately 2,200 railroads in the country at that time) disclosed that these rules were either substantially similar, or identical, to those promulgated by the Master Mechanics' Association. These rules, in combination with the 1915 amendments to the LBIA, formed the basis for the Interstate Commerce Commission (ICC) rules on inspection and maintenance of steam locomotives and tenders: rules, that with some modification, continue in effect to this day. When the FRA came into existence in 1967 as part of the newly formed DOT, it adopted all ICC rules, interpretations, and instructions pertaining to railroads that were in effect at that time. These rules were published in the **Federal Register** and incorporated into the Code of Federal Regulations in December of 1968. Since then, the rules have been updated and amended periodically. Although the steam locomotive regulations were removed from the CFR in 1980, FRA has continued to enforce them. For purposes of clarity, whenever those removed standards are referenced in this rule, they will be referred to as "the 1978 standards" since there is no current CFR citation for them.

At present, there are approximately 150 steam locomotives in operation in the United States. Most of them are used in tourist or historic service on an intermittent, seasonal basis. Several years ago, the Engineering Standards Committee (ESC), a task group of the NBBPVI comprised of steam locomotive operators, petitioned the FRA to change the then current rules on inspection and maintenance of steam locomotives to more realistically reflect the current use and conditions of service for today's steam locomotives. The agency agreed to work with the ESC to consider revisions to these standards. After FRA established the Railroad Safety Advisory Committee (RSAC) in 1996, the subject of steam locomotive inspection and maintenance was identified as one fit for collaborative rulemaking. Accordingly, the agency tasked the RSAC with the formal revision of steam locomotive inspection standards on July 24, 1996. It was also decided that the ESC, and the FRA representatives working with it, would become a task force assigned to the RSAC's Tourist and Historic Working Group.

**II. The Railroad Safety Advisory Committee**

The RSAC's mandate is to provide recommendations and advice to the

Administrator of the FRA on the development of FRA's railroad safety regulatory programs, including the issuance of new regulations, the review and revision of existing regulations, and the identification of non-regulatory alternatives for improvement of railroad safety. The RSAC is presently comprised of 48 representatives from 27 member organizations, including railroads, labor groups, equipment manufacturers, state government groups, public associations, and three associate non-voting representatives from the National Transportation Safety Board (NTSB), Canada, and Mexico. The Administrator's representative (the Associate Administrator for Safety or that person's delegate) is the Chairperson of the Committee.

### III. Steam Task Force of the Tourist and Historic Working Group

During the July 24, 1996 meeting of the RSAC, FRA tasked it with recommending revisions to the regulations governing locomotive inspection standards for steam-powered locomotives (49 CFR part 230). The stated purpose of this task was to promote the safe operation of tourist and historic rail operations, including "such additions and deletions [to the regulations] as may be warranted by appropriate data and analysis." In its Task Statement (Task No. 96-5) to RSAC, the agency instructed it to refer this task to the pre-existing Tourist and Historic Railroads working group ("THWG" or "The Group"). The THWG is comprised of the following organizations:

Association of American Private Railcar Owners  
American Short Line Railroad Association  
Association of American Railroads (AAR)  
Association of Railway Museums  
Brotherhood of Locomotive Engineers  
FRA  
Tourist Railway Association Inc. (TRAIN)

The THWG voted during its April 1996 meeting to officially endorse the ESC (which had been examining the issues of steam locomotive inspection and maintenance standards outside of the RSAC arena) and have it serve as a task force reporting to the Group. The Steam Standards Task Force (task force) is comprised of representatives from the organizations listed below:

Valley Railroad Company  
Durango & Silverton Narrow Gauge  
Union Pacific Railroad (UP)  
Strasburg Railroad  
Hartford Steam Boiler Inspection & Insurance Company

NBBPVI  
ABB/Combustion Engineering  
Smithsonian Institution  
FRA.

The task force met approximately seven times over an eighteen month period to develop recommendations for a proposed rule. During these meetings, the task force considered a previous ESC proposal to revise part 230, which had been presented to FRA in the early 1990's. The issues in this proposal engendered much discussion and debate within the task force. Brief summaries of those discussions are recorded in the appropriate parts of the section-by-section analysis portion of this document. The technical details supporting certain of the recommendations that were discussed by the task force may be found in the public docket of this rulemaking. Those issues designated by FRA as "major issues" are more fully discussed below.

During an early meeting, the task force identified a number of objectives in revising part 230:

- (1) Harmonizing FRA and National Boiler Inspection Code terminology and standards;
- (2) Modernizing the rules to reflect current operating realities;
- (3) Eliminating any incentives, financial or otherwise, for operators not to follow the rules;
- (4) Encouraging the use of new technologies; and
- (5) Producing a more clearly written and understandable rule that is more enforceable.

These goals are reflected throughout this document and are embodied in the changes and additions made to part 230.

On September 19, 1997, the THWG informed FRA of the group members' unanimous agreement that the task force's proposed recommended rule text revisions to part 230 should be forwarded to the RSAC. On January 16, 1998, the task force and the THWG reached consensus that the proposed preamble should be included in the package presented to RSAC at the January 27, 1998 meeting. Following the presentation, the RSAC formulated a consensus recommendation for a proposed rulemaking which was forwarded to the Administrator of FRA.

### IV. The Proposed Rule

Pursuant to section 553 of the Administrative Procedure Act, FRA published a Notice of Proposed Rulemaking (NPRM) in the **Federal Register** on September 25, 1998, detailing the agency's intent to issue new regulations for steam locomotive inspection and maintenance. In the NPRM, FRA solicited written comments

from all interested parties and provided notice of its intention to conduct a public hearing on the proposed rulemaking only if so requested. A total of 20 commenters responded to the NPRM, including: The AAR; Association of Railway Museums, Inc.; John C. Boykin; Grand Canyon Railway; Locomotive and Tower Preservation Fund, LTD; Michigan State Trust Fund for Railway Preservation, Inc.; Minnesota Transportation Museum, Inc.; NBBPVI; North Star Rail; Ohio Central Railroad System; San Diego Railroad Museum; St. Louis Steam Train Association; Tennessee Valley Railroad; UP; United States Department of the Interior; and Wisconsin Railway Preservation Trust. Although FRA had originally believed that a public hearing would be unnecessary, a number of interested parties requested the opportunity to present their views at such a forum, and a public hearing was held in Corpus Christi, Texas on February 4, 1999. Seven organizations presented testimony at the public hearing. Those testifying included: Austin and Texas Central Railroad; Diversified Rail Services; Grand Canyon Railway; Ohio Central Railway System; Tennessee Valley Railroad; TRAIN; and UP.

Because of the number of substantive comments received during the notice and comment period and at the public hearing, the task force suggested and FRA agreed to meet to address the issues raised and to consider changes to the proposal for inclusion in the final rule. The meeting was held in Columbus, Ohio on March 11-12, 1999. Among the issues addressed at this meeting were: Implementation of the rule; Preemption of state oversight of steam locomotive operations; Waivers of requirements; Responsibility for compliance; Definitions of terms used; Movement of non-complying locomotives; Thirty-one (31) service day inspection requirements; Ninety-two (92) service day inspection requirements; Annual Inspection requirements; One thousand four hundred and seventy-two (1472) service day inspection requirements; Alteration and repair reports for steam locomotive boilers; Responsibility for general construction and safe working pressure; Maximum allowable stress on stays and braces; Tensile strength of shell plates; Maximum shearing strength of rivets; Higher shearing strength of rivets; Times and methods of inspection; Welded repairs and alterations; Hydrostatic testing of boilers; Broken staybolts; Times and methods of staybolt testing; The number and location of water

glasses and gauge cocks; When to require boiler washing; Inspection, repair and/or replacement of arch tubes, water bar tubes, circulators, and thermic siphons; Steam locomotive speed indicators; Testing main reservoirs; Time of cleaning; Stenciling dates of testing and cleaning; Fire doors and mechanical stokers; Required illumination; Throttles; The draw gear between the steam locomotive and tender; Main, side, and valve motion rods; The steam locomotive frame; Tender trucks; Feed water tanks; and Inspection requirements.

The discussion that follows examines in detail comments received, the task force's consideration of and response to those comments, and those changes (if any) FRA is making in the final rule as a result of the comments received. This discussion is organized by the relevant section of the rule.

In order to make the final rule clearer (and therefore easier to comply with) FRA explains here the rationale and the deliberative thought processes of the task force in reaching its conclusions. Unless otherwise noted, the agency agrees with the reasoning and explanations advanced by the task force for the revisions and amendments the task force recommended be made to the 1978 standards. The task force's deliberations were thorough and deliberative in nature, though frequently marked by spirited debate. Throughout this document, FRA has tried to recapture as much of that debate as is relevant and practical.

## **V. Reorganization of Part 230**

The 1978 standards were divided into two main parts—one for the steam locomotive boiler and its appurtenances, and the other for the steam locomotive and tender. As part of the revisions to part 230, the agency has restructured the rule so that it contain a “general” part, Subpart A, which includes those provisions that are applicable to the entirety of part 230; a boiler part, Subpart B, applicable to the boiler and its appurtenances; and a locomotive part, Subpart C, applicable to the steam locomotive and tender. Some of the concepts found in Subpart A of this rule were formerly contained in Subparts A and B of the 1978 standards. These revisions are designed to reduce and eliminate identified redundancies in the 1978 standards, thereby making the rule easier to read and comprehend.

## **VI. Major Issues**

### *A. Responsibility for Compliance*

In the NPRM, FRA struck the term “railroad company” throughout the body of the rule and replaced it with the term “locomotive owner and/or operator.” FRA has retained this term in the final rule, consistent with the task force's recommendations, to reflect the changes in steam locomotive operating practices. Very few railroad companies own and/or operate steam locomotives today. While some tourist railroads own and operate their own locomotives, most frequently steam locomotives are owned and/or operated by entities other than the railroad on whose line they operate. These entities range all the way from wealthy private enthusiasts to state historical agencies. Sometimes the owner of the equipment actually runs (operates) the steam railroad operation; in other cases, an individual or individuals are hired (or volunteer) to do so. This means that in many—if not most—instances, the locomotive owner and/or operator is in a much better position than the railroad company to ensure compliance with various regulatory requirements. In recognition of this reality, the task force recommended that the agency more specifically affix responsibility for compliance on those who are primarily responsible for the operation of the steam locomotive and tender. In most cases, that party will be the locomotive owner and/or operator. The task force members debated how to best express the liability standard—whether to use “owner and operator,” “owner/operator,” or “owner or operator.” They settled on the “owner and/or operator” construct as the clearest method for affixing joint and severable liability for the inspection and maintenance of steam locomotives on the owner and operator. In certain sections of the rule, however, the owner and the operator are individually identified as the appropriate party on whom liability would rest.

In addition, as provided by statute, this rule makes clear that a railroad may also be held liable for permitting any entity to use a noncomplying locomotive on its line (see section-by-section discussion of § 230.4, below). The adoption of the owner and/or operator language is a clear signal that FRA intends to look first to the owner and/or operator to ensure compliance, regardless of whether that happens to be the railroad on which the steam locomotive is operating. It is important to note that the applicability section, § 230.2, which the agency modified from that originally submitted by the

task force, uses the term “railroad” to denote where the rule applies. As explained in the section-by-section analysis of the applicability section, FRA is making this change to harmonize all of its applicability sections. Since this section is intended to explain where the rule applies, it does not affect the primary compliance responsibility, which remains with the owner and operator. Therefore, FRA believes that this change does not substantially change the task force's proposal to the agency.

### *B. Inspection Scheme*

In issuing this rule, FRA has revised the inspection scheme for steam locomotive boilers to reflect the changed nature of modern steam locomotive operations. The 1978 standards required steam locomotive boilers to be inspected at various time periods that were linked to an annual calendar, regardless of the amount of actual usage the locomotive has incurred. When locomotives were in continuous service, this system was not unduly burdensome. Operation of steam locomotives today, however, occurs much more infrequently, sometimes only a few times a year, greatly reducing the need for frequent inspections rigidly tied to the passage of calendar days. Under the new inspection scheme, required locomotive inspections are based on the number of “service days” a steam locomotive accrues, with various intermediate calendar inspection requirements retained to ensure an adequate level of safety.

#### **1. Service Days**

This new inspection scheme is underpinned by the concept of a “service day”—defined as “any day the locomotive has steam pressure above atmospheric pressure and a fire in the firebox.” Because good operating practice requires that a steam locomotive boiler be slowly heated before use and slowly cooled after use to avoid the damage rapid heating and cooling can inflict on the boiler, a locomotive that runs on weekends may accrue as many as three service days for each day of actual “use.” For example, a steam locomotive could have fire in the firebox and pressure above atmospheric pressure for an entire day before it actually runs, for the entire day that it runs, and while it cools down after it runs. Under this scenario, the locomotive would accrue three service days although only in actual “use” for one day. Some operators were concerned that adopting this service day concept could create an incentive for operators to “dump” their fires at the end of a day operating the steam

locomotive in order to avoid incurring an extra service day. The task force was of the opinion, however, that the financial cost (in terms of stress and damage to the locomotive boilers from such behavior) to operators who did so dump their fires would likely outweigh any inspection time period benefits they might gain from such dumping. The task force also expressed the belief that, with proper damping and draft restriction, fire can be removed from the firebox (and a service day preserved) with no adverse affects for the boiler, and that this practice can, in fact, be easier on the boiler than banking the fire.

## 2. Daily Inspection

The new "daily inspection" section sets forth the daily inspection requirements for steam locomotive owners and/or operators. The only daily inspection requirement in the 1978 standards was that the steam locomotive and tender be inspected "after each trip, or day's work." The new section retains the general daily inspection requirement for each day that a steam locomotive is "offered for use," but adds a number of additional specific "pre-departure" inspection requirements that must be complied with at the beginning of each day the locomotive is used. This "pre-departure" inspection regime emphasizes the need to examine certain safety critical items such as the water glasses and gauge cocks, the boiler feedwater delivery systems, the air compressors and governors, and the air brake system on a daily basis.

## 3. 31 and 92 Service Day Inspections

This rule also establishes 31 and 92 service day inspection requirements. These are roughly comparable to the monthly and trimonthly inspections in the 1978 standards.

## 4. Annual Inspections

In addition, this rule establishes annual inspection requirements similar to the 1978 standards: requiring that a steam locomotive be inspected after 368 calendar days have elapsed since the time of the prior annual inspection. The 1978 standards required that certain items be inspected at least "once every 12 months." The revised annual inspection, as do all the other periodic inspections, incorporates the inspection requirements of those inspections required to be conducted more frequently. Thus, locomotives that are not operated often enough to accrue either 31 or 92 service days in a 368 day period will have those inspections conducted, at a minimum, once every 368 calendar days. In addition, this rule extends the inspection time period for

flexible staybolts and caps from once each 2 years under the 1978 standards to during each 5th annual inspection.

## 5. 1472 Service Day Inspection

Finally, the 1978 standards required that a steam locomotive boiler be inspected, at a minimum, once each 5 calendar years (boiler interior to be inspected after 48 calendar months, within 5 consecutive years; and the boiler exterior to be inspected every 5 years, or, if the locomotive is out of service for at least one full month during that time, after 60 calendar months within 6 consecutive years). This inspection was a major one, requiring the removal of the jacket and lagging to conduct the exterior inspection, and the removal of all flues in the locomotive boiler to conduct a "minute" inspection of the interior of the boiler. FRA is amending this provision by requiring that these inspections be conducted when the locomotive has accrued 1472 service days or when a period not to exceed 15 years has elapsed since the last 1472 service day inspection was performed. These revisions are being made in order to take into account the amount of actual usage a steam locomotive receives. The 15 year maximum, beyond which time a 1472 service day inspection must be conducted, is based on the task force's recommendations.

FRA is requiring the completion, verification and updating of the locomotive's FRA Form No. 4, the "specification card" required by § 230.54 of the 1978 standards, as part of the 1472 service day inspection. The updated FRA Form No. 4 must be filed within 1 month after the completion of the 1472 service day inspection. The agency is making clear that the verification and updating of this form as necessary to reflect the current condition of the boiler is required as part of every 1472 service day inspection. This recordkeeping requirement is not actually new, it merely clarifies and makes express what the 1978 standards required. Although the 1978 standards did not expressly require periodic surveying to verify the accuracy of the current form or the updating of any changes thereto, the need to do so was implicit in the requirement of a signed testimonial that all information provided on the form was true and accurate. In addition, the 1978 standards actually required that the FRA Form No. 4 be updated to reflect boiler repairs or changes that might affect the FRA Form No. 4 data. However, because some locomotive owners and/or operators may not understand that the 1978 standards

required that the FRA Form No. 4 be kept up-to-date and accurate, this change in language may be perceived by some as imposing new recordkeeping requirements.

FRA has also determined that safety concerns dictate that there be a competency requirement for the person or persons conducting a 1472 service day inspection and for the person or persons surveying the boiler for the purpose of recalculating a FRA Form No. 4. Accordingly, this rule specifically provides that only competent individuals may perform 1472 service day inspections and/or surveys of locomotive boilers in order to evaluate the accuracy of information on the locomotives' current FRA Form No. 4s.

## 6. FRA Inspection Oversight

Concerned that an adequate level of safety be maintained in light of the extended inspection intervals allowed under this rule, the task force recommended that FRA increase the amount of oversight it exercises over steam locomotive inspections. FRA shares the task force's concerns and is, therefore, requiring that the agency be afforded the opportunity to be present during certain periodic steam locomotive inspections. In the case of the 31 service day inspection, FRA will be responsible for communicating to the steam locomotive owner and/or operator that the agency wants to be notified prior to the inspection and given an opportunity to attend. Upon notification, the steam locomotive owner and/or operator must provide FRA with the anticipated date and location for the inspection. Once that information is conveyed to the agency, any subsequent change in the inspection schedule must be mutually agreed upon. FRA believes this approach balances competing interests and comports with the task force recommendations. In formulating their recommendation, the task force members sought to provide steam locomotive owners and/or operators with the flexibility to conduct their business without unreasonable interference by FRA scheduling demands while also insuring that the owners and/or operators would act in good faith and take all reasonable measures to accommodate FRA requests to be present at periodic locomotive inspections.

In the case of the annual inspection, the steam locomotive owner and/or operator is required to provide FRA with one month's prior notice that the annual inspection is to be conducted. The agency then has the option of notifying the owner and/or operator of its desire to be present for the

inspection. At that point, the steam locomotive owner and/or operator must provide FRA with a scheduled date and location for each aspect of the inspection. As with the 31 service day inspection, once the annual inspection is scheduled, any changes to that schedule have to be mutually agreed upon.

This notification scheme is designed to allow the agency the opportunity to observe the steam locomotive owner and/or operator performing the various required inspections and to allow the FRA field personnel directly responsible for inspecting steam locomotive operations to work cooperatively with the regulated community. Being able to observe the inspections firsthand also provides FRA with more accurate and up-to-date information on the condition of the steam locomotive fleet operating today.

#### *C. Elimination of the Special Waiver Process*

As part of this rule, FRA has eliminated all the special waivers that were available under part 230. The 1978 standards contained a section that allowed for the "modification of rules" for "roads operating less than 5 locomotives" upon a showing that conditions warrant it. This language, which predated the agency's formal waiver process (codified at 49 CFR 211.41), was originally intended to apply only to the subpart addressing the steam locomotive and tender. In addition, the flue removal section in the 1978 standards provided for the granting of extensions of the time period for removing flues and for conducting the comprehensive boiler inspection, upon formal application to the ICC's Director of Railroad Safety. One consequence of this waiver process, which was administered locally by the agency's eight regions, was that locomotive owners and/or operators were able to delay the conduct of the boiler inspection by varying amounts of time based, in part, on the regional procedures for addressing these requests. These waivers will now expire unless submitted to FRA for reevaluation prior to the effective date of this rule. By eliminating the waiver provision in part 230, the agency has accomplished several things: (1) Provided notice to the regulated community that the agency's part 211 waiver process is the appropriate vehicle for gaining relief from the requirements of this part; (2) gained assurance that FRA will have knowledge of and the ability to coordinate on a uniform, nationwide basis the consideration and granting of

all steam locomotive waivers applied for; and (3) ensured that steam locomotives are regulated consistently. The task force and FRA also believe that, although the extensions and waivers previously granted under this part will generally no longer be necessary given the flexibility being afforded by the proposed new inspection scheme, when an owner and/or operator believes such a waiver is necessary, such requests are best addressed by the centralized waiver process provided for in part 211.

#### *D. Standard for Repairs*

The agency is establishing standards for making certain repairs to the steam locomotive and boiler. The task force was concerned about controlling the quality of the repairs made to steam locomotives and boilers and decided to impose, as a minimum, the requirement that repairs be made in accordance with an "accepted industry standard." The task force considered simply requiring that repairs be made in accordance with the National Board Inspection Code (NBIC) published by the NBBPVI or in conformance with the standards established by the American Petroleum Institute (API). However, the task force finally decided to recommend that the agency allow steam locomotive owners and operators to perform repairs in accordance with established railroad practices that have been successfully utilized over time, thereby affording industry members a measure of flexibility. This proposal reflects that decision. While there was some concern about whether the term "accepted" was too vague, the task force felt that the industry members would know what was required to ensure that repairs are properly made. Due to the small size and cohesiveness of the steam locomotive community, the task force felt that imposing an "accepted industry standard" on repairs made, and allowing that standard to include "established railroad practices, or NBIC or API established standards" would result in an acceptable level of quality in the repairs made. Section 230.29 of the final rule reflects the task force's recommendations. Finally, as used in this proposal, "established railroad practices" means those practices used by one or more railroads over a period of time that can be reasonably shown to have been successful in service, or that most industry members would agree is an appropriate standard to use for a given repair. In practice, the locomotive owner and/or operator will be responsible for proving that the standard is established within the railroad community and that it is

appropriate for the repair under consideration.

For the first time, FRA is expressly allowing welding on both stayed and unstayed portions of the boiler, with some limitations. While the 1978 standards did not prohibit welding on unstayed portions of the boiler, it was widely understood that such welding was not allowed. Therefore, expressly allowing welding on unstayed portions of the boiler is a fairly radical change from the existing standards. Under § 230.33 of this final rule, "Welded Repairs and Alterations," FRA is requiring prior approval for any welding done on unstayed portions of high carbon boilers (greater than 0.25 percent carbon). FRA believes prior approval is necessary since the risk of welding on the boiler is much higher for boilers with a high carbon content. Welds on unstayed portions of lower carbon boilers (less than 0.25 percent carbon) are not so restricted. For both low and high carbon boilers, however, FRA is imposing a repair standard that allows the locomotive owner and/or operator a measure of flexibility while simultaneously insuring an adequate minimum level of safety. Accordingly, the agency is requiring that any welded repairs to unstayed portions of the boiler be performed in "accordance with an accepted national standard for boiler repairs." This modifies the general repair standard discussed above to more narrowly apply to boiler repairs.

By referencing an accepted national standard for boiler repairs, the task force and the agency sought to impose a measure of quality control that would provide assurance that all welding is performed properly. Because there are several national organizations that prescribe such procedures, the operator will be allowed to follow any one of a number of recognized methods. "In accordance with an accepted national standard for boiler repairs," therefore, means that all the physical, mechanical, and documentation requirements delineated in a particular standard such as the NBIC have been satisfied. The task force considered recommending that FRA simply adopt the NBIC standard but decided that the financial burden imposed on owners and/or operators would be too great. The NBIC program requires reporting of the final repair and third-party oversight throughout the repair, which can be very costly. Accordingly, the task force decided to simply reference the standard to which the repair should be done, without imposing the reporting or third-party inspection requirements of the standard. FRA agrees with and has adopted the task force's position.

The task force was also very concerned about follow-up radiography for the welds conducted, and at one point considered recommending that all welds on unstayed portions of the boiler be radiographed. The task force also considered incorporating an American Society of Mechanical Engineers (ASME) radiography standard (which includes procedures for conducting radiography of welds), but eventually decided that so doing would make this part too complicated. The task force felt that doing so was unnecessary because all "accepted national standards" include radiography where necessary. Accordingly, the final rule mandates only that any radiography required under the accepted national standard chosen for the welded repair at issue be so performed.

The task force discussed the potential for abuse of the "accepted national standard for boiler repairs" standard but felt that the risk of such abuse was low. This belief is based upon the clear requirement in this section that locomotive owners and/or operators be able to establish through documentation compliance with such a national standard, *i.e.*, point to the procedures they followed in performing a particular weld. The locomotive owner and/or operator will bear the burden of proving to FRA that they correctly followed a particular, relevant national standard. Accordingly, this section simply requires that the locomotive owner and/or operator adhere to whatever the particular national standard followed dictates—from pre-weld treatments and welder qualifications through post-weld inspection requirements. The locomotive owner and/or operator will be required to make a showing that they satisfied the accepted national standard upon request by an FRA inspector.

#### *E. Allowances Encouraging the Use of New Technologies*

The task force felt strongly that the 1978 standards, which had not been substantively revised in over 20 years, did not adequately address the new technologies which have developed during that time. Accordingly, the task force believed this rule should address recent innovations in inspection and maintenance methodology and technology. The task force was also concerned that compliance with the 1978 standards may have resulted in excessive wear of steam locomotives, locomotive boilers, and locomotive appurtenances. In addition, the task force felt that the changed nature of steam locomotive operations today provided additional justification for updating the rule to reflect modern

operating circumstances and for encouraging the use of non-destructive technologies to satisfy various inspection requirements. Accordingly, in many sections of this rule, FRA is encouraging the use of advanced technologies by granting additional regulatory flexibility where such technologies are utilized. In some cases, however, the task force recommended, and the proposal incorporates, mandatory non-destructive examination (NDE) testing for safety reasons. The main sections so affected are: (1) The flue removal section, 230.31; (2) the Arch tube, water bar tube and circulator section, 230.61; (3) the dry pipe section, 230.62; (4) the main reservoir testing section, 230.72; and (5) the draw gear and draft system section, 230.92.

#### *F. Imposition of Qualification Requirements for Repair*

By referencing national standards, this rule addresses, for the first time, the issue of qualification requirements for individuals making repairs to steam locomotives. The NTSB and the task force both felt strongly that the rule should establish minimum competency requirements for individuals making certain safety critical repairs. Thus, wherever the relevant national standards include qualification requirements, steam locomotive owners and/or operators making such repairs will have to comply with these requirements. The task force considered imposing more explicit qualification requirements than those imputed from these national standards but concluded that doing so was not necessary at this time. FRA agrees with the task force's position, and, therefore, is not mandating more explicit qualification requirements.

#### *G. Implementation Schedule*

This rule provides for a gradual phase-in of part 230 in order to provide locomotive owners and operators the flexibility necessary to bring their operations into compliance (see section 230.3 for a full discussion of the implementation schedule). Some requirements must be complied with no later than one year after the effective date for the final rule. In addition, FRA is allowing locomotive owners and/or operators two years after the effective date for the final rule in which to request flue removal extensions. Finally, locomotive owners and/or operators that qualify to file a Petition for Special Consideration will be required to do so within one year of the effective date of the final rule, and the agency will have one year from the date of filing to

consider and respond to any such petitions.

#### **VII. NTSB Recommendations**

Following their investigation of the 1995 steam boiler explosion on the Gettysburg Passenger Services railroad, the NTSB issued the following recommendations to the agency:

(1) Require that each operating steam locomotive have either a water column or a water glass in addition to the water glass and three gage cocks that are already required. (R-96-53).

(2) Require steam locomotive operators to have a documented water-treatment program. (R-96-54).

(3) Describe basic responsibilities and procedures for functions required by regulation, such as blowing down the water glass and washing the boiler. (R-96-55).

(4) In cooperation with the TRAIN, promote awareness of and compliance with the Hours of Service Act. (R-96-56).

(5) In cooperation with the NBBPVI and the TRAIN, explore feasibility of requiring a progressive crown stay feature in steam locomotives. (R-96-57).

(6) In cooperation with the NBBPVI and the TRAIN develop certification criteria and require that steam-locomotive operators and maintenance personnel be periodically certified to operate and/or maintain a steam locomotive. (R-96-58).

(7) In cooperation with the NBBPVI and the TRAIN, update 49 CFR part 230 to take advantage of accepted practical modern boiler-inspection techniques and technologies, to minimize interpretation based on empirical experience, and to maximize the use of objective standards. (R-96-59).

This rule reflects the careful consideration of these recommendations, both by FRA and the task force who, through the full RSAC, advised the Administrator regarding revisions to this part. That advisory committee task force was comprised of steam locomotive experts, steam railroad operators, steam boiler insurance companies, the National Boiler Inspection Code Committee, representatives from the Volpe National Transportation Systems Center (Volpe Center) and several representatives from FRA. Representatives of NTSB were offered a seat at the table but declined. FRA requested that the task force address the NTSB's recommendations and suggest appropriate responses. In response to FRA's request, the advisory committee task force recommended, and FRA has adopted, the following steps: R-96-53 Water Glasses—Based on task force support for this

recommendation and FRA concurrence, section 230.51 of this rule establishes a minimum requirement of two sight glasses or a sight glass and a water column on each operating steam locomotive.

R-96-54 **Water Treatment**—Industry members of the task force did not express support for NTSB's proposed water treatment requirement because they felt that the current regulatory focus on boiler washing was adequate to address the condition of the boiler interior, and to prevent the build up of sediment and mineral deposits. The task force also felt that water treatment programs could be unduly burdensome, especially for steam locomotives with a single water source that requires constant testing due to water quality variations, or where locomotives travel long distances and draw water from numerous sources. Finally, the industry members felt that the issue of water treatment should be addressed in a performance standard, but they indicated that it would be impossible to write a uniform performance standard. FRA agrees that the fundamental issue is the interior condition of the boiler and that the task force recommendations and FRA inspection practices adequately address the condition of the boiler interior.

R-96-55 **Delineation of Responsibilities**—The task force expressed support for this recommendation, and this rule clearly describes basic responsibilities and procedures. In addition, the Volpe Center has produced a training video for steam-locomotive operators for FRA. The video covers procedures required during daily inspections and pre-trip inspections in order to ensure the safe operation of a steam locomotive. This video was unveiled during TRAIN's annual convention in November of 1997, and was mailed to steam locomotive owners and operators throughout the country shortly thereafter. Finally, the industry members of the task force endorsed putting together a "Recommended Practice Manual" (RPM) for many issues that this proposal does not address. FRA will continue to work with the industry on the development of a RPM.

R-96-56 **Hours of Service Act Awareness**—The industry members indicated their support for the proposal that FRA working in tandem with the TRAIN to promote awareness of the Hours of Service Act. Although issues of compliance with the Hours of Service Act are beyond the scope

of this rule, FRA does wish to state that it will work with TRAIN to increase awareness of Hours of Service Act requirements, and to promote compliance with the Act.

R-96-57 **Progressive Crown Stays**—The industry representatives indicated their willingness to explore the feasibility of progressive crown-stays, but because of time constraints were not able to address this issue in the part 230 revisions. FRA has requested that the NTSB make staff assistance available to the task force to outline the steps necessary to conduct this evaluation.

R-96-58 **Certification Program**—The industry representatives expressed support for this recommendation and are investigating the feasibility of developing certification criteria for several classes of employees or volunteers affected. Some members, however, expressed concern about the cost involved in assessing job and task requirements. FRA's preference is a voluntary certification program. While the current standards for Qualification and Certification of Locomotive Engineers contain training requirements that may serve as a framework for better defining the competencies of steam locomotive operators, at present, those regulations only apply to railroads that operate locomotives on standard gage track that is part of the general system of rail transportation. Administering a technically elaborate certification program that would ultimately affect the operation of less than 175 locomotives does not appear to be a wise use of scarce federal resources. FRA encourages the Tourist & Historic Working Group to carry forward this discussion, with the objectives of (1) supporting private initiatives and; (2) offering technical support for sound training programs (including the evaluation of current competencies).

R-96-59 **Modernization of part 230**—Industry members expressed support for this recommendation and acted in partnership with FRA through the task force to accomplish it. FRA submitted responses to the NTSB's recommendations. The NTSB was satisfied with the agency's plan, influenced by the task force recommendations, to address NTSB recommendations R-96-53, R-96-55, R-96-56, and R-96-59 but was, however, dissatisfied with our plan to address recommendations R-96-54, R-96-57, and R-96-58. These three latter recommendations will be discussed at greater length below. FRA concurs with the task force's

responses to NTSB's recommendations and believes that the proposed revisions to the steam locomotive regulations will address most of those recommendations. The agency invited NTSB staff to participate in the task force deliberations, but they were unable to do so. FRA believes that a full technical exchange of views would have been helpful to resolving the remaining recommendations.

NTSB's recommendation R-96-54 would require operators to maintain a documented water treatment program. The task force simply disagreed that such a program was necessary. They felt that the boiler washes were the real issue, not the chemical remediation of the owner or operator's water source. The NTSB, in its response, concurred with the task force that the wash is "probably more directly effective in controlling boiler sediment and mineral deposits." However, the NTSB added, "a documented water treatment program does not have to be expensive, rigid or burdensome." While FRA lacks the data to evaluate the cost-effectiveness of any such program, it doesn't feel such an inquiry is necessary since all parties agree that a boiler wash is the most "directly effective" method of preventing boiler sediment and mineral deposits. Based on discussions in the task force and field experience concerning steam boiler maintenance, it is the agency's judgement that safety would not have been enhanced by incorporating this additional requirement into the rule. Operators are always free to voluntarily conduct their own water treatment programs (and many do). Given the effectiveness of the boiler wash, it does not appear to be cost-beneficial to mandate documented water treatment programs at this time. FRA is also concerned about the paperwork burdens associated with such a program. Federal agencies are mandated to reduce information collection burdens, and regulatory burdens on small entities are to be minimized. However, FRA remains willing to consider specific data and analysis submitted in support of this recommendation.

NTSB's recommendation R-96-57, if adopted, would have required the agency to explore the feasibility of progressive crown-stays in mitigating the damage caused by boiler failures. The task force's experience with progressive crown stays was not sufficient to support such a mandate at this time. The agency, after consultation with the task force, conveyed to the NTSB its willingness to explore this



issue fully at some later date, based on its belief that it lacked time and resources to adequately address this issue at this time. The NTSB found this response unacceptable. FRA told the NTSB it would appreciate the Board's making available staff assistance to the task force to help outline the steps necessary to conduct this evaluation, but no such assistance was forthcoming. The agency remains open to this issue but believes that more research is necessary before it can conclude, one way or another, that progressive crown stays are a cost-beneficial safety enhancement. In the NPRM, the agency requested that any party with data or analysis related to progressive crown stays, and their role in mitigating boiler failures, submit it to the agency for consideration: no such information was received.

Finally, NTSB recommendation R-96-58 would require the agency to develop a certification program for steam locomotive operators and maintenance personnel. After due consideration, FRA has decided in favor of a voluntary certification program. Given the small number of affected entities and the scarcity of federal resources available to administer a technically elaborate certification program, the agency believes a mandatory certification program is unnecessary at this time. The task force, in association with the Volpe Center, has already created and produced a training video for the conduct of steam locomotive daily inspections. This video was aired during the TRAIN convention held in November of 1997, and was subsequently mailed to each steam locomotive owner or operator for whom the agency had user fee records. This was but a first step in response to the NTSB's recommendation. The agency will continue to work with the regulated community to carry forward this discussion and, as such, supports those private initiatives offering technical support for training programs, including the evaluation of current competencies of steam locomotive operators and maintenance personnel. In the NPRM, FRA requested that any party supporting the NTSB's recommendation submit data and analysis indicating the need for a more prescriptive approach: again, no such information was received.

#### Comments and Responses

The discussion that follows examines in detail comments received, the task force's consideration of and response to those comments, and those changes (if any) FRA is making in the final rule as a result of the comments received.

#### Section 230.3 Implementation

The provisions of this section generated a number of comments and counter-proposals from interested parties. In the NPRM, FRA proposed a staggered implementation schedule for placing the new rule into effect. Under this schedule, locomotive owners and/or operators would be required to perform a 1472 service day inspection meeting the requirements of § 230.17 at that time when the locomotive flues would have had to be removed under § 230.10 of the 1978 revisions. Subsection (c)-(d) of the proposal provided for a 3-year period during which a steam locomotive owner and/or operator would be allowed to file a petition for special consideration of boiler inspections performed in accordance with § 230.17 within the 3-year period prior to the final rule's publication. Several commenters expressed concern about when steam locomotive owners and/or operators would be required to perform 1472 service day inspections under the new rule. Grand Canyon Railway commented that any locomotive in full compliance with § 230.17 of the proposed rule should have any flue time remaining under § 230.10 incorporated into the time allowed before having to perform a 1472 service day inspection. Grand Canyon Railway also stated that the 1472 service day period is a valid service time for steam locomotive boiler flues and should be applied to all steam locomotives with original flue time remaining within a 5-year maximum period. Minnesota Transportation Museum, Inc. commented that this section should allow a steam locomotive with existing flue time under § 230.10 of the 1978 revision to incorporate that flue time under the new 1472 service day period. North Star Rail commented that the implementation section, as proposed, would have its greatest impact on the newest, largest, least operated steam locomotives. North Star Rail also commented that if the new regulations are to be based on service days, then incorporation of properly documented locomotives meeting all aspects of the new regulations should also be based on actual documented service days. Wisconsin Railway Preservation Trust commented that the proposed 1472 service day inspection requirement needs to be changed to take into account the economic circumstances of the regulated community and the potential inequities of the rule as presently written. A number of the comments received addressed the issue of when the 3-year period for special consideration should

run from. The Association of Railway Museums, Inc. stated that the period of eligibility for filing a petition for "special consideration" should begin 1/27/96. Grand Canyon Railway commented that the 3-year period is arbitrary and should be revised to take into account the actual date of publication of the final rule. Michigan State Trust for Railway Preservation, Inc. expressed its belief that the period for special consideration should be increased to 4 years or more depending upon the date of publication of the final rule. Minnesota Transportation Museum, Inc. observed that the 3 year period for consideration was arbitrary. NBBPVI, Ohio Central Railroad, Tennessee Valley Railroad, and UP all commented that the final rule needs to take into account delays in getting the rule published. NBBPVI suggested that January 1, 1999 was a reasonable date for implementation of the 3 year period for special consideration. San Diego Railroad Museum commented that the time period in which to file a petition for special consideration should be increased to 4 or 5 years, or alternatively, start 3 years prior to the date of publication of the proposed rule.

At the Columbus, Ohio meeting, several members of the task force also expressed concern about the issue of when the time for filing special petitions for consideration would begin. It was suggested that the date of publication of the NPRM was the most equitable time to relate back from since that could be considered as the date that the regulated community first had constructive knowledge of FRA's intentions. The task force was agreeable to that proposal, reaching consensus on a recommendation to FRA that the period for filing special petitions for consideration extend back 3 years from the date of publication of the NPRM. FRA, after due consideration of the comments received and the task forces recommendations, has decided to adopt the date of publication of the Notice of Proposed Rulemaking as the date the 3 year period for special consideration will relate back from. This means that any locomotive owner and/or operator whose locomotive was fully or partially in compliance with § 230.17 (1472 service day inspection requirements) between September 25, 1995 and September 25, 1998 may petition FRA for special consideration.

#### Section 230.5 Preemptive Effect

This section of the NPRM, addressing the preemptive effect of the proposed rule, generated a large number of comments concerning state regulation of and/or enforcement of state boiler codes



against steam locomotive owners and/or operators. Many of the comments received took exception to FRA's stated intention of allowing state inspection and regulation of steam locomotives operations in those areas where FRA chooses not to exercise jurisdiction. A number of commenters took issue with the statement in this section that this part comes under 49 U.S.C. 20106's exception from preemption of an additional or more stringent State law, regulation, or order that is necessary to eliminate or reduce an essentially local safety hazard; is not incompatible with a law, regulation, or order of the United States Government; and does not unreasonably burden interstate commerce.

UP submitted comments which were supported in whole by the AAR. In its comments, UP stated that § 230.6 of the proposed rule takes too narrow a view of preemption, drawing on the Federal Railroad Safety Act (FRSA), but failing to take into account the total preemptive effect of the Locomotive Boiler Inspection Act (LBIA) and the Federal Safety Appliance Act (FSAA). UP also noted that neither the 1970 passage of the FRSA nor the 1994 recodification of the federal railroad safety laws changed the preemptive effect of the LBIA or the FSAA. The AAR observed that it is well settled that the federal railroad safety laws and regulations governing locomotive parts and appurtenances and safety appliances preempt the field and foreclose any state regulation thereof.

Several commenters expressed concern over having to comply with State standards. The Austin and Texas Central Railroad expressed concern that this section, as written, would allow states to hold steam locomotive owners and/or operators to different and possibly conflicting standards. Diversified Rail Services commented that allowing state regulation could impose unreasonable financial burdens and result in locomotive owners and/or operators having to comply with conflicting state and federal standards. Grand Canyon Railway opined that allowing the States to regulate steam locomotives was undesirable, would be disruptive to operations and severely burdensome on steam locomotive owners and/or operators forced to comply with conflicting, inconsistent state and federal regulations. The Michigan State Trust for Railway Preservation, Inc. commented that state regulation of standard gauge steam locomotives would impede interstate travel by steam locomotives. The Michigan State Trust also stated that the preemption language which tracked that of the Federal Railroad Safety Act

should be deleted. The NBBPVI was concerned that, under the proposed rule, states and local authorities could apply more stringent rules, thereby conflicting with the goal of establishing national steam locomotive standards. North Star Rail stated that the wording of the preemption section should be consistent with the language of other rules such as the Track Standards Rule. Ohio Central Railroad System's comment was that the preemption language as proposed should be stricken since there is no need to involve other authorities. St. Louis Steam Train Association commented that having to follow more than one set of rules and regulations invites misinterpretation and confusion over which rules apply. Tennessee Valley Railroad observed that it has had firsthand experience dealing with state boiler inspectors. Tennessee Valley Railroad further noted that in its experience, the state boiler inspectors had applied the state boiler code provisions—with methodology and inspection methods designed for stationary boilers—to steam locomotives, resulting in steam locomotive owners and/or operators being required to make repairs which were in conflict with FRA's repair requirements. The TRAIN organization commented that it was concerned that the preemption language in the proposed rule would allow the states to come in and create problems for tourist railroad owners and/or operators.

Although the preemption issue was discussed, the task force decided not to issue any recommendation, believing that preemption is a purely legal issue involving the interplay of state and federal law: an area in which the task force has no particular expertise. FRA recognizes the concerns raised by the commenters and acknowledges that the LBIA has been consistently interpreted for over 70 years as totally preempting the field of locomotive safety, extending to the design, the construction, and the material of every part of the locomotive and tender and all appurtenances thereof.

The proposed rule cited the standard for preemption under the former FRSA (now codified at 49 U.S.C. 20106). That standard allows additional or more stringent State regulations, under certain limited conditions, even where FRA has issued a rule or order covering a subject matter. By contrast, the LBIA (which has no preemption provision) has been held to preempt the entire field of locomotive safety. See *Napier v. Atlantic Coast R.R.*, 272 U.S. 605 (1926).

This rule is issued under the authority of both § 20103 (the former FRSA regulatory provision) and §§ 20701–

20703. While the preemption provision § 20103 would ordinarily set the standard for preemption of a rule issued under § 20701, the broader field preemption provided by the LBIA (as interpreted by the courts) seems the more appropriate standard to apply in light of this rule's subject matter. Field preemption is not dependent upon agency action; it is statutory in nature.

However, any preemption issue is fundamentally a question of legislative intent. *Schneidewind v. ANR Pipeline Co.*, 485 U.S. 293, 299 (1988). Executive Order 13132 on Federalism instructs Federal agencies to construe statutes as preemptive only where there is an express preemption provision or clear evidence that Congress intended to preempt. FRA is not aware of any indication that, in enacting the LBIA, Congress intended to preempt State regulation of rail operations over which FRA (or its predecessor, the ICC) had never exercised jurisdiction. Insular tourist railroads are a type of rail operation that includes theme parks, narrow gage lines, railroad museums, and amusement park operations. FRA has not exercised jurisdiction over these operations and has no present intention of doing so in the future (as made clear in the revisions to part 209 as amended by Appendix A to this final rule). When first enacted, the LBIA applied only to "common carriers engaged in interstate commerce by rail." *Napier v. Atlantic Coast R.R.*, 272 U.S. 605 (1926). As amended by the Rail Safety Improvement Act of 1988 (Pub. L. No. 100–342), the LBIA now applies to railroads as defined in 49 U.S.C. 20102. The stated intent of that amendment was to make the LBIA applicable to any railroad covered by the FRSA. However, there is no indication that, in broadening the reach of the LBIA, Congress intended to broaden the LBIA's field preemption beyond the railroad operations covered by the LBIA before 1988. The early cases finding preemption of the locomotive safety field (e.g., *Napier*), precede the 1988 amendments, and there is no record of any subsequent case applying field preemption to a railroad that would not have been covered by the LBIA before the 1988 amendments.

Even if, in 1988, Congress did intend to extend field preemption beyond common carriers engaged in interstate commerce, it is highly unlikely that it intended that preemption to extend beyond the universe of railroads over which FRA exercises jurisdiction. Presumably, Congress would have been quite explicit about preempting state action where Federal law has never been exercised.

Moreover, whether FRA could exercise safety jurisdiction over insular tourist railroads is an open question. While FRA has left open the possibility that it could someday assert such jurisdiction, the agency believes that a reasonable argument can be made that insular theme parks and amusement rides are not "railroads" within the meaning of 49 U.S.C. 20102, despite the breadth of that provision. Accordingly, it seems impossible to conclude, in the absence of clearly stated legislative intent, that Congress intended to preclude state regulation of operations where FRA has not exercised jurisdiction and where the very existence of that jurisdiction is open to debate.

Therefore, while FRA has stated in the rule text the general rule of field preemption in the area of locomotive safety, it has also stated its belief that Congress did not intend such preemption to apply to insular tourist railroads over which FRA has not exercised jurisdiction. This will not result in conflict with State rules and regulations because it allows for State regulation only with regard to those operations not covered by this rule.

#### *Section 230.6 Waivers*

In the NPRM, FRA proposed nullifying all waivers granted under part 230 of the 1978 revisions that are not filed for reassessment by the agency. Waivers so filed would be reviewed by FRA which would then notify the applicants whether their waivers were to be continued. Grand Canyon Railway and North Star Rail each submitted comments urging FRA to establish a position at the national level charged with the oversight of steam locomotive regulation to include addressing petitions, granting waivers, and receiving notifications of repairs performed. In considering the comments submitted, several task force members noted that since FRA would be enforcing the steam locomotive regulations on a national basis, there should be no issue of inconsistent or conflicting application of the rules. Although the task force felt that there was no need for FRA to establish an office of "national steam inspector", no recommendation was issued because the task force members felt this issue was primarily a matter of internal agency policy. After review of the comments received and the task force's discussion of this issue, FRA has decided that there is no need for the agency to create an office at the national level to consider petitions, waiver requests, and repair requests and notifications. FRA believes that the present system, whereby each

FRA Regional Administrator oversees the compliance of steam locomotives operating in his or her region with federal requirements, and all requests for waivers of compliance with the regulations are filed centrally with FRA in Washington DC, has resulted in uniform, consistent regulation of steam locomotive operations.

#### *Section 230.7 Responsibility for Compliance*

In § 230.8 in the NPRM, FRA is holding the locomotive owner and/or operator directly and primarily responsible for ensuring that all requirements of part 230 are complied with. Diversified Rail Services commented that contractors should also be held responsible under this section. Grand Canyon Railway commented that, in addition to owners, operators, and railroads, contractors should be held responsible for work they perform covered by this regulation. St. Louis Steam Train Association commented that responsibility should extend to the steam locomotive owner and/or compensated consultants and contractors. After a discussion in which it was pointed out that the rule as written requires that any person or persons performing covered work act in compliance with part 230, the task force reached consensus, recommending that this section be left as written in the NPRM. It was also noted that the definition of "person" in § 230.9 expressly includes contractors and their employees.

#### *Section 230.8 Definitions*

In § 230.9 in the NPRM, FRA proposed to add or amend 25 definitions. A number of these proposed definitions produced comments from interested parties.

**FIRE:** The NPRM did not provide a definition for the term "fire" and Tennessee Valley Railroad commented that "fire" should be defined so as to eliminate any ambiguity and to help determine what a "service day" is.

Although initially there was disagreement over the need to define the term "fire," the task force did finally agree that the term should be defined since it is used in the definition of "service day" which is one of the central underpinnings of the new rule. The task force reached consensus on a proposal to define "fire" as "anything that produces products of combustion that heat transferring components are exposed to." FRA agrees with this recommendation and has included the definition of "fire" in the final rule.

FRA believes the inclusion of a definition of "fire" will help to clarify

what a "service day" is. It is important that the definition of "service day" be unambiguous, which in turn necessitates that there be no uncertainty over what is a "fire" since the periodic inspection requirements in the final rule are predicated upon accrual of service days, the definition of which refers to those days where there is "fire" in the locomotive firebox.

**Heavy Repairs.** Although § 230.106(a) of the NPRM mentions "heavy repairs," the term is not defined anywhere in the rule. Grand Canyon Railway commented that the term "heavy repairs" was mentioned in the NPRM and, therefore, should be defined.

The task force was in agreement that there was no need to define "heavy repairs" since the term was only used once in the text of the rule. The consensus was to recommend that the language of § 230.106 be changed, substituting "as often as needed" for "each time the steam locomotive is in shop for heavy repairs."

Upon consideration of the comments and the task force recommendation, FRA has decided to strike the words "heavy repairs" from the final rule. The agency has done so, in the belief that requiring that locomotive frames be cleaned "as needed" is more consistent with the "safe and suitable for service" requirement used in the inspection criteria adopted in the final rule.

**Operator/Owner.** The NPRM defined Locomotive Operator so as to distinguish between locomotive operators and locomotive owners. Grand Canyon Railway commented that the definition of "operator" needs to be written so that the lines of accountability and responsibility are clearly delineated. Grand Canyon expressed concern over the growing incidence of steam locomotive operators who lease the locomotives from their owners, and the need to define the operators' accountability and areas of responsibility. Grand Canyon Railway also commented that "owner" should be defined in terms of who is responsible or assigned responsibility for compliance with applicable rules and regulations of the NPRM. Grand Canyon expressed concern over what the accountability and responsibility of owners is when their steam locomotives are not under their direct control, such as when the locomotives are being leased by independent operators.

The task force reached consensus, agreeing that the definitions of "locomotive owner" and "locomotive operator" provided in § 230.9 adequately address the issue of responsibility for compliance with all applicable rules and regulations. The

task force also felt that "locomotive operator," as defined, addresses the issue of who is primarily responsible for compliance in lease arrangements. FRA has reviewed the comments submitted and recognizes the concerns raised, but believes that the definitions provided in the NPRM adequately address those concerns. The agency has, therefore, decided that the final rule will adopt the definitions for locomotive owner and locomotive operator provided in the NPRM. However, it is to be noted that the final rule includes language making clear that an "operator" may in fact be a railroad.

**Service Day.** In the NPRM, FRA proposed an inspection schedule based on the number of service days a steam locomotive accumulates, with a service day defined as each day the steam locomotive boiler has steam pressure above atmospheric pressure and a fire in the firebox. John C. Boykin commented that the rule, as proposed, would promote over rapid cooling of locomotive boilers. Mr. Boykin suggested that a "service day" be any day where the steam locomotive boiler pressure is raised to a minimum of 50 percent of allowable working pressure. Diversified Rail Services commented that "service day" should be defined as a day where the locomotive is available for service, a day the locomotive moves away from a designated shop area under its own power. Diversified Rail Services also suggested that the definition of "service day" exclude those days where steam pressure is not raised or where steam tests are being performed within a designated shop area and include any day on which the locomotive has a fire in the fire box. In addition, Diversified Rail Services took issue with the statement that dumping a fire and damping is less dangerous than banking a fire. The Locomotive and Tower Preservation Fund, LTD commented that, since a slow cool down process imposes the least strain on a steam locomotive boiler, those days on which steam pressure is properly raised or the boiler is properly cooled down should not be considered service days. The Ohio Central Railroad commented that "service days" should be defined as those days the locomotive is used in revenue service with an assigned crew; requested clarification on whether a "service day" would include those days where: (1) a new or repaired locomotive was steam test-fired; (2) a locomotive had dying coal embers and was slowing losing steam pressure. Ohio Central also stated that the method of drawing fire from the firebox proposed in the NPRM would subject steam locomotive

ashpans and associated components to abuse. The St. Louis Steam Train Association commented that days when a steam locomotive is steamed up in a shop area for maintenance purposes should not be counted as service days. Finally, the Tennessee Valley Railroad commented that a requirement that a steam locomotive boiler stack be capped when banking its fire in order to qualify as a non-service day would be helpful.

The task force reached consensus on this issue, recommending that the definition of "service day" remain unchanged. One task force member commented that capping the stack as proposed by several of the commenters is actually a non-issue, since a steam locomotive is subjected to much higher thermal stresses in its everyday operations where a continuous stream of cool outside air is introduced into the firebox.

FRA has decided to retain the definition of "service day" provided in the NPRM in the final rule. The agency believes this is the most equitable way to calculate service days; balancing the need to take into account the realities of steam locomotive operations today with the need to ensure that steam locomotives are inspected on a timely basis.

#### *Section 230.12 Movement of Non-Complying Locomotives*

In the NPRM, FRA proposed making part 230 current with part 229 by allowing steam locomotive owners and/or operators to move "lite" or in tow, noncomplying steam locomotives for repair purposes after making the determination that the noncomplying steam locomotive was safe to so move. Grand Canyon Railway commented that this section should include a provision that the requirement that the steam locomotive be tagged as "non-complying" does not apply when such moves are made in yard areas and restricted to 10 miles per hour maximum speed. Grand Canyon Railway also suggested that this section include a requirement that the steam locomotive initials must be written on the non-complying tag in addition to the locomotive number. Tennessee Valley Railroad commented that, when referring to the movement of steam locomotives without railroad cars coupled on, the term "lite engines" should be spelled "light engine."

The task force agreed that this section should conform with the provisions for movement of non-complying locomotives found in part 229. Task force consensus was that FRA should revise this section to allow locomotive owners and/or operators to move non-

complying steam locomotives in yard areas at speeds not to exceed 10 miles per hour without having to tag the locomotives as non-complying. The task force was also in agreement that the spelling of "lite" engines would be retained so as to avoid confusion between "light" and "heavy" locomotives and because "lite" is the traditional (and uniformly recognized) spelling within the railroad industry.

FRA is revising the final rule to comport with the task force's recommendations. This revision is also based upon the agency's acknowledgment of the commenters' contention that there is no compelling reason for having different procedures for the movement of noncomplying steam and nonsteam locomotives.

#### *Section 230.14 Thirty-One (31) Service Day Inspection*

In the NPRM, FRA proposed requiring that certain inspections be performed when the steam locomotive accrued 31 service days. This section, which included subsections on (a) general inspection requirements, (b) FRA notification, and (c) the filing of inspection reports, generated a number of comments. A number of commenters expressed concern that under this section, as proposed, some steam locomotives would not be adequately inspected. There were also a number of comments submitted seeking clarification of the notification and scheduling of inspections procedures proposed in this section. Finally, comments were received on the requirement that locomotive owners and/or operators file a report of each steam locomotive's 31 service day inspection in the place where that steam locomotive is maintained and with the FRA Regional Administrator for that region. Diversified Rail Services commented that the boiler wash requirement is too "lax;" suggested that a 31 service day inspection and a boiler wash be required no later than every 92 calendar days, regardless of the number of service days the steam locomotive has accrued. The representatives of Grand Canyon Railway urged that steam locomotive owners and/or operators be required to perform 31 service day inspections no later than 92 calendar days after the last 31 service day inspection. Grand Canyon Railway also suggested that an inspection's effective date be the date the steam locomotive is placed in service and not the day upon which the steam locomotive's boiler is test fired. In addition, Grand Canyon Railway commented that this section should mandate that FRA inspectors may only request daily records during

normal business hours, with such records to be produced within 4 hours of a request to do so. In its comments, St. Louis Steam Train Association expressed the belief that the proposed 31 service day inspection must be performed no later than every 92 calendar days. Grand Canyon Railway requested clarification on how and when FRA will notify steam locomotive owners and/or operators of its desire to observe a 31 service day inspection. Grand Canyon Railway also commented that FRA inspectors desiring to attend a 31 service day inspection should be required to notify the steam locomotive owner and/or operator performing the inspection of their desire to so attend. Ohio Central Rail System suggested that this subsection include an explanation of how and within what prescribed time period FRA would respond to the notifications of inspection dates required under this section. Ohio Central Rail System also requested clarification on whether an inspection can take place as scheduled when the FRA delegate is unable to attend at the agreed upon time and the parties cannot reach agreement on another inspection date. Tennessee Valley Railroad also expressed concern about whether an inspection scheduled to be performed with an FRA inspector in attendance could be conducted as planned if the inspector failed to show at the agreed upon time and place. The United States Department of Interior commented that the inspection criteria should include the requirement that all water glasses are to be maintained free from leakage. Tennessee Valley Railroad commented that filing 31 service day inspection reports with FRA is unnecessary since the annual FRA Form No. 3 provides the agency with adequate notice that the steam locomotive is in service that year, and it suggested eliminating the filing requirement.

The task force members were in accord that—as clearly explained in this section—when FRA is unable to attend a scheduled inspection as agreed upon and FRA and the locomotive owner and/or operator are unable to agree upon a new date to perform the inspection, the inspection may go on as planned. The task force was also in agreement that when FRA desires to attend an inspection, it will convey that information to the steam locomotive owner and/or operator through generally accepted means of business communication. The issue of boiler washes and the effects of long-term water storage of water on the steam locomotive boiler were discussed at length. The task force members agreed

that the concerns raised by the commenters were legitimate but, at the same time, addressed by the requirement that steam locomotive be inspected to determine safety and suitability for service each day. The task force believes that the “safe and suitable” requirement includes a duty on the part of the steam locomotive owner and/or operator to monitor water quality and the effects of water storage on the locomotive each day that it is offered for service. The task force members reached consensus on the issue of when and how 31 day inspection reports must be filed with FRA; agreeing that the agency’s desire to be furnished with written proof that required inspections have been performed was reasonable, especially in light of the fact that the paperwork burden imposed on owners and/or operators has been reduced by approximately 33 percent under the new rule. There was also agreement that the difference between alterations and repairs is explained in the definitions section of the proposed rule, and that the proposed rule clearly states when a FRA Form No. 19 must be filed with FRA. The task force also discussed the issue of when a steam locomotive is considered to be in service, reaching consensus that any day the locomotive has fire in the firebox and boiler pressure above atmosphere is a service day.

After weighing the concerns of the commenters and the recommendations of the task force, FRA has decided to leave this section unchanged in the final rule. The agency believes that the “safe and suitable for service” requirement, by implication, imposes a duty on all steam locomotive owners and/or operators to ensure that water quality and water storage do not have a detrimental effect on the steam locomotive. The agency also believes that, as written, this rule clearly explains how notification and rescheduling of inspections is to be done and how inspections will go on as originally scheduled if FRA is unable to attend as scheduled and is unable to reach agreement with the locomotive owner and/or operator as to an alternative date on which to conduct the inspection. On the issue of “service days,” no evidence has been produced to show that FRA is not justified in its conviction that every day that a steam locomotive has fire in the firebox and steam pressure raised to above atmospheric pressure must be counted as a service day. As previously explained, FRA believes that the stresses and wear imposed on a steam

locomotive every time it has fire in the “box” and raised steam pressure necessitate such days being counted as service days. FRA also believes that the requirement of timely filing of inspection reports is justified by its need to have up-to-date proof that all steam locomotives currently in use are being inspected as required.

#### *Section 230.15 Ninety-two (92) Service Day Inspection*

In this section of the NPRM, FRA proposed requiring certain inspections be performed when the steam locomotive has accrued 92 service days with the steam locomotive owner and/or operator required to file an inspection report with the appropriate Regional Administrator. The agency received a number of comments regarding the (a) general inspection requirements, and (b) filing on 92 service day inspection reports. A number of commenters expressed concern that under this section as proposed, some steam locomotives would not be adequately inspected. Comments were also received regarding the requirement that locomotive owners and/or operators keep a report of each steam locomotive’s 92 service day inspection on file in the place where that steam locomotive is maintained and with the FRA Regional Administrator for that region. Grand Canyon Railway noted that under this rule, certain operations (such as those who run on weekends only) could go as long as 12 consecutive months without having a 31 day or 92 day inspection performed. Grand Canyon Railway also sought clarification on what the effective date of an inspection is; suggested that a 92 service day inspection’s effective date be the day the steam locomotive is placed in service and not the day upon which the steam locomotive’s boiler is test fired following a repair or rebuild. Tennessee Valley Railroad commented that filing 92 service day inspection reports with FRA is unnecessary since the annual FRA Form No. 3 provides the agency with adequate notice that the steam locomotive is in service that year, and it suggested eliminating the filing requirement.

The task force believes that the “safe and suitable” requirement includes a duty on the part of the steam locomotive owner and/or operator to inspect and monitor the locomotive each day that it is offered for service. The task force members agreed that the agency’s desire to be furnished with written proof that 92 service day inspections have been performed was reasonable considering the safety issues implicated, especially in light of the greatly reduced

paperwork burden imposed on owners and/or operators under the new rule.

FRA has also decided to leave this section unchanged in the final rule. As previously stated, the agency believes that the "safe and suitable for service" requirement, by implication, imposes a duty on all steam locomotive owners and/or operators to ensure that water quality and water storage do not have a detrimental effect on the steam locomotive. Also previously stated, FRA believes that no evidence has been produced to show why every day that a steam locomotive has fire in the firebox and steam pressure raised to above atmospheric pressure should not be counted as a service day. As previously explained, FRA believes that the stresses and wear imposed on a steam locomotive every time it has fire in the "box" and raised steam pressure necessitate such days being counted as service days. FRA also believes that the requirement of timely filing of inspection reports is justified by its need to have up-to-date proof that all steam locomotives currently in use are being inspected as required.

#### *Section 230.16 Annual Inspection*

FRA has proposed requiring that an annual inspection be performed 368 calendar days after the last (previous) annual inspection, with the steam locomotive owner and/or operator required to notify FRA of the time and place of the inspection and to file an inspection report with the appropriate FRA Regional Administrator. A number of interested parties submitted comments on subsections (a)(1) general requirements, subsection (b) FRA notification, and subsection (c) filing inspection reports. Ohio Central Rail System requested clarification on whether an inspection can take place as scheduled when the FRA delegate is unable to attend at the agreed upon time and the parties cannot reach agreement on another inspection date. The United States Department of the Interior (USDI) stated its belief that annual inspections are only needed on steam locomotives that have dome throttles or shut-off valves at the dome end of the dry pipe. USDI also recommended requiring that annual inspections be performed each year for the first 2 years a steam locomotive is in service, with the provision that if no wastage was found at that time, any further annual inspections could be deferred until the 1472 service day inspection. Tennessee Valley Railroad commented that the requirement that annual reports be filed with FRA should be eliminated.

As previously explained, the task force members believe that the rule

clearly states that when FRA is unable to attend a scheduled inspection as agreed upon and FRA and the locomotive owner and/or operator are unable to agree upon a new date to perform the inspection, the inspection may go on as planned. The task force was also in agreement that the proposed annual inspection requirements are not "overkill", and that safety considerations justify any "burden" imposed on the owners and/or operators under this section.

Here too, FRA has decided to leave this section unchanged in the final rule, believing that the "safe and suitable for service" requirement, by implication, imposes a duty on all steam locomotive owners and/or operators to ensure that water quality and water storage do not have a detrimental effect on the steam locomotive. FRA also believes that the inspection and filing requirements are justified by the safety concerns implicated, especially in light of the reduced compliance "burden" imposed on locomotive owners and/or operators under the final rule.

#### *Section 230.17 One Thousand Four Hundred and Seventy-Two (1472) Service Day Inspection*

In the NPRM, FRA proposed an extremely comprehensive inspection which is to be performed when a steam locomotive is first brought out of retirement and thereafter when 1,472 service days have accrued or 15 years have elapsed from the time of the last such inspection (whichever comes first). The agency received several comments on the general inspection requirements. Grand Canyon Railway requested clarification on what the effective date of an inspection is; suggested that a 1472 service day/15 year inspection's effective date be the day the steam locomotive is placed in service and not the day upon which the steam locomotive's boiler is test fired following a repair or rebuild. St. Louis Steam Train Association expressed the belief that protection needs to be provided for owners and/or operators who perform the work required under the 1472 service day inspection, but who otherwise may have to repeat some of that work because the requisite reports were not filed in a timely manner.

Because most steam locomotives accrue relatively few service days in the space of a year, the task force concentrated on the issue of when the 15 year period [maximum time between 1472 service day inspections] would begin to run. After a lengthy discussion, the task force was able to reach a consensus, recommending that the 15

year "clock" start on the day a steam locomotive is placed in service or 365 calendar days after the first flue tube is installed, whichever comes first.

FRA is adopting the task force recommendation that the 15 year clock start running on the day the steam locomotive is placed in service or 365 calendar days after the first flue tube is installed, whichever comes first. The agency recognizes that many steam locomotive restorations are done on by "part-timers," primarily volunteers who are only able to work on the locomotives on weekends. Because of the complexity of the task and the sheer number of manhours required to restore such a locomotive, restoration can literally take years; often times with the locomotive sitting outside, continuously exposed to inclement weather. In such situations, corrosion is a primary safety concern; especially so after the flue tube installation begins, since at that point it is no longer possible to do a visual and tactile inspection of the entire boiler surface. After considering all the factors involved, FRA has decided to impose a 15 year "drop-dead" limit on the length of time after the steam locomotive is placed in service or first flue tube is installed (whichever occurs first) that a steam locomotive can go before a 1472 service day inspection must be performed.

#### *Section 230.18 Recordkeeping Requirements (Service Days)*

Under this section, steam locomotive owners and/or operators are required to (a) keep and have available for inspection, a current copy of the service day record for each steam locomotive currently in service, (b) file a FRA Form No. 5 no later than January 31st of each year showing the days the steam locomotive was in service during the preceding year, and (c) complete all the requirements of the 1472 service day inspection before that locomotive can be returned to service, if the required service day reports are not filed for a steam locomotive and FRA considers that steam locomotive to have been retired. Diversified Rail Services, Inc. commented that this section needs to take into account certain out-of-service and/or ownership conditions. Diversified Rail suggested that a steam locomotive should be considered retired only if the locomotive owner and/or operator failed to file a service day report with FRA within 2 years of the last filing of a service day report.

The task force agreed that the 31 calendar day "grace period" provided for under the rule is sufficient given FRA's need for timely proof that all steam locomotives currently in service

were properly inspected and maintained during the preceding year. The task force was also in agreement that the Preamble should explain that FRA recognizes that exigent circumstances may arise which make it difficult for an owner and/or operator to furnish the FRA Form No. 5 in a timely manner. The task force also recommended that FRA not be totally inflexible in enforcing this section.

FRA believes the recordkeeping and filing requirements proposed in the NPRM are reasonable and, therefore, has incorporated them in the final rule. The agency also realizes that a 1472 service day inspection is a very time-consuming, costly procedure and that, under certain circumstances, locomotive owners and/or operators may be unable to file a FRA Form No. 5 within the prescribed time. As such, FRA will consider those claims that failure to timely file was due to compelling circumstances on a case-by-case basis.

#### *Section 230.20 Alteration and Repair Report for Steam Locomotive Boilers*

In § 230.20 of the NPRM, FRA proposed that steam locomotive owners and/or operators who make alterations to steam locomotive boilers be required to file alteration reports with the appropriate FRA Regional Administrator. This section would also require the filing of repair reports with the FRA Regional Administrator whenever steam locomotive owners and/or operators perform either welded or riveted repairs to unstayed parts of locomotive boilers, and the completion and maintenance of repair reports when welded or riveted repairs are performed on stayed parts of locomotive boilers. A number of interested parties submitted comments on subsections (a) Alterations; subsection (b) Welded and riveted repairs to unstayed locomotive boiler portions; and subsection (c) Welded and riveted repairs to stayed portions of the locomotive boiler. Diversified Rail Services commented that locomotive owners and/or operators performing welded repairs on stayed areas should only be required to maintain records of those repairs. Grand Canyon Railway commented that locomotive owners and/or operators should be required to maintain—but not file with FRA—records of standard repairs such as welding or repairing staybolts. Grand Canyon Railway also suggested that FRA should establish the position of National Steam Inspector with responsibility for handling waivers, petitions, repair acceptance notifications, and alteration/repair reports. Ohio Central Railroad System requested clarification on when FRA

Form No. 19s must be filed. The St. Louis Steam Train Association commented that reports on steam locomotive boiler work should continue to be maintained and FRA Form No. 19s filed when locomotive boilers are altered. St. Louis Steam Train Association also commented that when a locomotive boiler is repaired, the form used to report the repair should not require the calculation of stress levels.

The task force reached consensus on this issue, agreeing that the present system (whereby FRA Regional Administrators provide oversight of steam locomotives operating within their respective regions) is efficient and does result in uniform application of the regulations. Concern was expressed that creation of a national steam inspector would result in one more layer of bureaucracy, and that the person filling that position would be overburdened and unable to provide proper oversight over the regulated community as a whole. It was also felt that there is no issue of local vs. national standards since the FRA Regional Administrators already send alteration and repair reports and other documentation to FRA's Office of Safety as conditions warrant. The task force was also in agreement that the rule as written clearly explains that owners or operators performing welded or riveted repairs on stayed portions of steam locomotive boilers are only required to complete and maintain a FRA Form No. 19 record of the work done. It was noted that Form 19s need to be filed with FRA whenever alterations are performed in order to satisfy the requirement that a current FRA Form No. 4 be on file with FRA at all times for each steam locomotive in service.

FRA agrees with the task force recommendations and observations; also believing that creation of another level of oversight would provide little or no additional safety benefit while needlessly straining the agency's already limited resources. Since the agency believes that the present system of reporting and filing is efficient and not unduly burdensome to locomotive owners and/or operators, this section of the final rule remains unchanged from that of the NPRM.

#### *Section 230.23 Responsibility for General Construction and Safe Working Pressure*

Section 230.23 sets out what the specific responsibilities of the steam locomotive owner and the steam locomotive operator are. Grand Canyon Railway submitted comments in which it objected to what it considered to be FRA's lack of consistency in the use of

the terms "locomotive owner" and "locomotive operator", stated the belief that all reference should be to "owners or operators." Grand Canyon Railway further commented that the regulation should specify that responsibility for construction of and repairs to a steam locomotive lies with whoever is delegated responsibility for that locomotive. The task force discussed this issue, but felt that it involves legal matters best left to FRA's Office of Chief Counsel. The consensus was to make no recommendations; deferring to the agency's interpretation on this issue.

FRA believes that, in most cases, the responsibility for compliance will fall equally on the owner and the operator of the steam locomotive, and, in these cases, the agency has chosen to use the words "owner and/or operator" in the final rule. However, the agency also believes that in certain limited situations, the responsibility for compliance will lie with either the steam locomotive owner (such as when a steam locomotive is being rebuilt or brought out of retirement), or the steam locomotive operator (such as where a steam locomotive breaks down while in actual use). In these cases FRA has used the words "owner or operator" in the final rule.

#### *Section 230.25 Maximum Allowable Stress on Stays and Braces*

This section sets the maximum allowable stress per square inch of net cross-sectional area on firebox and combustion chamber stays and braces. The Tennessee Valley Railroad commented that the maximum allowable stress levels should be presented as a percentage of the ultimate tensile strength of the material used in the braces and stays. Tennessee Valley Railroad believes that so doing would encourage steam locomotive owners and/or operators to make use of the higher strength steels now available. Tennessee Valley Railroad also noted that the ATSM requirements for some of the older materials are no longer available. The task force was in agreement that the maximum allowable stresses should continue to be based on the psi ratings provided. In the discussion on this issue, it was pointed out that steam locomotives were designed and built as integral units with stress levels calculated based on the locomotives in whole. Several members of the task force observed that it is not good engineering practice to use a combination of materials of different composition and strengths in an interdependent structure like a locomotive. It was also noted that changing the rule as suggested would

result in little or no advantage over the present standard since there are few, if any, new steam locomotive boilers being built. FRA agrees with the task force's observations and is leaving this section unchanged in the final rule. The agency believes that allowing stays and braces made of higher strength steels to be subjected to higher stress levels could result in damage to or even failure of surrounding sections that are not made of correspondingly high strength materials.

#### *Section 230.26 Tensile Strength of Shell Plates*

This section establishes a default tensile strength figure to be used for steel or wrought iron shell plates when the actual figure is unknown. Tennessee Valley Railroad submitted comments on this issue, urging that the final rule recognize the advances in materials available today and take those advances into account when publishing ductility and/or tensile/shearing strength standards. Tennessee Valley Railroad also suggested that the words "for pre-existing boilers" be inserted after "wrought-iron shell plates."

The task force members disagreed with Tennessee Valley's comments; recommending instead that the final rule retain the language in the NPRM. It was observed that this was essentially a non-issue since the default standard is only intended to pertain to materials the tensile strength of which is unknown and the tensile strength of present day steels is known or easily determinable. The task force believes that these standards are only intended to apply to the maintenance of existing equipment.

This section of the final rule is unchanged from the NPRM. After reviewing the comments and the task force's recommendation, FRA decided that the safety benefits of establishing maximum tensile strength values for shell plates made of steel or wrought-iron, the strength of which cannot be ascertained, outweighs any inconvenience or burden placed upon locomotive owners and/or operators.

#### *Section 230.27 Maximum Shearing Strength of Rivets*

This section establishes a default tensile strength figure to be used for steel or wrought iron shell plates when the actual figure is unknown. The Tennessee Valley Railroad submitted the only comments on this issue, stating that the maximum shearing strength values for rivets should be presented as a percentage of the ultimate tensile strength of the material the rivets are made from since this would encourage steam locomotive owners and/or

operators to utilize the higher strength steels now available. Tennessee Valley Railroad also requested clarification on what the basis was for the maximum shearing strength values published and recommended that the final rule include the actual basis for the published values.

The task force reached consensus, agreeing that the maximum shearing strength of rivets used in steam locomotives should continue to be calculated based on values listed in the table unless the rivets are made from other materials: materials that have been proven through testing to exceed those levels. It was noted that the psi levels provided in the table were based on many years of actual operating experience.

FRA is in concurrence with the task force recommendations and is adopting them in the final rule. The agency believes that the conservative shearing strength values provided in the table provide a margin of safety in an area where failure could result in extensive damage to the equipment and serious injury or loss of life.

#### *Section 230.28 Higher Shearing Strength of Rivets*

In this section, FRA proposed allowing steam locomotive owners and/or operators to use a higher shearing strength for rivets when tests of the material used show it to be of such quality as to justify so doing. Tennessee Valley Railroad commented that this section is no longer needed since the appropriate ASTM or ASME specifications were referenced in previous sections. In the alternative, Tennessee Valley Railroad recommended that current ASTM standards be used as the basis for higher strength values in lieu of requiring that the materials used be strength tested.

The task force disagreed with Tennessee Valley Railroad; recommending instead that the maximum shearing strength of rivets used in steam locomotives continue to be calculated based on values validated through empirical evidence unless the rivets are composed of materials that have been proven through testing to exceed the levels provided.

Here too, FRA is in concurrence with the task force recommendations and is adopting them in the final rule. The agency believes that limiting the assignment of higher strength values to those materials that have been conclusively proven to have shearing strengths in excess of the table values provides the necessary margin of safety in an area where failure could result in

extensive property damages, as well as serious injury or loss of life.

#### *Section 230.32 Time and Method of Inspection*

Subsection 230.32(a) imposes a requirement that the entire steam locomotive boiler be inspected when a 1472 service day inspection is performed. Tennessee Valley Railroad took exception to the proposed inspection requirements; commenting that these provisions would create unnecessary work and inflict needless stress and wear on dome lid studs and seal rings.

After due consideration of the comments submitted, the task force decided to recommend that the criteria for performing a 1472 service day inspection remain unchanged from the NPRM. Several members of the task force noted that the inspection procedure referred to by the Tennessee Valley Railroad is only required after 1,472 service days have accrued or 15 years have elapsed and, considering the minimal burden imposed on locomotive owners and/or operators and the safety benefits gained, the criteria for the 1472 service day inspection should be retained.

FRA is retaining the 1472 service day inspection methods prescribed in the NPRM. The agency remains convinced that, in light of the age of the steam locomotive community, and the potential danger posed by boiler explosions and other catastrophic failures, any burden imposed on locomotive owners and/or operators by requiring a comprehensive, hands on inspection be performed once every 1472 service days or 15 calendar years (whichever occurs first) is reasonable.

#### *Section 230.33 Welded Repairs and Alterations*

This section of the NPRM generated a number of comments. Several commenters took exception to subsection (a), which imposes reporting requirements on steam locomotive owners and/or operators welding on unstayed portions of the locomotive boiler, and subsection (d), which provides that steam locomotive owners and/or operators must submit a written request for approval to FRA before installing flush patches on unstayed boiler portions. Diversified Rail Services commented that steam locomotive owners and/or operators that perform welded repairs on stayed portions of the locomotive boiler should be required to maintain records of those reports but not be required to file FRA Form No. 19s with FRA. Grand Canyon Railway submitted similar comments, urging that



FRA only require that such reports or FRA Form No. 19s be kept by the steam locomotive owner and/or operator's chief mechanical officer or at the site where the work was performed. Tennessee Valley Railroad requested clarification on what FRA considers a "repair" and on whether FRA considers a "flush patch" to be a "repair." Tennessee Valley Railroad also questioned whether FRA would consider a partial boiler course replacement to be a repair.

The task force members agreed that a partial boiler course replacement should be considered a flush patch if it is applied by welding. There was also agreement that § 230.33(d) steam locomotive owners and/or operators installing welded flush patches on unstayed portions of the locomotive boiler are required to submit a written request for approval by FRA prior to performing such work and to file a FRA Form No. 19 with FRA as per § 230.20(a) of the rule after the work is completed. The task force also noted that § 230.9 of the rule explains that any restoration work is considered a "repair" while "alterations" are defined as "any changes to the boiler affecting its pressure retention capability." Addressing the comments urging that the proposed filing requirements be deleted from the final rule, it was noted that, in light of the fact that FRA is allowing the use of relatively new methods of repair not previously applied to steam locomotives, these filing requirements are not onerous. It was also observed that in the past FRA had required that such patches be riveted, a much more expensive method of repair than welding.

FRA believes that the reporting and filing requirements in this section are justified. The agency believes that, considering the critical nature of such work and the importance that it be done properly, requiring owners and/or operators to obtain FRA approval before performing this type of work on a locomotive boiler and to file a report with FRA after completing said work is not unreasonable.

#### *Section 230.34 Riveted Repairs and Alterations*

Subsections (a)–(c) impose reporting requirements on steam locomotive owners and/or operators performing riveted alterations or repairs on stayed and/or unstayed portions of the locomotive boiler. Grand Canyon Railway commented that the rule should only require that such reports or FRA Form No. 19s be kept by the steam locomotive owner and/or operator's

chief mechanical officer or at the site where the work was performed.

The task force recommended that the reporting requirements be retained. The task force members expressed the belief that FRA oversight will ensure that riveted repairs are made in compliance with established railroad practices and/or accepted national standards for boiler repairs.

FRA is retaining the requirements of this section in the final rule. The agency believes that it is essential that it have the right to review all proposed riveted alterations on unstayed boiler portions since any such work, in changing the boiler's pressure retention capability, may have a major impact on the locomotive's structural integrity.

#### *Section 230.36 Hydrostatic Testing of Boilers*

Subsection (b) explains how steam locomotive owners and/or operators will perform a hydrostatic test on their locomotive boilers, and subsection (c) sets forth the requirement that steam locomotive owners and/or operators conduct an internal inspection of the locomotive boiler after every hydrostatic test conducted above MAWP. Several steam railroads objected to those parts of § 230.36. Grand Canyon Railway commented that performing a hydrostatic pressure test on a boiler with a metal temperature of 60° F could result in the boiler metal be shocked/stressed, further commented that the minimum boiler temperature should be 70° F whenever a steam locomotive boiler is subjected to hydrostatic pressure, and the minimum temperature should be 120° F whenever the locomotive boiler is subjected to hydrostatic pressure at or above maximum authorized working pressure (MAWP). Grand Canyon Railway also commented that all hydrostatic testing should be done at 125 percent of MAWP. Tennessee Valley Railroad commented that the annual boiler inspection required under § 230.32(a) is sufficient to detect wear. Tennessee Valley Railroad further commented that such an inspection requirement is not in conformity with industry practice; results in unnecessary work being done; and inflicts needless stress and wear on dome lids, studs, and seal rings.

Upon consideration of the comments received, the task force agreed that a minimum boiler metal temperature of 60° F consensus was probably too low; deciding to recommend that the required minimum metal temperature to be raised to 70° F. One task force member stated that it is extremely important that boiler metal temperature be above 45°–50° F before such testing

is done. Another member observed that there are a number of easy, inexpensive methods available for supplying heated fill water. It was also noted that the ASME has raised its recommended minimum metal temperature to 70° F. The task force agreed that raising the minimum temperature required to 70° F was in keeping with industry trends and would provide an extra margin of safety when performing hydrostatic tests. However, the task force did not agree with the comments urging that the minimum boiler metal temperature for performing hydrostatic tests at or above MAWP be raised to 120° F. The task force members believe that the maximum boiler metal temperature should remain at 120° F because boiler metal heated to a temperature above 120° F could pose a substantial risk of injury to any personnel coming in direct contact with the steam locomotive. The task force noted that the rule already requires that hydrostatic testing is to be performed at 125 percent of MAWP. On the issue of boiler inspections, the task force was in agreement that requiring a boiler inspection after hydrostatic testing of the locomotive boiler is in keeping with industry safety practices and does not impose undue burdens on the owners and/or operators and that any stress and wear inflicted on dome lids, studs, seal rings etc. is justified.

FRA also agrees that the boiler metal temperature should be, at a minimum, 70° F before hydrostatic testing of the boiler is performed. The agency believes that raising the minimum metal temperature will reduce the risk of metal "shock" and stress which could lead to boiler failure. FRA does not agree with the comments urging that the boiler metal temperature be at least 120° F whenever hydrostatic testing is done at or above MAWP. The agency believes that the danger presented to people working around metal heated to such temperatures would outweigh any safety benefits gained. FRA agrees with the recommendation that hydrostatic testing be done at or above MAWP, but points out that the NPRM already specified that all hydrostatic testing must be done at 125 percent of MAWP.

#### *Section 230.39 Broken Staybolts*

This section establishes (a) a limit on the number of broken staybolts a steam locomotive can have and still remain in service; (b) when and how broken staybolts must be replaced; (c) what counts as a broken staybolt; and (d) what methods of closing telltale holes are prohibited. Subsections (a) and (d) generated comments. Diversified Rail Services commented that this section is repetitive and could be interpreted as

requiring a steam locomotive with a broken staybolt be operated in that condition for as long as 30 days. Grand Canyon Railway commented that this section should be deleted and replaced with the 1978 § 230.25 language. Grand Canyon Railway also commented that the rule should not contain a blanket prohibition on plugging telltale holes of leaking staybolts.

The task force considered the comments but disagreed with them, deciding to recommend that this section remain as written in the NPRM. It was observed that there were a number of compelling reasons for amending the rule and deleting § 230.25 of the 1978 standards. Among the reasons cited were the continuing aging of the steam locomotives in use in the United States today; the longer operating and inspection cycles of steam locomotives today; and the progressive nature of staybolt failures. It was observed that the failure of one staybolt puts significant additional pressure on the surrounding staybolts, leading to the possibility of a "cascade" or "domino" effect with each ensuing staybolt failure rapidly leading to yet another failure ultimately resulting in a catastrophic boiler failure. In addition, all members of the task force concurred that, while this section of the rule establishes that the maximum time a steam locomotive may be operated with broken staybolts is 30 days, it does not require owners and/or operators to run their steam locomotives for that period of time with broken staybolts. The task force was also in complete agreement that this section does not impose a total ban on the closing of telltale holes; it simply lists the prohibited methods for so doing.

FRA is leaving this section unchanged in the final rule. The agency believes that, in light of the safety concerns implicated, it is essential that steam locomotives not be allowed to operate with 2 or more broken staybolts within 24 inches of one another or with more than 4 broken staybolts at one time. FRA also believes that the rule does not prohibit the closing of telltale holes per se.

#### *Section 230.40 Time and Method of Staybolt Testing*

Subsection (a) establishes when staybolts are to be hammer tested and provides an exception for inaccessible staybolts; subsection (b) sets out the procedure to be followed when staybolts are hammer tested. Diversified Rail Services and Grand Canyon Railway both took exception to the procedures set forth in subsection (b). Diversified Rail Services commented that hammer testing of staybolts done with the

locomotive boiler under pressure is much more successful in detecting broken staybolts. Grand Canyon Railway suggested that the procedure for hammer testing staybolts be changed to a 3-step process starting at 50 percent MAWP, water temperature 70° F and incrementally increasing pressure and water temperature to 95 percent MAWP and water at 120° F. Grand Canyon Railway also recommended that the provision allowing testing of staybolts without water in the locomotive boiler be deleted; expressed the belief that such tests are highly inaccurate.

The task force reviewed the comments but disagreed with the commenters' conclusions: believing instead that this section simply prescribes the minimum testing criteria and should not be changed. Several task force members observed that steam locomotive owners and/or operators are free to make use of stricter testing methods if they believe the method prescribed is inadequate.

FRA's purpose, in writing this section, was to set forth minimum testing procedures. As such, FRA will not take exception to steam locomotive owners and/or operators using more comprehensive testing methods, provided the minimum testing requirements are met.

#### *Section 230.51 Number and Location of Water Glasses and Gauge Cocks*

This section provides that all steam locomotive boilers must be equipped with a minimum of 2 water glasses. John C. Boykin commented that the requirement for 2 water glasses is unreasonable and that there is no evidence that trycocks do not work as well.

The task force felt that the 2 water glass requirement was based on valid concerns and should remain. It was observed that 75 years of experience have shown that water glasses are more accurate and more reliable than trycocks. One task force member noted that the NTSB has recommended that each steam locomotive be equipped with 2 water glasses. Another task force member observed that the ASME Boiler Code § 1 has abolished the requirement for water gauge trycocks because of the high level of operator skill and experience required to operate properly and safely.

FRA concurs with the findings of the NTSB and the recommendations of the task force and is retaining the requirement that all steam locomotives be equipped with at least 2 water glasses in the final rule. FRA believes that this requirement will enhance safety since water glasses are more accurate and easier to use than water gauge trycocks.

#### *Section 230.60 Time of Washing*

This section of the NPRM generated a number of comments, most of which were in regards to subsection (a) Frequency of washing. The NBBPVI commented that the reference in the section-by-section analysis of § 230.60 to § 230.45 of the 1978 standards was inaccurate or incomplete. Grand Canyon Railway expressed concern that under this washing schedule, water could be left in steam locomotive boilers for more than 30 days at a time; commented that boiler washes should be performed at least once every 92 calendar days. Ohio Central Railroad System observed that a requirement that boilers be washed every 92 calendar days would be a lot better than the current regulation. Ohio Central Railroad System also noted that requiring that boiler washes be performed at least once every 92 calendar days would insure that sediment and other solids would remain soft enough to be easily flushed and would help to avoid a buildup of excess sediment in the locomotive boiler. Tennessee Valley Railroad commented that the rule needs to address the issue of steam locomotives being stored for long periods of time with water in the boiler; expressed concern about the situation where a steam locomotive owner and/or operator uses his or her steam locomotive less than 31 service days a day, under this section, in such a case, the locomotive boiler might only be washed once a year. Tennessee Valley Railroad also advocated requiring that locomotive boilers be washed at least once every 92 calendar days, expressing the belief that leaving standing water in a locomotive boiler is detrimental to the boiler: suspensions will settle out and create sludge while dissolved oxygen in the water may react with carbon components in the boiler metal.

The task force recommended that this section stay as written in the NPRM. It was noted that the concerns expressed by the commenters merited consideration but were, in fact, addressed under the daily inspection requirements. The task force believes that the requirement that the steam locomotive be inspected on a daily basis to ensure that it is safe and suitable for service includes a duty to test water quality and to ensure that water is not kept in boilers so long that it causes damage to the locomotive boiler and other parts and appurtenances.

FRA has decided to leave this section unchanged in the final rule. The agency believes that under the "safe and suitable for service" requirement, a duty is imposed on all steam locomotive

owners and/or operators to ensure that water quality and water storage are continuously monitored so as to not have a detrimental effect on the steam locomotive and all its parts and appurtenances.

#### *Section 230.61 Arch Tubes, Water Bar Tubes, Circulators, and Thermic Siphons*

In § 230.61 of the NPRM, FRA proposed that every time a steam locomotive boiler is washed (a) its arch tubes, water bar tubes, circulators, and thermic siphons be cleaned, washed, and inspected; and at every annual inspection that (b) defective arch tubes and/or water bar tubes be renewed, defective circulators and thermic siphons be renewed or repaired; and (c) arch bar tubes, water bar tubes, and circulators be examined through nondestructive means, with those found to have wall thickness reduced below required levels replaced or repaired. Diversified Rail Services commented that the rule should require that arch bar tubes be replaced every 1472 service day inspection. Diversified Rail also observed that removing the arch bar tubes would allow for a full inspection of all telltales and staybolts. Grand Canyon Railway commented that this section should specify that the locomotive owners and/or operators are responsible for compliance therewith. The NBBPVI commented that the reference in the section-by-section analysis of § 230.61 to § 230.45 of the 1978 standards was inaccurate or incomplete.

After careful consideration of Diversified Rail Services' comments and recommendations, the task force consensus was that adopting in the final rule the requirement that steam locomotive owners and/or operators perform an ultrasonic inspection of the arch tubes every time the boiler is washed and repair or replace those not safe and suitable for operation will adequately address those safety concerns raised. The task force believes that this is more prudent than an absolute requirement that arch tubes be replaced every 1472 service days since that could be interpreted as requiring replacement of the arch tubes only at that time. The task force then considered NBBPVI's comments, agreeing that the reference as cited in the section-by-section analysis was inaccurate and incomplete. The task force's recommendation was that the section-by-section analysis of § 230.61 be amended to include reference to §§ 230.14 and 230.46 of the 1978 Rule.

FRA believes that requiring that an ultrasonic inspection of the arch tubes

be performed every time the boiler is washed adequately addresses the issue of defective arch tubes, while, at the same time, taking into account the economic burdens imposed on steam locomotive owners and/or operators required to perform such inspections. The agency shares the concerns of the task force that a "blanket" requirement that arch tubes be replaced when the 1472 service day inspection is performed could be misinterpreted by owners and/or operators, leading to the mistaken belief that they were only required to replace arch tubes at that time.

#### *Section 230.68 Speed Indicators*

Under § 230.68, all steam locomotives that operate on the general system of railroad transportation at speeds in excess of 20 miles per hour are required to be equipped with speed indicators maintained to ensure accurate functioning. Grand Canyon Railway and Minnesota Transportation Museum commented that the speed indicator requirement should be the same as that for nonsteam locomotives (found at 49 CFR 229.117).

With the stipulation that the term "accurate functioning" be further explained, the task force members recommended that this section remain as written. The task force issued its recommendation in the belief that FRA can adequately address the issue of what it considers to be "accurate functioning" of the speed indicator in the preamble to the final rule.

#### *Section 230.70 Safe Condition of Brake and Signal Equipment*

This section establishes: (a) the criteria for performing a pre-departure inspection of a steam locomotive at the beginning of each day the locomotive is used; and (b) a requirement that each steam locomotive and/or locomotive tender be equipped with a clearly identified emergency brake valve. Grand Canyon Railway, commenting on subsection (a)(2)'s requirement that the steam locomotive air compressor or compressors be in condition to provide "an ample supply of air for the locomotive service intended," urged that the rule be rewritten to allow a steam locomotive to continue to operate as long as it is able to provide a safe level of air for the service the train is being operated in.

The task force took exception to Grand Canyon Railway's comments. After due consideration, the task force's recommendation to FRA was that the agency allow any steam locomotive equipped with 2 or more air compressors that experiences a

compressor failure while in service to complete that day's service, provided that the remaining air compressors on that locomotive are able to supply a safe level of air for the train's operation. However, the task force was adamant that, as per the requirements of the daily inspection, no steam locomotive be allowed to start a service day unless/ until all of the locomotive's air compressors are properly operating.

FRA believes that no steam locomotive should be allowed to begin service unless all of its air compressors are properly operating. The agency recognizes that locomotives do experience equipment failures while operating away from service facilities and, in such instances, will allow a steam locomotive suffering a compressor failure to finish its service for that day provided that a safe level of air for the service being performed is continuously maintained.

#### *Section 230.71 Orifice Testing of Compressors*

Section 230.71(b) of the NPRM referenced a published table which lists the compressors commonly used on steam locomotives. The compressor size of one of Westinghouse compressors is listed in the table as "150 HP 8½ CC" and another as "120 LP 8½ CC". Tennessee Valley Railroad commented that these compressors should be listed as "150 cfm" and "120 cfm" respectively. In the discussion of Tennessee Valley's comments, it was observed that at one time Westinghouse had used the terms "HP" and "LP" in rating its compressors' output.

The task force, agreeing in principle with Tennessee Valley Railroad, recommended that, for the sake of consistency and ease of compliance, the table rate all compressors in terms of cfm.

In the interests of consistency and ease of enforcement, FRA is changing the terminology for the aforementioned steam locomotive compressors to "150 cfm" and "120 cfm" respectively.

#### *Section 230.72 Testing Main Reservoirs*

This section establishes (a) how and when main reservoirs must be hammer and hydrostatically tested; (b) how and when main reservoirs may be drilled with telltale holes; (c) testing procedures for welded main reservoirs without longitudinal lap seams; and (d) testing procedures for welded or riveted main reservoirs with longitudinal lap seams. Tennessee Valley Railroad requested clarification on testing methods for welded main reservoirs, commented that the testing

requirements should be clarified, stated its belief that the rule should adopt the language of the diesel rule and that nondestructive testing of welded main reservoirs is unnecessary. The NBBPVI commented that the formula provided in subsection (c) for wall thickness values was missing a parens at the end.

The task force agreed that the language of the part of § 230.72 dealing with drilling of main reservoirs (part b) needs to be clarified. Since the intent of this part is to restrict drilling of main reservoirs to welded reservoirs built to a safety factor of 5, the task force recommended that the first word of § 230.72(b), "every" should be replaced with the term "only," thereby making clear that drilling is only allowed on main reservoirs meeting the specified criteria. There was also unanimous agreement that—given the potential for serious injury and death resulting from a main reservoir failure—there is a need for non-destructive testing of main reservoirs in order to determine when wall thicknesses become dangerously thin. The task force agreed with NBBPVI that the formula in section (c) for determining wall thickness is incorrect, recommending that another parenthesis be inserted to the right of the one following .6P, resulting in the correct formula of  $t = [PR / (S - .6P)]$ .

After review of the comments and the task force recommendations, FRA is making a small but significant change in the language of part (b): striking the first word "every" and replacing it with the restrictive term "only." The agency feels that this change will alleviate any confusion over when drilling of main reservoirs is allowed. FRA remains convinced that non-destructive testing of main reservoirs must be done on an annual basis in order to minimize the risk of a structural failure of a main reservoir under pressure.

#### *Section 230.74 Time of Cleaning*

Section 230.74 of the NPRM provides that all valves, related dirt collectors, and related filters shall be cleaned and tested as per accepted brake equipment manufacturer specifications or as often as necessary to maintain in a safe and suitable condition for service, with cleaning and testing required after 368 service days or at the time of the second annual inspection, whichever occurs first. Tennessee Valley Railroad commented that the wash dates are inconsistent, recommended that the rule allow owners and/or operators of steam locomotives equipped with diesel type air systems to adopt the washing and testing schedule of similarly equipped diesel locomotives.

The task force was in agreement that the cleaning and testing requirements should remain as written in the NPRM. It was observed that steam locomotives operate in a much "dirtier" environment than diesel-electric and electric locomotives. Several task force members pointed out that steam locomotives are continuously exposed to water, steam, smoke, ash, and coal dust; all of which have the potential of getting inside and "fouling" the airbrake system.

FRA remains firmly convinced that, because of the environmental conditions in which steam locomotives operate, the air brake system on these locomotives must be cleaned and tested no less frequently than after 368 service days accrue or during every second annual inspection, whichever comes first.

#### *Section 230.75 Stenciling Dates of Testing and Cleaning*

Section 230.75 requires that the date of testing and cleaning and the initials of the shop or station where the work was done be legibly stenciled on the tested parts or displayed under transparent cover in the steam locomotive cab. Grand Canyon Railway commented that the shop and/or station where the testing and cleaning was performed should be spelled out.

The task force agreed that this section of the rule should remain as written. Several task force members noted that this section merely sets the minimum stenciling requirement and owners and/or operators are free to stencil additional information if so desired.

FRA is leaving this section unchanged in the final rule. The agency will allow steam locomotive owners and/or operators to provide (stencil) additional, more detailed information provided the basic requirements of the final rule are met.

#### *Section 230.82 Fire Doors and Mechanical Stokers*

Section 230.82 establishes the requirements for steam locomotive fire doors. The NBBPVI commented that the words "and mechanical Stokers" should be deleted from the section title since there is no mention of fire doors in this section.

The task force was in agreement that the words "and mechanical stokers" are excess verbiage and should be deleted as their inclusion could mislead readers into thinking that section of the rule was incomplete as published.

FRA agrees that the words "and mechanical stokers" are unnecessary and even possibly confusing and is, therefore, striking them from the heading for § 230.82.

#### *Section 230.86 Required Illumination*

Under § 230.86(a), steam locomotives used between sunset and sunrise are required to be equipped with an operating headlight of a specified brightness; (b) which may be dimmed when necessary; and (c) which the lead steam locomotive is required to display when 2 or more steam locomotives are used in the same train. Grand Canyon Railway commented that this section should follow the language of the diesel regulation (49 CFR 229.125(a)—(c)), thereby clarifying the requirements and providing for the dimming and extinguishing of the lead steam locomotive headlight when a non-steam locomotive is on the point (actually in the lead).

The task force agreed that § 230.86(c), as written, is subject to misinterpretation and could be read as requiring the lead steam locomotive have its headlight on at all times between sunset and sunrise regardless of whether the lead steam locomotive was actually the lead locomotive on the train. The task force, therefore, recommended that the word "steam" be struck from § 230.86(c) of the final rule.

FRA acknowledges that § 230.86(c), as written in the NPRM, was subject to misinterpretation and is amending the language of this section in the final rule by striking the word "steam." The agency's primary objective in this section is ensuring that whenever a locomotive is used in the lead position, it is displaying a headlight.

#### *Section 230.88 Throttles*

This section provides that throttle must be safe and suitable for service and equipped with an effective means for holding the throttle lever in any desired position. A number of comments were received on the issue of throttle locking devices and on the need to include in the rule a ban on tampering with safety devices. Diversified Rail Services, Ohio Central Railroad System, St. Louis Steam Train Association, and Tennessee Valley Railroad each submitted comments urging FRA to require throttle locking devices on steam locomotives. Diversified Rail Services and Tennessee Valley Railroad also urged the inclusion of language expressly forbidding the removal of or failure to properly maintain safety devices.

The task force, while recognizing the concerns raised in the comments, was in agreement that there is no need to add a specific requirement for throttle locking devices to the rule. In the discussion of this issue, several task force members observed that the requirement in this section that

"efficient means [be] provided to hold throttle levers in any desired position" may be read as requiring the use of throttle-locking devices to lock throttle levers in the off position when that is the desired position. The task force also felt that the addition of a specific provision prohibiting tampering with safety devices was unnecessary in light of § 230.4(a)'s general prohibition on the use of steam locomotives or tenders that are not in proper condition and safe to operate.

FRA believes the requirement under this section that throttles be maintained in safe and suitable condition for service with efficient means to hold the throttle lever in any desired position imposes a duty on steam locomotive owners and/or operators to include a throttle locking device on the steam locomotive if a locked throttle is a desired position. FRA further believes that the general requirement that steam locomotives be maintained in the proper condition and safe to operate includes a prohibition on tampering with safety devices since an inoperative or altered safety device is by definition not in the proper condition.

#### *Section 230.90 Draw Gear Between Steam Locomotive and Tender*

This section establishes (a) the maintenance and testing criteria for the draw gear; (b) the requirements for safety bars and/or safety chains; (c) the minimum length of safety chains and/or safety bars; (d) the permissible limits for lost motion between steam locomotives and tenders; and (e) the conditions under which spring buffers may be used between steam locomotives and tenders. Ohio Central Railroad requested clarification on the intent of subsection (a); specifically questioning whether visual inspection is considered a form of nondestructive examination (NDE). Tennessee Valley Railroad also requested clarification on the language and intent of the visual testing requirement and the additional testing requirement.

The task force considered the comments submitted, but, in the end, decided to recommend that this section remain as published in the NPRM. The task force members felt that this section clearly explains that a visual inspection of the draft gear between the steam locomotive and its tender must be performed at every annual inspection and, if the visual inspection fails to uncover any defects, an additional inspection using another form of NDE testing methods will be performed on the gear.

FRA believes that steam locomotive owners and/or operators should be allowed to choose an appropriate

method of NDE for the testing of the locomotive pins and drawbar. FRA also believes that, if a visual inspection of the pins and drawbar is performed and fails to detect any defects, an additional examination of the pins and drawbar must be performed utilizing another appropriate method of NDE.

#### *Section 230.96 Main, Side, and Valve Motion Rods*

Section 230.96 sets forth (a) when main, side, or valve rods must be removed from service; (b) how and when repairs of main, side, or valve rods may be made; (c) the criteria for bearings and bushings; (d) how much rod side motion is acceptable; (e) the requirements for oil and grease cups; (f) limits on main rod bearing wear; and (g) wear limits on side rod bearings. Grand Canyon Railway and Tennessee Valley Railroad submitted comments in which they expressed disagreement with the requirement in subsection (b) that steam locomotive owners and/or operators submit a written request to FRA for approval prior to doing any welding of defective main rods, side rods, and valve gear components. Grand Canyon Railway, concerned that steam locomotive owners and/or operators would likely incur long delays waiting for agency approval during which the owners and/or operators would not be able to use their steam locomotives, urged instead that the owners and/or operators be permitted to perform welding on the rods (as per accepted national standards) and then submit detailed notification to FRA. The task force quickly reached consensus on this issue, emphatically agreeing that the reporting requirement should remain as written in the NPRM. The task force members agreed that, because rod welding is a relatively new procedure and can involve welding on a number of different types of metals, there is need for uniform oversight and prior approval to minimize the possibility of these repairs being done improperly. It was noted that an improperly repaired rod could break and fly up into the locomotive, resulting in the serious injury or death of crew members, passengers, and bystanders as well as substantial damage to the steam locomotive, and the possible derailment of the train.

FRA agrees completely with the task forces observations and recommendations. Given the potentially disastrous consequences if an improperly repaired side and/or valve rod were to break while the steam locomotive was operating in service, the agency believes that it is mandatory that it have the opportunity to review and

approve or deny requests to perform such repairs beforehand.

#### *Section 230.106 Steam Locomotive Frame*

Section 230.106(a) establishes the cleaning, inspection, and maintenance requirements for steam locomotive frames, decks, plates, tailpieces, pedestals, and braces—requiring cleaning and thorough inspection of these parts whenever the steam locomotive is shopped for "heavy repairs." Grand Canyon Railway took exception to this section as written, commenting that if the cleaning and inspection requirement is tied to the performance of "heavy repairs" then that term should be defined.

The task force agreed that the term "heavy repairs" is not essential since it is only used once in the proposed rule. The task force quickly reached consensus that the term "heavy repairs" should be stricken from the rule. It was decided to recommend that § 230.106(a) be changed to require that frames, decks plates be cleaned "as often as necessary to maintain in a safe and suitable condition for service, with cleaning intervals not to exceed every 1472 service days."

FRA believes the term "heavy repairs" is very subjective and would be difficult to define clearly and concisely. Therefore, the agency has decided to accept the task force's recommendations and is changing this section by striking the words "each time the steam locomotive is in shop for heavy repairs" and replacing them with the words "as often as necessary to maintain in a safe and suitable condition for service, with cleaning intervals not to exceed every 1472 service days."

#### *Section 230.109 Tender Trucks*

Subsection (d) establishes a requirement that all tenders be equipped with devices or securing arrangements to prevent the separation of the tender body and trucks in the event of a derailment. This section drew comments from Ohio Central Railroad System and the Tennessee Valley Railroad. Ohio Central Railroad commented that the requirement is vague and does not explain how such a device is to be setup and what the installation standard will be for tenders not originally equipped with such devices. Ohio Central also requested clarification on whether steam locomotive tenders that were designed and built without such securing devices would be "grandfathered" in under the rule and as to whether auxiliary water and/or fuel cars are considered to be tenders. Tennessee Valley Railroad

requested clarification as to what is a "securing device" and stated its belief that this section is not needed and will place a major financial burden on those locomotive owners and/or operators whose tenders are not so equipped.

The task force discussed this issue at some length and finally decided to recommend that this section be amended to adopt the requirements of the 1978 revisions to part 230. Under the 1978 revisions, when tenders are equipped with securing arrangements or devices, those arrangements or devices must be maintained in safe and suitable condition for service. The effect of the recommended change would be to simply require that such devices must be properly maintained when used. The task force members agreed to recommend that FRA consider only auxiliary water and/or fuel cars that are semi-permanently or permanently coupled to the steam locomotive and tender as tenders.

FRA agrees with and is adopting the recommendations of the task force. Section 230.109(d) will be amended by changing the language in the NPRM to read that "When a tender is equipped with a device or securing arrangement to prevent the truck and tender body from separating in the event of a derailment, that device or securing arrangement shall be maintained in a safe and suitable condition for service. FRA is making this change in the final rule because of its concern that requiring the installation of truck securing devices/arrangements on tenders that were built without such devices would impose substantial financial costs on the locomotive owners and/or operators while conferring minimal additional safety benefits in return.

#### *Section 230.115 Feed Water Tanks*

This section of the rule sets the requirements for steam locomotive feed water tanks. Subsection (a) includes a requirement that feed water tanks be equipped with measuring devices that allow the amount of water in the tank to be measured from the locomotive cab or tender deck. Tennessee Valley Railroad commented that 3 truck Shay locomotives should be specifically excluded from this section or, in the alternative, a provision for the issuance of waivers from this requirement should be included in this section.

The task force weighed Tennessee Valley's comments but decided to recommend against making the suggested changes. The task force members believed that compliance with this section will not be unduly burdensome and the safety benefits of

being able to continuously monitor the amount of water in the feed water tank greatly outweigh any financial burden imposed on locomotive owners and/or operators.

#### **Inspection Requirements**

Appendix A to part 230 lists (for guidance purposes only) the inspection requirements for daily, 31 service day, annual, and 5 year inspections. Listed under item 18 of the daily inspection requirements is a duty to inspect the classification lamps. The Minnesota Transportation Museum, Inc., took exception to this requirement, commenting that the inspection requirement for class lights should be deleted as such lights no longer have any function.

The task force disagreed with Minnesota Transportation Museum's comments. One task force member observed that his steam locomotive operation utilizes class lamps whenever extra trains are run. The task force decided to recommend that FRA retain the requirement that class lamps be inspected on a daily basis because, although unlikely, the need to illuminate these lamps could arise at any time.

FRA is retaining the requirement that classification lamps be inspected in the final rule. The agency believes this requirement is justified because whenever a steam locomotive is used on a steam operation that runs extras, the need to use the class lamps may arise.

#### *49 CFR Part 209*

##### **Section-by-Section Analysis**

The following section-by-section analysis discusses in more detail the changes and amendments made to Appendix A to part 209.

In the NPRM, FRA proposed to include as an appendix to part 230 a discussion of the agency's exercise of jurisdiction over tourist railroads. FRA has concluded that it is more logical to include this discussion in Appendix A to part 209, which already contains an agency statement of policy about its safety jurisdiction. Therefore, rather than including this jurisdictional discussion as an appendix to part 230, FRA is amending appendix A to part 209. Because this discussion will be inserted into an existing policy statement that explains the basic principles of FRA jurisdiction, it does not contain the discussion of those principles that was originally included when proposed as an appendix to part 230. FRA has also changed the discussion in ways that are intended to make it more clear.

This jurisdictional statement summarizes the policy FRA has implemented toward tourist operations for many years. FRA has explained that policy in a report to Congress ("Federal Railroad Administration Regulatory Actions Affecting Tourist Railroads") in June 1996, Congressional testimony, and in many letters to individual tourist railroads and their associations over the last several years. Several rules have contained provisions specifically concerning FRA's exercise of jurisdiction over tourist operations (e.g., 49 CFR 234.3(c)). However, until now, FRA has not published its policy in the CFR for easy reference.

#### *49 CFR Part 230*

##### **Section-by-Section Analysis**

The following section-by-section analysis discusses in more detail the changes and amendments made to the 1978 version of part 230. As an aid to readers, FRA has denominated as "new" sections of the final rule which lack a present counterpart.

##### **Subpart A—General**

In this subpart, FRA has added a series of provisions consistent with those found in its other recent regulations. Through these uniform provisions, FRA makes explicit the scope, purposes and applicability of these rules and the potential consequences of noncompliance with the rules once adopted.

#### *Section 230.1 Purpose and Scope (New)*

This section clearly defines the scope of part 230; explaining that these standards are intended to establish minimum standards for inspection and maintenance of steam locomotives used on railroads to which this part applies.

#### *Section 230.2 Applicability (New)*

As described in the "Responsibility for Compliance" discussion, the task force wanted to rewrite this part to make clear that the steam locomotive regulations would apply primarily to steam locomotive owners and/or operators. The task force's proposed applicability section read as follows: "This part applies to any entity which owns a steam locomotive or operates one under a contract, agreement or lease. This part does not apply to entities that own or operate steam locomotives over track that is less than 24 inches in gage or to entities that are considered "insular" by this agency." See Appendix A of part 209 for a current statement of the policy on FRA's exercise of jurisdiction.

Although the agency changed this language to text that is more in keeping with the purpose and language of the applicability provisions of FRA's other rules, the changes made do not conflict with the task force's recommendation that the rule clearly place primary responsibility for compliance with the rules on the owner and/or operator of the locomotive. By design, the applicability section explains the type of rail operations to which the rule will apply, not upon whom responsibility for compliance will lie. By statute, FRA has jurisdiction over all railroads (except for urban rapid transit operations not connected to the general system), but it frequently limits the reach of a particular rule to less than the entire universe of railroads, using the applicability section to clarify which operations it intends to be covered by the rule. Locomotive owners and/or operators and other parties seeking guidance on whether they must comply with this part should refer to § 230.8 Responsibility for Compliance for guidance. That section specifically explains to whom the rule applies.

Notwithstanding their elimination from the applicability section, wherever appropriate, the locomotive owner(s) and/or operator(s) are specifically identified in the rule as the party or parties best able to execute certain delineated inspection and maintenance responsibilities. Thus, the fact that the locomotive owner and/or operator are not referred to by name in the applicability provision does not mean that they may not be held primarily responsible for compliance. Section 230.2 should be viewed as describing the extent of the agency's exercise of its statutory jurisdiction in the area of steam locomotive safety, with § 230.8 providing the practical compliance guidance that the task force recommended be included in the applicability section. Accordingly, § 230.2 explains that these standards apply to all railroads that operate steam locomotives, with four categorical exceptions (three of which are considered "standard" exceptions). First, this section does not apply to railroads of less than 24" gage. This exception is not standard but is consistent with the agency's historical approach to exercising its safety jurisdiction. Railroads operating on less than 24" gage track have never been considered railroads by the Federal railroad safety laws; generally being considered miniature or imitation railroads. In the context of this rule, which clearly applies to certain operations of less than standard gage, it

is important to clarify that the smallest gage railroads are not included. Second, this section does not apply to "plant" railroads that exclusively operate freight trains on track inside an installation that is not part of the general system of transportation, this is a standard provision. Third, this section does not apply to urban rapid-transit operations that are not connected to the general system of transportation. This is also a standard provision that merely restates the statutory limit on FRA's jurisdiction for the convenience of the reader. Finally, this section excludes from its reach railroads that operate passenger trains only on track inside an insular installation—operations limited to separate enclaves in such a way that the safety of those not entering the enclaves is not affected by the operations. Insularity is destroyed, however, and the rule applies where any of the following exists on its line: (1) A public highway-rail crossing that is in use; (2) an at-grade rail crossing that is in use; (3) a bridge over a public road or commercially navigable waters; or (4) a common corridor with another railroad, i.e., where operations are conducted within 30 feet of those of any other railroad. This section, too, is standard and reflects the agency's long-standing policy on its exercise of jurisdiction over tourist and historic railroads. This language is used where FRA intends to reach tourist railroads whose operations are not over the general railroad system but affect public safety sufficiently to be covered by a particular rule. As proposed, this section includes the word "installation" in its discussion of this part's applicability to entities that operate "passenger" trains. While the agency has included this term with specific reference to passenger operations in three of its rulemakings over the past few years, the agency believes that the regulated industry may not be accustomed to seeing this term in the context of tourist railroads. It is the agency's view that an "installation" is simply a separate enclave off the general system.<sup>1</sup>

### Section 230.3 Implementation (New)

This section establishes a staggered implementation scheme. This scheme is designed to provide flexibility to those steam locomotive owners and operators

who otherwise might be adversely affected by the magnitude of changes being implemented. This implementation language was strenuously debated by the task force members. The task force's greatest concern was that steam locomotive owners and/or operators would be required to conduct an inspection equivalent to that required by this rule's § 230.17 sooner than they would be required to do so under § 230.10 of the 1978 standards. The task force was also concerned that steam locomotive owners and/or operators not be granted a "windfall" and allowed so much time under the new standards to perform required inspections that safety could be compromised. The task force's primary concern was insuring that the new inspection requirements would be applied retroactively to locomotives that had complied with §§ 230.10 and 230.11 of the 1978 standards within a certain period of time prior to the effective date of the rule. The task force had difficulty in determining what was an appropriate period of time prior to the rule's effective date in which to allow retroactive application of the new inspection standards. Under the compromise finally worked out by the task force and adopted by FRA, performance of the 1472 service day inspection, which must be conducted at the time a § 230.10 inspection would have been required under the 1978 standards, triggers the compliance requirement. Thus, with the exception of certain inspection and maintenance requirements that become effective one year from the effective date of the rule, steam locomotive owners and/or operators must begin to comply with part 230 when the 1472 service day inspection becomes due under this rule. Up until that time, however, compliance with the regulations in effect prior to the effective date of this rule will be considered to be full compliance with this part. To provide additional flexibility, however, the agency will continue to consider flue removal extension requests made under the provisions of § 230.10 of the 1978 standards for two years from the effective date of the rule. Thus, for example, a locomotive that received an inspection under § 230.10 of the 1978 standards up to five years before the date of this rule would have, with this flue extension provision, a minimum of two years from the effective date of the rule to conduct the 1472 service day inspection required by these standards. If the locomotive very recently received the inspection required by § 230.10 of the 1978 standards, the locomotive

<sup>1</sup> See Power Brake Regulations NPRM, 59 FR 47676 (September 16, 1994); Railroad Accident Reporting NPRM, 59 FR 42880 (August 19, 1994); and Grade Crossing Signal System Safety Final Rule, 59 FR 50086, (September 30, 1994). Subsequent publications in the Grade Crossing (GC) and Accident Reporting (AR) arenas have included this language as well. See 61 FR 30940 (AR) (6/18/96), 61 FR 31802 (GC), (6/20/96), and 61 FR 67477 (AR) (12/23/96).



owner and/or operator will have the entire period allowed under that section before having to conduct the required 1472 service day inspection.

In addition, under this section, locomotive owners and/or operators may petition the agency for "special consideration" of the rule's implementation. In order to qualify to file a petition for special consideration, the locomotive owner and/or operator must have either fully or partially satisfied the 1472 service day inspection requirements within three years prior to September 25, 1998 (the date of publication of the NPRM). If the locomotive is only in partial compliance with the requirements of this section, it will have to be in full compliance by the time the petition is actually filed. The petition must be filed within one year from the effective date of the rule and must include all the documentation necessary to establish that the locomotive is in compliance with the requirements of the 1472 service day inspection standards. The agency must respond to the petition within one year of filing. Thus, the time involved in filing a petition for special consideration and receiving FRA's response to that petition, will be the same as the two-year grace period allowed to non-petitioning locomotive owner and/or operators who utilize the available flue extension provision. If FRA does not respond in a timely fashion, the locomotive owner and/or operator awaiting the response will be granted an additional extension of up to 6 months or until the time the agency's decision is received, whichever occurs first.

The distinction between "full" and "partial" satisfaction of the 1472 service day inspection requirements is made in reference to the two-step procedure that must be complied with under subsection (a) of § 230.17. This consists of the general inspection requirements and the requirement that the FRA Form No. 4 be updated and verified at that time. A locomotive owner and/or operator who has satisfied both of these requirements within three years prior to the effective date of this rule will be able to file the petition the day the rule becomes effective. A locomotive owner and/or operator that has only satisfied one requirement, however, has only "partially" satisfied the requirements of § 230.17 and will have until the term of the petition process, one year, to satisfy the second requirement. For example, a locomotive owner and/or operator who inspected their locomotive under § 230.10 of the 1978 standards within three years prior to the effective date of this rule, but did not update and verify

the FRA Form No. 4 at that time, will have a full year to do so before submitting the application. Likewise, if the FRA Form No. 4 has been updated and verified within three years prior to the effective date of the rule but an inspection satisfying § 230.10 of the 1978 standards has not been conducted, the locomotive owner and/or operator will have one year in which to conduct the qualifying inspection before submitting an application for special consideration.

Section 230.3 also contains provisions addressing the requirements related to the filing of the petition. This section requires petitions for special consideration to be accompanied by all the locomotive records that show how many service days the locomotive has accumulated since the last inspection conducted under the 1978 standards, and the number of service days remaining before a 1472 service day inspection must be conducted under the "new" § 230.17. The task force was concerned about proving the submission and response to the petition, so they recommended, and FRA agreed to stress that these petitions should be sent by some form of registered mail to ensure a record of delivery. For its part, the agency will respond to all such petitions by registered mail within one year of receipt. In addition, this section contains provisions addressing the effect of the petition's disposition on the implementation requirements. If the agency grants the petition, the requirements will become effective upon receipt of the response letter. Likewise, if the agency denies the petition, the rule will become effective as though the petition had never been filed.

Finally, because many task force members were concerned about the problem of potential untimeliness in the agency's response, this section addresses the effect of agency silence within the one year response time period. Under this rule, the petitioner must notify the agency if a response to the petition for special consideration has not been received within the prescribed one year period. Operators at the end of their inspection cycle, who have not received a response from the agency within the one year provided, will be allowed to operate under the 1978 standards for an additional 6 months, or until they receive FRA's decision, whichever occurs first.

#### *Section 230.4 Penalties (New)*

This section incorporates the maximum penalties provided for in the Federal railroad safety laws. These penalty amounts, however, have

recently been adjusted for inflation pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990, Pub. L. 101-410, Stat. 890, 28 U.S.C. 2461 note, as amended by the Debt Collection Improvement Act of 1996, Pub. L. 104-124 (4/26/96). For a more complete discussion of the agency's recent penalty adjustments see Civil Monetary Penalty Inflation Adjustment, 63 FR 11618 (March 10, 1998).

#### *Section 230.5 Preemptive Effect (New)*

This part is issued under the authority of 49 U.S.C. 20106 and 49 U.S.C. 20701-20703. FRA believes that the broad field preemption of the LRIA (49 U.S.C. 20701 *et seq.*), while the appropriate standard in the area of locomotive safety, does not preempt state regulation of those steam locomotive operations over which FRA has never exercised jurisdiction, such as insular tourist railroads and amusement rides.

#### *Section 230.6 Waivers (New)*

All waivers previously granted under part 230 that are not filed for reassessment with the FRA's Office of Safety prior to the effective date of this rule will lapse on that date. However, under the terms of this provision, the agency will review those waivers that are timely filed and notify applicants whether the waiver has been continued. The one exception to this is where the waiver granted was for a "flue extension." Those waivers automatically expire one year from the date granted.

The reason FRA has eliminated the granting of waivers under part 230 is to correct the misapplication of § 230.158 of the 1978 standards for inspection and maintenance of steam locomotive boilers and flues. Under the 1978 standards, railroads operating fewer than 5 locomotives were allowed to apply for waivers from the requirements of Subpart B—Steam Locomotives and Tenders. This section was intended to apply only to those regulations in Subpart B; in practice, it was extended to apply to Subpart A as well. Consequently, operators were often granted waivers from compliance with the provisions of Subpart A.

In addition, the agency is using this section to make clear that its waiver process, described in 49 CFR part 211, has now been centralized. As such, this section cites to part 211 of this chapter for the appropriate standards when filing petitions for waiver from the requirements of part 230.

**Section 230.7 Responsibility for Compliance (New)**

This section restates, in regulatory language, the provisions of Chapter 207 of Title 49 of the United States Code: commonly referred to as the Locomotive Inspection Act. This section also designates the party or parties responsible for ensuring that the requirements of part 230 are satisfied. See the discussion in section VI(A) titled "Responsibility for Compliance," above.

**Section 230.8 Definitions (New)**

The following is an explanation of each definition that FRA is adding or amending in this final rule.

**Alteration:** This definition incorporates the NBIC definition to harmonize concepts within the industry.

**ANSI:** This definition is non-substantive and is included for clarification purposes only.

**API:** This definition is non-substantive and is included for clarification purposes only.

**ASME:** This definition is non-substantive and is included for clarification purposes only.

**Boiler Surfaces:** This definition was added to make clear what areas of the boiler are referenced throughout the rule.

**Break:** This definition incorporates the distinction between "break" and "crack" delineated in part 229.

**Code of Original Construction:** This definition is non-substantive and is included for clarification purposes only.

**Crack:** This definition incorporates the distinction between "break" and "crack" delineated in part 229.

**Dead-in-tow:** This definition is intended to provide guidance as to when a non-complying steam locomotive may be moved.

**Lite Locomotive:** This definition is intended to provide guidance as to when a non-complying steam locomotive may be moved.

**Locomotive Operator:** As discussed in the liability section above, in recognition of the fact that many locomotives are owned and operated by entities other than railroad companies, FRA is making its liability standards more specific. This definition distinguishes between these relevant entities in order to make clear that a locomotive may be owned and operated by separate entities.

**Locomotive Owner:** As discussed in the liability section above, in recognition of the fact that many locomotives are owned and operated by entities other than railroad companies,

FRA is making its liability standards more specific. This definition distinguishes between these relevant entities in order to make clear that a locomotive may be owned and operated by separate entities.

**MAWP:** This definition is non-substantive and is included for clarification purposes only.

**NBIC:** This definition is non-substantive and is included for clarification purposes only.

**NDE:** This definition is non-substantive and is included for clarification purposes only.

**NPS:** This definition is non-substantive and is included for clarification purposes only.

**Railroad:** This definition incorporates the statutory definition of railroad in 49 U.S.C. Sec. 20102.

**Renewal:** This definition incorporates industry concepts and is not intended to have substantive effect.

**Repair:** This definition incorporates the NBIC definition to harmonize concepts within the industry.

**Serious Injury:** This definition incorporates the definition of serious injury from the "FRA Guide for preparing Accident Incident Reports" (Effective: January 1997).

**Service Day:** As described in the inspection section above, the agency is revising the inspection time periods throughout this part, basing them on a new "service day" concept. Service day is defined as each and every calendar day that a steam locomotive boiler has steam pressure above atmospheric pressure with fire in the firebox. Each such day will count as a "service day" for the locomotive.

**Stayed Portion of the Boiler:** This definition establishes a threshold for distinguishing between stayed and unstayed portions of the boiler, both of which are identified in this part. It is not intended to have substantive effect.

**Steam Locomotive:** This definition modifies the 1978 standard's definition of "locomotive" to make it specific to a "steam locomotive." It has been rewritten for grammatical clarity.

**Unstayed Portion of the Boiler:** This definition establishes a threshold for distinguishing between stayed and unstayed portions of the boiler, both of which are identified in this part. It is not intended to have substantive effect.

**Wastage:** This is a technical definition; included for the purpose of clarifying required minimum thicknesses and condemning limits for the boiler.

**Section 230.10 Information Collection (New)**

This section is included for the convenience of the reader. Imposing no new requirements upon regulated entities, it simply represents the agency's certification that it has complied with all Office of Management and Budget review requirements pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 *et seq.*). The review and approval process reflected in this provision are explained in greater detail below.

**General Inspection Requirements****Section 230.11 Repair of Non-Complying Conditions (New)**

This section adopts the requirement in part 229 that non-complying locomotives be repaired before being returned to service. In addition, it affixes the responsibility for such repairs and for approving any noncomplying conditions that are not repaired on the locomotive owner and/or operator.

**Section 230.12 Movement of Non-Complying Steam Locomotives (New)**

This section makes part 230 current with part 229 by incorporating the concept of movement for the purpose of repair. Under this section, locomotive owners and/or operators are allowed to move a noncomplying locomotive for the purpose of repair, after the locomotive owner and/or operator has determined that the locomotive is safe to be so moved. Upon consideration of the comments received, FRA and the task force amended this section to provide for the movement of noncomplying steam locomotive. The task force felt strongly that this provision was necessary to accommodate the operating exigencies which may occur in the course of steam locomotive operations.

**Section 230.13 Daily Inspection**

This provision adopts, without substantive change, the existing regulations governing the daily inspection of steam locomotives.

**Section 230.14 31 Service Day Inspection (New)**

This provision, while not substantively changing the inspection requirements for steam locomotives, adds a requirement that locomotive owners and/or operators notify FRA before performing a 31 service day inspection and revises the time interval within which certain inspections must be performed.

*Section 230.15 92 Service Day Inspection (New)*

This provision imposes no new inspection requirements for steam locomotives but revises the time frame within which certain inspections must be performed.

*Section 230.16 Annual Inspection (New)*

This provision makes no substantive change in the annual inspection of steam locomotive requirements, except to add a requirement that locomotive owners and/or operators notify FRA before performing annual locomotive inspections.

*Section 230.17 1,472 Service Day Inspection (New)*

This provision revises the time frame within which certain inspections must be performed and imposes a requirement that steam locomotive owners and/or operators complete, update, and verify the steam locomotive's FRA Form No. 4 at the time of the locomotive's 1472 service day inspection and file the FRA Form No. 4 with FRA within 30 days of completion of the inspection. See the analysis in section IX(B)(5), above.

**Recordkeeping Requirements***Section 230.18 Service Days (New)*

This provision imposes a new recordkeeping requirement on the owners and/or operators of steam locomotives. Under this section, locomotive owners and/or operators are required to keep a current service day record showing the number of service days the steam locomotive has accrued since its last 31 service day, 92 service day, annual and 1472 service day inspection. Locomotive owners and/or operators are also required to file a report with FRA each January 31, detailing the number of service days each steam locomotive accrued during the preceding calendar year. Failure to file this report will result in the locomotive being considered "retired." In order to return a "retired" locomotive to service, the locomotive owner and/or operator will have to first perform a 1472 service day inspection. The agency realizes that exigencies do arise and, as such, does not intend to be totally inflexible in the enforcement of this recordkeeping requirement. Should a service day report be filed a day or two late, the agency will give the operator the benefit of the doubt and accept the report as though it had been timely filed.

While these changes impose some additional recordkeeping duties on

regulated entities, the agency believes that the additional burdens so imposed are substantially outweighed by the benefits the regulated community will realize from the new inspection time periods.

*Section 230.19 Posting of FRA Form No. 1 and FRA Form No. 3*

There are no new recordkeeping requirements imposed upon locomotive owners and/or operators under this section. The FRA Form No. 1, 31 service day and 92 service day inspection report required under this rule, is equivalent to the monthly inspection report formerly required under §§ 230.51 and 230.160 of the 1978 standards. The required FRA Form No. 3, annual inspection report, is equivalent to the annual inspection report formerly required under §§ 230.52 and 230.161 of the 1978 standards.

*Section 230.20 Alteration and Repair Report for Steam Locomotive Boilers*

This section imposes recordkeeping requirements upon locomotive owners and/or operators. FRA Form No. 19 is the alteration report regulated entities were required to file under § 230.54 of the 1978 standards. Under this rule, the locomotive owner and/or operator is required to file a FRA Form No. 19 whenever alterations that affect the information on the FRA Form No. 4 are made and/or whenever welded or riveted repairs are made to the unstayed portion of the locomotive boiler. Locomotive owners and/or operators also must make out and maintain (but not file with FRA) FRA Form No. 19s whenever welded or riveted repairs are made to stayed portions of the locomotive boiler.

*Section 230.21 Steam Locomotive Number Change (New)*

This section incorporates requirements originally issued by the former Interstate Commerce Commission in its "Interpretations, Rulings and Explanations on Questions Raised Regarding the Laws, Rules, and Instructions for Inspection and Testing of Steam Locomotives and Tenders and Their Appurtenances" (ICC Interpretations).

*Section 230.22 Accident Reports*

This section, which retains the requirements of § 230.162 of the 1978 standards, details when a railroad must report an accident involving a steam locomotive boiler and/or appurtenance, how and to whom the report must be made, and what information must be conveyed in the report.

**Subpart B—Boilers and Appurtenances***Section 230.23 Responsibility for General Construction and Safe Working Pressure*

This section makes the locomotive owner and operator, both, jointly and severally responsible for the general design and construction of the locomotive boiler. Section 230.1 of the 1978 standards placed that responsibility on the "railroad company." This change, made on account of the changes which have occurred in the steam locomotive industry since the original steam rules were promulgated, places responsibility for the locomotive on the locomotive owner and/or operator, the parties in the best position to assume that responsibility. Under this rule, responsibility is affixed on the locomotive owners and operators regardless of whether they are railroad companies.

**Allowable Stress***Section 230.24 Maximum Allowable Stress*

This section, while not substantively changing § 230.2 of the 1978 standards, rephrases some of the wording in order to help clarify and eliminate any ambiguities or confusion arising thereunder.

*Section 230.25 Maximum Allowable Stress on Stays and Braces*

Other than removing the distinction between locomotives constructed before and after 1915, which the task force and FRA both believe is no longer relevant, this section is substantially the same as § 230.3 of the 1978 standards.

**Strength of Materials***Section 230.26 Tensile Strength of Shell Plates*

This section of the final rule adopts, without change, § 230.4 of the 1978 standards.

*Section 230.27 Maximum Shearing Strength of Rivets*

This section of the final rule adopts, without change, § 230.5 of the 1978 standards.

*Section 230.28 Higher Shearing Strength of Rivets*

This section of the final rule adopts, without change, § 230.6 of the 1978 standards.

**Inspection and Repair***Section 230.29 Inspection and Repair*

This section combines the concepts embodied in §§ 230.7 and 230.12 of the

1978 standards. The task force recommended changing the party charged with responsibility for inspection and repair of the locomotive boiler from the "mechanical officer in charge at each point where boiler work is done" to the steam locomotive owner and/or operator. FRA agreed to make the recommended changes in this section because few steam operations still have chief mechanical officers, and the agency wanted to make "liability" as consistent as possible throughout the rule. This section also requires the locomotive owner and/or operator to remove a locomotive boiler from service whenever they, or the FRA inspector, considers it necessary due to the presence of other defects. The task force originally had some concern about FRA inspectors' exercise of discretion in this arena. However, it was agreed that the agency will act in good faith and do its best to minimize any disruption of the operator's service whenever such concerns arise. The task force also recommended that FRA allow for non-destructive testing in the investigation of any "safety concerns" identified.

This section also makes more specific the repair standard in § 230.12 of the 1978 standards, requiring that all defects disclosed be repaired in accordance with accepted industry standards. These "accepted industry standards" include established railroad practices, or NBIC or API established standards. See section IX(D), above, for a discussion of the meaning of "established railroad practices." This section also replaces the "satisfactory condition" repair standard of the 1978 standard's § 230.12 with the requirement that a locomotive boiler may not be returned to service unless it is in good condition and "safe and suitable for service."

Finally, this section requires that welded repairs to unstayed portions of the boiler made pursuant to § 230.33 be performed in accordance with an accepted national standard for boiler repairs.

#### *Section 230.30 Lap-Joint Seam Boilers*

This section clarifies and eliminates ambiguous language in § 230.13 of the 1978 standards by explaining that "examined with special care" means removing enough lagging, jacketing, flues and tubes so that a thorough inspection of the entire joint (inside and out) can be made. FRA does not intend for this section, which is otherwise unchanged from the 1978 standards, to restrict the use of modern technology which may allow a "thorough inspection" to be performed without

having to disassemble so much of the locomotive.

#### *Section 230.31 Flues To Be Removed*

This section revises the time period within which locomotive owners and/or operators must remove all flues of locomotive boilers and conduct a thorough inspection of the boiler. Section 230.10 of the 1978 standards required that flue removal and inspection be done at least once every four (4) years. This section allows the locomotive owner and/or operator to leave the superheater flues in the boiler and perform the inspection using NDE methods to assess their condition, provided two conditions are satisfied. These conditions are: (1) that the NDE testing shows that the superheater flues are safe and suitable for locomotive service; and (2) that the boiler can be entered to be cleaned and inspected without their removal. However, under this section, the locomotive owner and/or operator will still be required to remove the superheater flues if they—or the FRA inspector—believe doing so is necessary for some identifiable safety concern.

This section also deletes the provision in the 1978 standards that authorized FRA to grant extensions of the time period within which flues must be removed. The task force felt that the 15-year "drop dead" time limit for conducting the 1472 service day inspection should be the absolute maximum amount of time a steam locomotive may operate without having the flues removed. Under the 1978 standards, operators who were required to remove their locomotive flues once each four years (which could become five years with the use of "out of service credit") could receive flue removal extensions of as much as thirteen years. Since this section allows the time period between flue removals to be stretched out to a maximum of 15 years, the task force felt that no further extensions were necessary.

As discussed above in section IX(E), the task force strongly believes that operators should be encouraged to take advantage of new technologies in the use and operation of steam locomotives. By allowing the operator to leave superheater flues in the boiler as long as it could be determined that they were safe and suitable for service without removing them, the task force felt it was creating an incentive for operators to utilize the latest NDE methods in making that determination.

#### *Section 230.32 Time and Method of Inspection*

This section combines the boiler inspection requirements previously contained in §§ 230.9, 230.11, 230.15 and 230.16 of the 1978 standards, and rewrites them for clarity. The task force felt that the various inspection requirements should be consolidated into one section and made more explicit.

#### *Section 230.33 Welded Repairs and Alterations (New)*

This section specifies when welding may be done on stayed and unstayed portions of the locomotive boiler. Subsection (a) requires the locomotive owner and/or operator to obtain prior written approval of the FRA Regional Administrator before performing any welding on unstayed portions of boilers containing alloy steel, or carbon steel with a carbon content greater than .25 percent. It also requires that any welding so approved be conducted in accordance with an accepted national standard for boiler repairs. See section IX(D)(1), above, for a discussion of this standard.

Subsection (b) provides that locomotive owners and/or operators must perform welding to unstayed portions of boilers containing carbon steel not exceeding .25 percent carbon in accordance with an accepted national standard for boiler repairs. Both subsections (a) and (b) require the locomotive owner and/or operator to satisfy the reporting requirements file an FRA Form No. 19, Report of Welded Repair, as discussed in § 230.20.

Subsection (c) restricts the use of weld build up for wasted areas of unstayed surfaces of the boiler. A locomotive owner and/or operator desiring to build up by weld wasted areas that exceed: (1) A total of 100 square inches; or (2) the smaller of either 25 percent of the minimum required wall thickness or 1/2 inch must submit a written request for approval to the FRA. This subsection also prohibits the use of weld build up for wasted sheets that have been reduced to less than 60 percent of the minimum thickness required by these rules.

Subsection (d) prohibits the installation of flush patches of any size on unstayed portions of the boiler unless the locomotive owner and/or operator has submitted a written request for prior approval to the FRA Regional Administrator.

Finally, subsection (e) allows locomotive owners and/or operators to perform welded repairs or alteration on stayed portions of the boiler in

accordance with established railroad practices or an accepted national standard for boiler repairs. In recognition of the fact that many operations successfully use their own welding procedures on stayed portions of the boiler, the task force recommended and FRA has agreed to allow locomotive owners and/or operators to use established "railroad practices" as an acceptable standard for welding on stayed portions of the boiler.

As discussed in the preamble, FRA has grave concerns about the quality of the welding being done on locomotive boilers. By enacting these changes, the agency believes that it has established standards that will improve safety while still providing operators with the flexibility critical to their business survival by allowing them to make necessary repairs without incurring unnecessary costs.

#### *Section 230.34 Riveted Repairs and Alterations (New)*

This section establishes the procedures for performing riveted repairs and alterations on both unstayed and stayed portions of the locomotive boiler. Under subsection (a), the locomotive owner and/or operator is required to receive prior written approval from the FRA Regional Administrator before making any riveted alterations to unstayed portions of the boiler. Any such riveting must be done in accordance with established railroad practices or an accepted national standard for boiler repairs. See the analysis for § 230.29, above, for a discussion of these repair standards. This subsection also requires the locomotive owner and/or operator to satisfy, at this time, the reporting requirements listed in § 230.20.

Subsections (b) and (c) establish guidelines for riveting locomotive boilers. Under these guidelines, all riveted repairs to stayed and unstayed portions of the boiler must be made in accordance with established railroad practices or an accepted national standard for boiler repairs.

#### *Pressure Testing of Boilers*

##### *Section 230.35 Pressure Testing (New)*

This section sets a minimum temperature requirement for the application of hydrostatic pressure to locomotive boilers. The temperature of the locomotive boiler must be raised to at least 70 degrees Fahrenheit anytime it is tested under hydrostatic pressure. This change, which incorporates the NBIC temperature standard, brings FRA standards in accord with NBIC

standards, a change the task force recommended and FRA supports.

##### *Section 230.36 Hydrostatic Testing of Boilers*

This section consolidates the 1978 standards for the hydrostatic testing of boilers and adds an additional requirement that the boiler temperature must be raised to between 70 and 120 degrees Fahrenheit every time the boiler is subjected to hydrostatic pressure. This change incorporates the NBIC standard for hydrostatic testing into the federal regulations for steam locomotive inspection. In its consideration of these issues, the task force members were divided over the purpose of the hydrostatic test, and the pressure at which such tests should be conducted. Many operators believe that the purpose of the hydrostatic test is merely to test the boiler for leaks—not to see if the boiler is structurally sound at the time of the test. To them, testing the boiler at the MAWP, as calculated in the FRA Form No. 4, serves the requisite safety function by disclosing leaks without unnecessarily stressing (and prematurely ruining) the boiler. Many in the agency, however, felt strongly that the purpose of the hydrostatic test is to test the boiler's integrity—to disclose weaknesses in the structure of the boiler that have not yet developed into defects. They also felt strongly that no convincing data had been presented that testing a boiler at MAWP, as specified on the FRA Form No. 4, would provide an equivalent level of safety. Because the parties could not reach a consensus on this provision, the agency has decided not to change the pressure testing standard, keeping the required pressure for hydrostatic pressure testing at 25 percent above MAWP, as specified on the FRA Form No. 4.

##### *Section 230.37 Steam Test Following Repairs or Alterations*

This section adopts § 230.20 of the 1978 standards, rewriting parts of it for greater clarity. The one substantive revision changes the pressure required for the steam test from "not less than the allowed working pressure" to "between 95 and 100 percent of the MAWP." The task force decided that setting a lower pressure limit would reduce the stress on the boiler without an accompanying reduction in safety—that 95 to 100 percent of MAWP would be adequate to disclose unsatisfactory conditions in the locomotive boiler.

#### *Staybolts*

##### *Section 230.38 Telltale Holes*

This section consolidates the 1978 standards' telltale hole provisions, §§ 230.23 and 230.26, and the "reduced body" staybolt section from the ICC Interpretations in one section. Subsection (a) retain § 230.26 of the 1978 standards but deletes, as moot, the application date. Subsection (b) is a new provision written to import the ICC interpretation for reduced body staybolts to part 230. Finally, subsection (c), derived from § 230.23 of the 1978 standards, creates a stand alone provision for clarity and to emphasize that telltale holes must be kept open at all times, except as required in § 230.41.

##### *Section 230.39 Broken Staybolts*

This section amends § 230.25 of the 1978 standards. Subsection (a) establishes the maximum number of broken staybolts allowed for each locomotive boiler. Under § 230.25 of the 1978 standards, a locomotive boiler was required to be taken out of service when it developed two (2) broken or plugged staybolts adjacent to one another in any part of the firebox or combustion chamber; when three (3) or more staybolts were broken or plugged in a circle four (4) feet in diameter, or when five (5) or more were broken or plugged in the entire boiler. This section changes this standard by requiring that a boiler be taken out of service when it develops either two (2) broken staybolts within twenty-four (24) inches of each other, as measured inside the firebox or combustion chamber on a straight line, or more than four (4) broken staybolts within the entire firebox and combustion chamber combined.

The NBIC requires boilers with one broken staybolt to be taken out of service and repaired. Although the task force wanted to comport these standards with the NBIC, they decided to recommend that FRA allow for a second broken staybolt within twenty-four (24) inches in consideration of the operational difficulties involved in immediately taking a boiler out of service when one staybolt breaks. Because prolonged exposure in a slowly progressive fail mode turns exponential as additional staybolts break, and in order to minimize the overload on staybolts in the area of the one which has broken, the task force also recommended and this section has adopted a requirement that staybolts adjacent to those that break be inspected at the time the broken staybolt is replaced.

Subsection (b), requires broken staybolts detected during the 31 service

day inspection to be replaced at that time, and broken staybolts detected between 31 service day inspections to be replaced no later than 30 days from the date of detection. The task force, although recognizing that a strict time period was required to ensure an adequate measure of safety, wanted to take into account the fact that operational realities that might prevent owners and/or operators from repairing broken staybolts immediately. This section reflects the task force consensus that 30 days is a reasonable period of time within which to make the necessary repairs to the boiler and allows owners and/or operators to plan when, within a 30-day time period, they want to take the locomotive out of service and replace the broken bolts. This subsection also sets a requirement, consistent with the task force's recommendation, that the locomotive owner and/or operator replace broken staybolts eight (8) inches in length or less with staybolts drilled with telltale holes three-sixteenths ( $\frac{3}{16}$ ) to seven thirty-seconds ( $\frac{7}{32}$ ) inch in diameter and not less than one and one quarter ( $1\frac{1}{4}$ ) inches deep in each end, or that have holes three-sixteenths ( $\frac{3}{16}$ ) to seven thirty-seconds ( $\frac{7}{32}$ ) inch in diameter their entire length. This requirement is based on the task force's belief that drilled bolts are useful in revealing progressive failures before they reach catastrophic proportions.

Subsection (c) imports from the ICC Interpretations the definition of "broken" staybolts as those that are leaking, plugged, or missing, in the interest of consolidating and centralizing all current steam locomotive requirements.

Finally, subsection (d) prohibits the closing of broken staybolt ends by welding, forging or riveting. This is in accord with the ICC Interpretations stating that telltale holes that are leaking, plugged, riveted over, or missing, will be counted as broken staybolts. In this section, FRA has imposed a stricter standard for broken staybolts as per the task force's recommendation.

#### *Section 230.40 Time and Method of Staybolt Testing*

This section consolidates the requirements for staybolt testing formerly found in §§ 230.21, 230.22, 230.24 of the 1978 standards and the ICC Interpretations. Because the 1978 standards did not treat rigid staybolts and flexible staybolts without caps differently, this section combines these requirements into "staybolt testing" general requirements. Since the testing requirements for flexible staybolts with

caps are separate and distinct, the agency is not including them in the consolidation of testing requirements.

Section 230.21 of the 1978 standards required that staybolts be tested once a month and immediately after every hydrostatic test. In subsection (a), the agency has relaxed this requirement slightly by allowing the monthly inspection to be conducted once each thirty-one (31) service days. The requirement that staybolts be tested following each hydrostatic test is retained, but is more clearly explained. Subsection (a)(1) makes allowance for inaccessible staybolts that are drilled through their entire length. Under this provision, impediments making the staybolts inaccessible (brickwork, grate bearers, etc.) need not be removed to hammer test the staybolts. The task force members agreed that, since through-drilled staybolts would begin to leak if broken, safety would not be sacrificed by granting owners and/or operators a measure of flexibility in the testing of such staybolts.

Subsection (b) spells out the general testing requirements for all forms of staybolts. In this subsection, the task force tried to combine all the different "method of testing" provisions from the 1978 standards (§§ 230.21–230.27). The requirement that "not less than 95 percent of the MAWP" must be applied if staybolts are tested while the boiler contains water is a new one and reflects the task force's consensus view.

#### *Section 230.41 Flexible Staybolts with Caps*

This section rewrites § 230.23 of the 1978 standards for enhanced clarity and adds several new requirements.

Subsection (a) extends the time interval for removing the caps and inspecting flexible staybolts from once every two (2) years to every 5th annual inspection. This change was made in order to provide owners and/or operators additional flexibility without compromising safety.

Subsection (b) has been rewritten for clarity and to eliminate superfluous information.

Subsections (c) and (d) incorporate the provisions of § 230.23 of the 1978 standards substantially unchanged but edit it for clarity, deleting repetitious text and moving some text to more appropriate sections. For example, the 1978 requirement that the FRA Form No. 3 be kept in the railroad company's office has been relocated to § 230.19, the recordkeeping section of this rule.

#### *Section 230.42 Location of Gauges*

This section adopts § 230.28 of the 1978 standards substantively unchanged

while editing it for purposes of clarity and understanding.

#### *Section 230.43 Gauge Siphon*

This section adopts § 230.29 of the 1978 standards without any substantive change but rewrites it to enhance clarity and ease of compliance.

#### *Section 230.44 Time of Testing*

This section revises the requirements of § 230.30 of the 1978 standards in order to address the realities of modern steam locomotive operations. Today, it is common practice for steam locomotive owners and/or operators to remove gauges from their locomotives to prevent them from being stolen or vandalized. Sometimes the removed gauges are stored in conditions which may affect their calibration and accuracy. Accordingly, this section imposes a requirement that gauges must be tested prior to being installed or reapplied. In addition, for purposes of consistency with the rest of the rule, this provision extends the time for periodic testing of gauges from once every three months to whenever a 92 service day inspection is performed. Finally, as recommended by the task force, this section incorporates the requirement in § 230.30 of the 1978 standards that gauges be tested whenever any irregularity is reported.

#### *Section 230.45 Method of Testing*

This section provides a more complete description of the approved method for testing steam gauges than that found in the 1978 standards.

#### *Section 230.46 Badge Plates*

This section retains § 230.32 of the 1978 standards in principle but corrects the use of improper terminology by deleting the term "boiler head" and replacing it with the more correct term "boiler backhead."

#### *Section 230.47 Boiler Number*

This section retains § 230.33 of the 1978 standards in principle but rewrites the text for clarity and to comport with the ICC Interpretations.

#### *Safety Relief Valves*

#### *Section 230.48 Number and Capacity*

With the exception of two changes, this section retains the requirements for the number and capacity of locomotive safety relief valves found in § 230.34 of the 1978 standards. Subsection (a) increases the relieving tolerance from five (5) to six (6) percent above the MAWP. The task force recommended and FRA agreed to raise the tolerance to six percent to reflect modern testing practices. That figure was arrived at by

adding the manufacturer's tolerance for the safety valve itself (three (3) percent) and the industry standard from the ASME 1952 Code for the testing tolerance for safety valves (an additional three (3) percent). This subsection also makes clear that FRA inspectors have the authority to require proof of the relieving capacity for safety relief valves on steam locomotives.

Subsection (b) makes explicit the requirement that additional safety valve capacity must be provided if the capacity testing demonstrates the need to do so. In addition, this section acknowledges the use of the accumulation test as a method for testing safety valve capacity. However, in so doing, FRA is not expressing a preference that accumulation tests be used when determining safety relief valve capacity.

#### *Section 230.49 Setting of Safety Relief Valves*

In this section, FRA has made several changes to the requirements for setting safety relief valves provided in § 230.35 of the 1978 standards. First, this section imposes a new requirement that the individual responsible for setting the safety relief valves be "thoroughly familiar with the construction and operation of the valve being set." This competency requirement was added because the task force and FRA, while recognizing that modern safety valves have seals which are certified by certain organizations, did not want to officially require that the valves be reset by state officials. This section creates a competency standard which requires any person resetting safety valves to be thoroughly familiar with their construction and operation.

This section also revises the "opening pressures" for safety relief valves in § 230.35 of the 1978 standards by requiring that at least one of the two required safety-relief valves open at a pressure that is no greater than the MAWP. This rule changes the 1978 provision, which required that both valves be set to open at pressures not exceeding 6 pounds above MAWP. This change reflects the task force consensus that requiring one of the two safety valves to set to open at pressures not greater than MAWP would achieve a greater level of safety. However, this section does retain the 6 psi upper limit in § 230.35 of the 1978 standards for any additional safety valves utilized.

This section also revises the procedure for setting safety valves in § 230.35 of the 1978 standards. The requirement that the water level be "not above the highest gauge cock" has been changed to the equivalent requirement

that it not be "higher than  $\frac{3}{4}$  of the length of the visible water glass, as measured from the bottom of the glass" consistent with the changes to § 230.37 of the 1978 standards made in this rule. See the analysis for § 230.51, below.

Finally, this section adds a new requirement that the lowest set safety relief valve pressure be indicated on a tag or label and attached to the steam gauge so that it may clearly be read while observing the gauge. Requiring this insures that the locomotive engineer and/or other crew members are provided with notice of the pressure setting of the safety relief valve, thereby allowing for easier detection of safety valve failure.

#### *Section 230.50 Time of Testing*

This section adopts the requirements of § 230.36 of the 1978 standards while increasing the inspection time period from three months to ninety-two (92) service days for consistency with rest of the inspection schedule.

#### *Water Glasses and Gauge Cocks*

##### *Section 230.51 Number and Location*

This section amends the requirements for water level indicating devices contained in § 230.37 of the 1978 standards to require that steam locomotive boilers be equipped with at least two water glasses, the lowest reading for which must be at least 3 inches above the highest part of the crown sheet. The use of gauge cocks in addition to water glasses is not prohibited, but gauge cocks are no longer mandatory. However, the requirement that any gauge cocks installed on a steam locomotive boiler must be properly located and maintained is retained. These changes reflect the task force's recommendation that water level indicator standards be modernized. The task force and FRA believe that water glasses are more reliable than gauge cocks, and easier to use since they do not require manual operation. The task force also believes that few operators know how to correctly manually operate gauge cocks anymore. The task force was also concerned that gauge cocks screwed directly into the backhead are more likely to provide highly inaccurate readings due to the phenomenon where the water rushes against the boiler backhead and creates a surge effect, generating a reading that is artificially high. This requirement comports with the NTSB's recommendation following its investigation into the boiler explosion involving the Gettysburg Railroad Company, that steam locomotive boilers be equipped with a

second water glass, and with ASME standards, which no longer require that newly constructed boilers be equipped with gauge cocks.

FRA and the task force are aware of the costs this change imposes upon steam locomotive owners and/or operators. They discussed at length the extra cost this requirement would impose upon owners and/or operators, concluding that the extra measure of safety measure afforded justifies the financial burden imposed. In addition to the enhanced safety factor, as one member of the task force pointed out, since gauge cocks are no longer being manufactured, their replacement would be extremely problematic and very costly if any could even be found. The task force was also concerned that locomotive owners and/or operators be allowed sufficient time to make any necessary changes to their locomotive boilers. Accordingly, this section implements the task force's recommendation that implementation of this provision be delayed one year to provide all affected parties with sufficient notice and sufficient time to add the second water glass.

##### *Section 230.52 Water Glass Valves*

This section adopts § 230.38 of the 1978 standards but rewrites it for the sake of clarity and to emphasize the functions the valves are designed to fulfill.

##### *Section 230.53 Time of Cleaning*

This section requires water glass valve and gauge cock spindles to be cleaned at every 31 service day inspection, and whenever testing indicates that the apparatus is malfunctioning. In addition, this section revises the time period in which this inspection must be performed. It also adds a performance standard for owners and/or operators to follow, requiring them to clean the spindles when they have indications that water glasses or gauge cocks are not functioning properly.

##### *Section 230.54 Testing and Maintenance*

This section rewrites § 230.40 of the 1978 standards for clarity. The section also explains the reasons for requiring that water glasses be tested.

##### *Section 230.55 Tubular Type Water and Lubricator Glasses and Shields*

This section revises § 230.41 of the 1978 standards. Under the revisions, tubular type water glasses must be renewed at each 92-service day inspection and water glasses must be located and maintained so that the engine crews have an unobstructed view



of the water in the glass from their proper positions in the locomotive cab.

This section is based on the task force's collective experience that water tubes get thin and develop a risk of breaking after approximately 90 service days. These water glass placement requirements complement, and give effect to the changes adopted in § 230.51 of this rule.

#### *Section 230.56 Water Glass Lamps*

This section retains § 230.42 of the 1978 standards without change, consistent with the task force's recommendation.

#### *Injectors, Feedwater Pumps, and Flue Plugs*

##### *Section 230.57 Injectors and Feedwater Pumps*

Subsection (b) of this section retains § 230.43 of the 1978 standards, and subsections (a) and (c) are new. Subsection (a) requires a steam locomotive to be equipped with at least two means of delivering water to the boiler, with—at a minimum—one of the two being a live steam injector. Subsection (b) incorporates language from the ICC Interpretations which require bracing to "avoid" vibration. The task force recommended changing "avoid" to "minimize", believing it to be a more realistic standard. Subsection (c) sets a requirement that injectors and feedwater pumps be securely braced so as to minimize vibration.

##### *Section 230.58 Flue Plugs*

This section strengthens the rules for plugging flues contained in § 230.44 of the 1978 standards. When § 230.44 of the 1978 standards was first promulgated by the former Interstate Commerce Commission, it was designed to accommodate the locomotive owner and/or operator's business concerns by allowing them to plug their flues in order to continue in operation until the nearest repair point where the flue could be repaired or replaced. The task force decided to recommend that FRA continue to allow flue plugging provided restrictions are placed on the manner in which flues may be plugged in order to minimize the risk of flue failures.

The task force was concerned because one failed flue will often be followed by additional flue failures since flues are typically replaced all at once, and are therefore exposed to similar stressors. Accordingly, this section allows only one flue to be plugged at any time and requires any such plugged flue to be repaired or replaced within 30 calendar days. In addition, the task force wanted

to distinguish between flues greater than 2¼" in OD and flues equal to or smaller than 2¼" in OD, and to prohibit the plugging of the latter. Subsection (b) of this section is largely derived from § 230.44 of the 1978 standards, however it eliminates that section's implied allowance of plugging flues at one end only, requiring instead that flues be plugged at both ends. The task force felt that plugging a flue at one end was inconsistent with the function plugging is designed to accomplish.

#### *Fusible Plugs*

##### *Section 230.59 Fusible Plugs*

This section, incorporating the provisions of § 230.14 of the 1978 standards, imposes no new inspection requirements for steam locomotives on locomotive owners and/or operators. Consistent with the comprehensive changes made to the inspection scheme in part 230, it relaxes the time frame in which fusible plugs must be removed and cleaned. It also adds the requirement that the removal be noted on the inspection report.

#### *Washing Boilers*

##### *Section 230.60 Time of Washing*

This section retains the inspection and maintenance requirements of § 230.45 of the 1978 standards. In addition, although not imposing any new inspection requirements for steam locomotives on locomotive owners and/or operators, this section does change the minimum requirement for mandatory boiler washes from once each month to every time that a 31-service day inspection is conducted.

In its review of the Gettysburg steam explosion, the NTSB recommended that the agency consider regulating water quality, specifically by imposing water treatment program requirements. The task force strenuously debated this topic and concluded the boiler wash itself was the best method for addressing water quality, especially since the regulation requires that the boiler be washed as frequently as water conditions require.

This section is based on FRA's agreement with and adoption of the task force's recommendation.

##### *Section 230.61 Arch Tubes, Water Bar Tubes, Circulators and Thermic Siphons*

This section expands the requirements of § 230.46 of the 1978 standards by requiring, in addition to removal, that the arch tubes and water bar tubes be cleaned and inspected each time the boiler is washed. In addition, this section adds condemning limits for arch tubes and water bar tubes. Both of

these additions to this section are derived from the ICC Interpretations and reflect the task force's desire to incorporate the Interpretations into this part.

Finally, this section requires a NDE evaluation of arch tubes, water bar tubes and circulators during the annual inspection in order to assess reduced wall thickness. The task force was concerned about the cost this would impose, and debated whether this requirement would prove too onerous for smaller operations. They concluded, however, that ultrasonic testing is affordable and that the increased safety levels provided by this testing justify the additional costs imposed on the locomotive owners and/or operators.

#### *Steam Pipes*

##### *Section 230.62 Dry Pipe (New)*

This section require locomotive owners and/or operators to inspect dry pipes that are subject to pressure during each annual inspection for the purpose of measuring the pipe wall thickness. It establishes a requirement that owners and/or operators remove from service any dry pipes that are no longer "suitable for the service intended."

##### *Section 230.63 Smoke Box, Steam Pipes and Pressure Parts (New)*

Under this section, locomotive owners and/or operators are required to inspect the smoke box, steam pipes and pressure parts at each annual inspection, or whenever conditions so warrant. This section requires the person performing the inspection to enter the smoke box and examine it for signs of leaks from any of its pressure parts and to examine all draft appliances.

#### *Steam Leaks*

##### *Section 230.64 Leaks Under Lagging*

This section retains the concepts of § 230.49 of the 1978 standards without substantive change while rewriting the standards for clarity and for ease of compliance.

##### *Section 230.65 Steam Blocking View of Engine Crew*

This section retains the concepts of § 230.50 of the 1978 standards without substantive change, but rewrites them for clarity and for ease of compliance.

#### *Subpart C—Steam Locomotives and Tenders*

##### *Section 230.66 Design, Construction and Maintenance*

This section retains § 230.101 of the 1978 standards with the only substantive changes being those

required to take into account the changed liability standard; see section IX(A).

#### *Section 230.67 Responsibility for Inspection and Repairs*

This section amends § 230.102 of the 1978 standards by making the locomotive owner and/or operator the party responsible for the inspection and repair of all locomotives and tenders under their control, instead of the chief mechanical officer. In addition, this section acts in conjunction with § 230.23 by delineating the standard for repairs and by requiring that a locomotive not be returned to service unless in good condition and safe and suitable for service.

#### *Speed Indicators*

##### *Section 230.68 Speed Indicators (New)*

This section requires all steam locomotives that operate at speeds in excess of 20 miles per hour over the general system of transportation to be equipped with speed indicators that are maintained to ensure proper functioning. The task force discussed (and wanted to address) the interplay between this part and part 240's engineer certification standards. Because locomotive engineers may be decertified for certain speed-related violations, the task force felt that steam locomotives that operate at more than 20 miles per hour should be equipped with speed indicators.

#### *Ash Pans*

##### *Section 230.69 Ash Pans*

This section adopts § 230.105 of the 1978 standards without substantive change, but rewrites it for the sake of clarity and for ease of compliance.

#### *Brake and Signal Equipment*

##### *Section 230.70 Safe Condition*

This section adopts § 230.105 of the 1978 standards without substantive change but rewrites it for the sake of clarity and for ease of compliance.

##### *Section 230.71 Orifice Testing of Compressors*

This section retains § 230.107 of the 1978 standards but reorganizes and rewrites it for clarity. In addition, consistent with the comprehensive changes in the inspection scheme in part 230, it lengthens the time within which compressors must be orifice-tested from once each three months, to once each 92 service days. Finally, it expands the table listing the testing criteria to include the commonly used 120 LP Westinghouse compressor.

##### *Section 230.72. Testing Main Reservoirs*

Subsection (a) of this section retains the requirements of § 230.108 of the 1978 standards but rewrites them for clarity.

Subsections (b) through (d) of this section are new. Subsection (b) incorporates part 229's allowance for drilling of certain specified welded main reservoirs. The task force felt that drilling was a good idea because it facilitates reservoir failures in a non-catastrophic manner. This section is largely derived from § 229.31 and reflects the task force's desire to harmonize these sections wherever possible. Subsection (c) is intended to encourage the use of appropriate NDE methods for testing the wall thickness of the welded main reservoirs. It also provides for NDE testing of welded main reservoirs without longitudinal lap seams rather than the more destructive hammer and hydrostatic testing otherwise required. The formula for the condemning limits for welded main reservoirs is derived from the ASME Section VIII, Div I. The spacing for the sampling points is derived from § 229.31.

Finally, under subsection (d), NDE testing of welded or riveted longitudinal lap seam main reservoirs is required. While the task force seriously debated recommending that the use of lap seam main reservoirs be prohibited, they felt that there wasn't a strong enough safety basis for justifying this action. Their concerns were further eased by the belief that lap seam main reservoirs will eventually be phased out for economic reasons.

##### *Section 230.73 Air Gauges*

This section adopts, with minor substantive changes, § 230.109 of the 1978 but reorganizes and rewrites it for clarity. Part of the comprehensive changes made to the inspection scheme in part 230, it increases the time frame for performing required air gauge testing from once each three months to the 92 service day inspection. It also adds a requirement that gauges be tested prior to reinstallation. The task force recommended that gauges that are removed be retested because they were concerned about the impacts the gauges may sustain in handling and storage while off the locomotive. The method of testing required by this section is identical to that found in § 230.109 of the 1978 standards.

##### *Section 230.74 Time of Cleaning*

This section modifies § 230.110 of the 1978 standards by broadening the scope

of the section to include all valves in the air brake system, by specifying a testing procedure, and by relaxing the time frame for conducting the inspection. The task force recommended reconciling this section, to the greatest extent possible, with § 232.10. A number of task force members were concerned about requiring this cleaning too frequently, based on their experience that the cleaning process itself can adversely affect the proper functioning of the valves. Experience has shown that once the system is opened to clean the valves, dirt can get in and be distributed throughout, seriously affecting the integrity of the system. The task force discussed various cleaning intervals. These ranged from once every six months (the 1978 standard) to once each fifth annual inspection; the task force ultimately settled on a recommended interval between cleanings of between once every 368 service days and at every second annual inspection.

##### *Section 230.75 Stenciling Dates of Tests and Cleaning*

This section retains the provisions of § 230.111 of the 1978 standards but rewrites them for clarification. In addition, the requirement that testing dates be stamped on metal tags and attached to the locomotive is deleted.

##### *Section 230.76 Piston Travel*

This section adopts § 230.112 of the 1978 standards without substantive change.

##### *Section 230.77 Foundation Brake Gear*

This section adopts § 230.113 of the 1978 standards without substantive change.

##### *Section 230.78 Leakage*

This section retains the provisions of § 230.114 of the 1978 standards without substantive change, while identifying specific inspection time periods and requirements in the rule text.

##### *Section 230.79 Train Signal System*

This section retains § 230.115 of the 1978 standards with minor changes. In addition, it recognizes other forms of "onboard communication" and relaxes the train signal system testing requirements from before each trip made to the beginning of each day the locomotive is used.

#### *Cabs, Warning Signals, and Sanders*

##### *Section 230.80 Cabs*

This section changes § 230.116 of the 1978 standards by removing all the cab curtain requirements and rewriting the standards for clarity. Subsection (a)

incorporates the general provision section of the 1978 standards while updating the requirements to track part 229's cab condition language. The task force discussed the language relating to the cab climate at length and agreed to try and draft a performance standard for the cab rather than select temperature ranges and specific environment controls. The task force also decided to delete all the cab curtain requirements because they believed that the curtains don't adequately keep temperature in the proper range, and that the performance standard in subsection (a) was a better way to achieve the desired outcome. This section's requirement that the environment not "unreasonably interfere with the engine crew's performance of duties under ordinary conditions of service" establishes a performance standard the locomotive cab climate must be in compliance with. Therefore, a cab with poor ventilation that gets so hot that it causes the engine crew to get sleepy or otherwise affects their performance of required duties would be in noncompliance with this section. The "ordinary conditions of service" language, however, takes into account those conditions that are unavoidable in steam locomotive service such as the extreme amount of heat from the locomotive boiler fire box. The task force wanted to make clear its belief that only those cab conditions that are "abnormal" for steam locomotive service should constitute noncompliance with this section. The task force wanted to move toward a "common sense" perspective on cab conditions that would simultaneously be enforceable yet not unreasonably interfere with steam locomotive operations.

Subsection (b) addresses the issue of steam pipes in the locomotive cab. This section retains most of § 230.116 of the 1978 standards but makes more specific the "double strength pipe" description. The task force recommended that the minimum standard for these pipes be specified as "schedule 80" to conform with the more common industry terminology. All other subsections of § 230.116 of the 1978 standards have been deleted as unnecessary.

#### *Section 230.81 Cab Aprons*

This section expands the requirements of § 230.117 of the 1978 standards by delineating standards for the width of the apron. Concerned about the risk of serious injury or death resulting from an individual standing on a cab apron getting caught between the locomotive and tender, the task force wanted to incorporate the ICC Interpretations regarding apron width.

Requiring cab aprons be of a minimum width eliminates the danger of the apron dropping between the locomotive and tender if a knuckle breaks or the drawbar becomes disconnected and the safety chains are stretched taut.

#### *Section 230.82 Fire Doors*

This section eliminates the requirement in § 230.118 of the 1978 standards that all locomotives have mechanically operated fire doors. The task force decided to recommend doing so because some smaller locomotives cannot be equipped with them. The task force considered making the mechanically operated fire door requirement contingent upon the weight of the locomotive, and the agency requested—but did not receive—comments on this issue. Because no comments were received on this issue, FRA has decided to simply eliminate the requirement that all steam locomotives be equipped with mechanically operated fire doors. However, this section does not prohibit the use of such mechanically operated fire doors.

In addition, the task force recommended and FRA has agreed to the deletion of subsections (b) and (c) of § 230.118 of the 1978 standards, relating to stokers.

#### *Section 230.83 Cylinder Cocks*

This section retain § 230.119 of the 1978 standards without substantive change, but edits it for clarity and ease of compliance.

#### *Section 230.84 Sanders*

This section retains § 230.120 of the 1978 standards without substantive change, but rewrites it for clarity and, consistent with the changes to the pre-departure inspection concept made in this rule relaxes the inspection time period from at the beginning of each trip to the beginning of each day the locomotive is used.

#### *Section 230.85 Audible Warning Device*

This section modernizes § 230.121 of the 1978 standards by replacing its whistle requirement with a requirement that steam locomotives be equipped with audible warning devices. The decibel thresholds and the methodology for measuring the sound level are directly derived from § 229.129, which specifies the standards for audible warning devices for locomotives other than steam locomotives.

#### *Lights*

##### *Section 230.86 Required Illumination*

This section retains the requirements in §§ 230.129 and 230.131 of the 1978 standards but consolidates and edits them for clarity. In addition, this section eliminates the distinction made in the 1978 standards between locomotives in yard service and those in road service. FRA has done so, consistent with the task force's recommendation, since any justification for differentiating between road and yard locomotives disappeared when the nature of steam locomotive operations changed.

##### *Section 230.87 Cab Lights*

While retaining § 230.132 of the 1978 standards essentially unchanged, this section extends the coverage to all locomotives, instead of merely those used between sunset and sunrise. The task force recommended doing so in order to address those operating circumstances that might arise during "daylight" hours, making it difficult, if not impossible, for the engine crew to observe unlit control instruments, gauges, and meters.

#### *Throttle and Reversing Gear*

##### *Section 230.88 Throttles*

This section restates the provisions of § 230.156 of the 1978 standards without substantive change.

##### *Section 230.89 Reverse Gear*

This section retains parts of § 230.157 of the 1978 standards but reorganizes and rewrites it for clarity and ease of compliance. Subsection (a) retains the general language that appears before subsection 230.157(a) of the 1978 standards. However, based on the task force's experience that many steam locomotives in service today operate safely without power-operated reverse gear, subsections (a) and (b) of the 1978 standards have been deleted. As the task force observed, power-operated reverse gears can be dangerous as well. The task force considered attaching a weight restriction to this requirement but concluded that the problem would be self-regulating since it would be impractical to move certain locomotives with manual reverse operating gear. Subsections (b) and (c) are derived from subsection 230.157(c) of the 1978 standards.

#### *Draw Gear and Draft Systems*

##### *Section 230.90 Draw Gear Between Steam Locomotive and Tender*

Subsection (a) of this section retains most of the requirements of subsection § 230.122(a) of the 1978 standards

unchanged but adds a requirement that NDE testing of draw pins and drawbars be done during every annual inspection. This section also requires that an additional NDE testing method be used when a visual inspection fails to disclose any defects. The task force, wishing to balance industry's concerns about requiring this test too frequently with safety considerations, recommended FRA require the use of better technology as a condition for extending the inspection time-period from three months to one year. This section adopts the task force's recommendation.

Subsection (b) of this section modifies the 1978 standards requirements for safety bars or chains and their relative strength. Some task force members took issue with the reference in the 1978 standards to "two or more safety bars or safety chains," observing that some locomotives are designed with one (1) safety bar. The consensus was that the old rule addressed those instances where smaller draw bars take the place of safety chains and not the double drawbar design whereby the drawbar that normally bears no load is, in fact, a safety bar. In addition, this section incorporates the ICC interpretation of the 1978 standard's "ample strength" as requiring that the combined strength of safety chains or bars and their fastenings be at least 50 percent of the strength of the drawbar and its connections.

Subsections (c), (d), and (e) of this section retain subsections (c), (d), and (e) of § 230.122 of the 1978 standards without change.

#### *Section 230.91 Chafing Irons*

This section retains the requirements of § 230.123 of the 1978 standards without substantive change but edits it for clarity and for ease of compliance.

#### *Section 230.92 Draw Gear and Draft Systems*

This section retains the requirements of § 230.124 of the 1978 standards without substantive change but expands it to cover couplers as well.

#### *Driving Gear*

#### *Section 230.93 Pistons and Piston Rods*

This section basically retains the requirements of § 230.127 of the 1978 standards but revises it by eliminating the stamping requirement for rods and by adding standards for fasteners. The task force debated whether or not a mechanism for tracing materials should be retained, concluding that part 230 should not require it. The task force discussed issuing a "recommended

practices" handbook for steam locomotive operators (not part of this rule) in which traceability of materials would be discussed.

#### *Section 230.94 Crossheads*

This section retains the requirements of § 230.125 of the 1978 standards without substantive change but edits them for clarity and ease of compliance.

#### *Section 230.95 Guides*

This section retains the requirements of § 230.126 of the 1978 standards without substantive change.

#### *Section 230.96 Main, Side, and Valve Motion Rods*

Subsection (a) of this section retains the requirements in subsection (a) of § 230.128 of the 1978 standards without substantive change but edits them for clarity.

Subsection (b) of this section revises § 230.128 of the 1978 standards to expressly allow welding of main, side and valve motion rods, subject to FRA approval of requests to do so. The task force debated how to best regulate the welding methodology and concluded that requiring the welding in accordance with an accepted national standard was the easiest and most thorough way to do so. The task force concluded that this section should be in conformity with § 230.33 of these proposed standards. See the analysis of welding concerns in that section which mirrors the task force's discussion of this subsection.

Subsection (c) of this section incorporates subsection (c) of § 230.128 of the 1978 standards in its entirety and, for clarity, adds a sentence to address floating bushings.

Subsection (d) of this section retains the requirements of subsection (d) of § 230.128 of the 1978 standards without change.

Subsection (e) of this section retains the requirements of subsection (e) of § 230.128 of the 1978 standards but edits it for the sake of clarity.

Subsection (f) of this section retain the requirements in subsection (f) of § 230.128 of the 1978 standards without change.

Subsection (g) of this section retains the requirements of subsection (g) of § 230.128 of the 1978 standards without change.

This section, in accordance with the elimination of any distinction between road and yard service, deletes the requirements found in subsections (h) and (i) of § 230.128 of the 1978 standards. As discussed previously, FRA believes that the justification for treating these types of service differently no longer exists.

#### *Section 230.97 Crank Pins*

Subsection (a) of this section changes the requirements of § 230.136 of the 1978 standards, eliminating the stamping requirement, consistent with § 230.92 of this proposal. The task force felt very strongly that there was no need to have the application date stamped on the pin, since there is no apparent reason for anyone to need to know the application date.

This subsection also expands the prohibition for shimming or prick punching to include a ban on "securing the fit of a loose crank pin by shimming, prick punching, or welding."

Subsection (b) of this section adopts the requirements of subsection (b) of § 230.136 of the 1978 standards essentially as is except for changing the word "bolts" to "fasteners." This change is non-substantive and reflects the acceptable use of other mechanisms as fasteners.

#### *Running Gear*

#### *Section 230.98 Driving, Trailing, and Engine Truck Axles*

This section retains the requirements of § 230.133 of the 1978 standards with minor substantive changes: editing and reorganizing it for clarity and for ease of compliance. This section also relaxes the wear allowance on secondary driving axles. The task force decided to recommend making this change in order to bring the regulation in line with their own operational experiences.

#### *Section 230.99 Tender Truck Axles*

This section retains the requirements of § 230.134 of the 1978 standards without substantive change.

#### *Section 230.100 Defects in Tender Truck Axles and Journals*

This section retains the requirements of § 230.135 of the 1978 standards without substantive change.

#### *Section 230.101 Steam Locomotive Driving Journal Boxes*

This section retains the requirements of § 230.137 of the 1978 standards without substantive change but reorganizes and edits the requirements for clarity and for ease of compliance.

#### *Section 230.102 Tender Plain Bearing Journal Boxes (New)*

This section establishes condemning limits for plain bearing journal boxes, consistent with the task force's recommendation. The task force's recommendations were based on its collaborative efforts to identify those issues that could affect the operational integrity/function of the journal.

**Section 230.103 Tender Roller Bearing Journal Boxes (New)**

This section imposes maintenance requirements for tender roller bearing journal boxes, consistent with the task force's recommendation. The task force felt that imposing specific condemning limits for roller bearing journal boxes was unnecessary, believing that the performance standard "safe and suitable" would suffice.

**Section 230.104 Driving Box Shoes and Wedges**

This section adopts the provisions of § 230.138 of the 1978 standards without change.

**Section 230.105 Lateral Motion**

This section adopts the provisions of § 230.140 of the 1978 standards without change.

**Trucks and Frames and Equalizing System****Section 230.106 Steam Locomotive Frame**

This section adopts the provisions of § 230.139 of the 1978 but expands upon them by allowing locomotive owners and/or operators to operate steam locomotives with broken frames, provided the frames are properly patched or secured in a way that restores the rigidity of the frame.

**Section 230.107 Tender Frame and Body**

This section adopts the provisions of § 230.152 of the 1978 standards and adds a section that establishes condemning limits for tender frames, consistent with the task force's recommendation.

**Section 230.108 Steam Locomotive Leading and Trailing Trucks**

This section retains the requirements of § 230.143 of the 1978 standards but, consistent with the task force's recommendations, modifies them to require that all centering devices not permit lost motion in excess of 1/2 inch.

**Section 230.109 Tender Truck**

This section adopts the provisions of § 230.155 of the 1978 standards while adding condemning defects for springs and a "safe and suitable" requirement for truck centering devices (where the tender is so equipped).

**Section 230.110 Pilots**

This section retains the requirements in § 230.141 of the 1978 standards without change but adds language to make clear that minimum and maximum clearances of the pilot above

the rail must be measured on tangent level track.

**Section 230.111 Spring Rigging**

This section adopts the requirements in § 230.142 of the 1978 standards with minor revisions. This section changes the 1978 standards to allow the adjusting of load weights by shifting weights from one pair of wheels to another and the repair of broken springs within the condemning limits for spring rigging by clipping, provided the clips can be secured so as to stay in place.

**Wheels and Tires****Section 230.112 Wheels and Tires**

This section retains and consolidates the 1978 standards of §§ 230.144, 230.150, and 230.151. Subsections (a), (b), and (c) adopt the requirements of § 230.144 with a few modifications. Subsection (a) changes "pressed" to "mounted." This change was made based on the task force's recommendation that the rule take "official" notice of the process of shrinking wheels onto the axle. It was felt that acknowledgment of this practice is not sufficiently provided by using the term "pressed." Subsection (b), add a sentence to address the issue of gage for track that is less than standard gage. The figures used were derived from back to back measurement. The task force debated whether to recommend that FRA include standards for "wide-flange" wheels but concluded that the agency should wait to see if the use of "wide-flange" wheels becomes more prevalent before addressing the issue. FRA's agrees with and has adopted that recommendation. Finally, subsection (c) retains the requirements in subsection (c) of § 230.144 of the 1978 standards without change.

Subsections (d) and (e), although new, are derived from §§ 230.150 and 230.151 of the 1978 standards. Subsection (d) adopts the provisions of § 230.151 of the 1978 standards without substantive change but rewrites them for enhanced clarity. Subsection (e) consolidates the standards found in § 230.150(d) and (e) of the 1978 standards but edits them for clarity and ease of compliance.

**Section 230.113 Wheels and Tire Defects**

This section retains the requirements in §§ 230.145, 230.146, and 230.149 of the 1978 standards but consolidates and edits them to make the standards more specific, to eliminate redundancies, and to enhance clarity.

**Section 230.114 Wheel Centers**

This section combines §§ 230.147 and 230.148 of the 1978 standards but

rewrites them to make the standards more specific and to address the issue of welding on wheel centers. The task force recommended that welding on wheel centers be allowed in accordance with § 229.75(m) of the 1978 standards. This section is based on FRA's adoption of that recommendation.

**Steam Locomotive Tanks****Section 230.115 Feed Water Tanks**

This section adopts the requirements of § 230.153 of the 1978 standards, largely without change, but does some rewriting to enhance clarity and make the requirements easier to comply with. Subsection (a) of this section changes § 230.153 of the 1978 rule by requiring that all locomotives, regardless of the date of their manufacture or method of use, be equipped with a water level measurement device capable of being read from the cab or tender deck of the locomotive. The task force felt that this could be done at a relatively low cost and would eliminate the need for the locomotive operator to climb atop the tender tank to check the water level. In addition, this section extends the time period for inspecting feed water tanks from once each month to once each 92 service days, consistent with the other changes made in the inspection scheme of this rule.

**Section 230.116 Oil Tanks**

This section retains § 230.154 of the 1978 standards without substantive change but rewrites it to enhance clarity.

**Appendices**

FRA has included four appendices to this rule. A brief description for each is provided below.

**Appendix A—Inspection Requirements**

FRA is providing a simple reference guide for those persons who will be conducting inspections required under these regulations in this appendix. This reference guide does not modify the specific requirements found in the particular sections.

**Appendix B—Drawings and Diagrams**

This appendix provides—for informational purposes only—a series of drawings and diagrams that are cross referenced to various sections of the rule. Each drawing or diagram visually demonstrates how the rule language should be applied. For example, one drawing depicts shows how a measuring device should be used to take accurate measurements of objects such as wheels to determine the size of flanges, flat spots, and broken rims for compliance purposes.

**Appendix C—Inspection Forms**

This appendix contains examples of the six forms being issued by FRA for the purpose of recording compliance with the inspection and repair activities in this rule. Use of these forms is mandatory since FRA is not allowing individual operators to create their own forms for recording this data. FRA will make every effort to insure that these forms are readily available to those parties required to use them.

**Appendix D—Schedule of Civil Penalties**

This appendix contains a penalty schedule similar to those that FRA has issued for its other regulations. FRA suggests that those consulting this appendix read FRA's current policy statement concerning the manner in which the agency enforces the rail safety laws. This policy statement is contained in Appendix A to 49 CFR part 209.

In addition, FRA is amending its Statement of Agency Policy in Appendix A of part 209 to include a summary of its exercise of jurisdiction over tourist railroads. FRA had proposed that this summary become an appendix to part 230. However, inserting the summary in FRA's broad discussion of its jurisdiction in part 209 is more logical.

**Regulatory Impact****A. Executive Order 12866 and DOT Regulatory Policies and Procedures**

This rule has been evaluated in accordance with existing policies and procedures, and determined to be non-significant under both Executive Order 12866 and DOT policies and procedures (44 FR 11034; February 26, 1979). FRA has prepared and placed in the docket a Regulatory Impact Analysis (RIA) addressing the economic impact of this rule. Document inspection and copying facilities are available at 1120 Vermont Avenue, NW, 7th Floor, Washington, DC. Photocopies may also be obtained by submitting a written request to the FRA Docket Clerk at Office of Chief Counsel, Federal Railroad Administration, 400 Seventh Street, SW, Washington, DC 20590.

As part of the regulatory impact analysis, FRA has assessed quantitative measurements of costs and benefits expected from the adoption of this rule. For a twenty year period the Present Value (PV) of the potential societal benefits is approximately \$11.5 million and the PV of the estimated quantified costs is approximately \$1.6 million. A majority of the costs will result from the transition from the former rule to this rule. A majority of the savings will

result from the changes in the inspection frequencies under this rule's requirements.

FRA anticipates that this rule will not only reduce the federally mandated burden for the average steam locomotive owner/operator, but will also reduce the risk involved in steam locomotive operations. The PV of the net benefits is \$9.94 million.

**B. Regulatory Flexibility Act**

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires a review of proposed and final rules to assess their impact on small entities. FRA has prepared and placed in the docket a Regulatory Flexibility Assessment (RFA) which assesses the small entity impact. Document inspection and copying facilities are available at 1120 Vermont Avenue, 7th Floor, Washington, DC. Photocopies may also be obtained by submitting a written request to the FRA Docket Clerk at Office of Chief Counsel, Federal Railroad Administration, 400 Seventh Street, SW, Washington, DC 20590.

FRA has published an interim policy which formally establishes "small entities" as being railroads which meet the line haulage revenue requirements of a Class III railroad. For other entities, the same dollar limit on revenues is established to determine whether a railroad shipper or contractor is a small entity. FRA proposed to use this alternative definition of "small entity" for this rulemaking during the Notice of Proposed Rulemaking, and requested comments from the public on its use. No comments were received.

This RFA concludes, and FRA certifies that this final rule is not expected to have a significant economic impact on a substantial number of small entities. The significance of such impact on the potentially affected small entities varies according to the current level of maintenance and inspection that a steam locomotive receives. Thus, an owner and/or operator of a steam locomotive which has only been marginally maintained could be significantly impacted by this rule. In order to determine the significance of the economic impact FRA requested comments to the docket that would have provided additional data on the economic impact imposed by this rulemaking. FRA received no comments or additional data.

For this rulemaking there are potentially 150 steam locomotives that fall under the FRA's jurisdiction which could be affected. These locomotives are owned by 82 operators. FRA estimates that somewhere between 85 and 95 percent of these operators are small

entities. These operators primarily use their steam locomotives in a tourist, historic, excursion, scenic, or museum railway operations. Since this regulation is primarily being imposed on small entities, readers interested in further details about the impacts on these entities beyond those noted in the RFA, should review the final rule's Regulatory Impact Analysis (RIA) which is also in the docket.

The impacts that this regulation would have on the affected steam locomotive operators will vary for the 82 different operators. The impact will be inversely proportional to the level of inspection, maintenance and repair that each steam locomotive has received prior to the implementation of this rule. Thus, steam locomotives that have been inspected, maintained and repaired properly should be impacted less than one's that have not. FRA estimates that the Present Value (PV) of the average cost of this rule, per steam locomotive, is approximately \$10,700 over twenty years. One of the more significant economic impacts that will affect all steam locomotives is the cost from the transition from the former regulation to the final rule. A revision which could impact a small quantity of steam locomotives significantly each year is the requirement for replacing broken staybolts. New equipment requirements, such as a second water glass, total less than \$50,000 for all affected steam locomotives over the twenty year period.

Since this final rule impacts primarily small entities, most of the provisions in it were formed with the recognition that small operations would have to be burdened with its implementation and cost. In other words, all provisions of this rule considered the potential impact to small entities when consensus was being formed on the rule-text. Because of this consideration, all requirements for specific equipment (*i.e.*, cab lights, water glass *etc.*) allow the operators to have one year from the effective date of the final rule to implement these requirements.

The largest impact and the greatest savings occur when a steam locomotive transitions from the former regulation to the final rule. Therefore, implementation for this is phased-in gradually. This requirement provides steam locomotive owners and operators the flexibility necessary to bring their operations into compliance with the requirements of this final rule.

**C. Small Business Regulatory Enforcement Fairness Act of 1996**

Pursuant to Section 312 of the Small Business Regulatory Enforcement

Fairness Act of 1996 (Pub. L. 104-121), FRA is issuing a Small Entity Compliance Guide to summarize the requirements of this rule. The Guide will be made available to all affected small entities to assist them in understanding the actions necessary to comply with the rule. The Guide will in

no way alter the requirements of the rule but will be a tool to assist small entities in the day-to-day application of those requirements.

*D. Paperwork Reduction Act*

The information collection requirements in this final rule have been

submitted for approval to the Office of Management and Budget (OMB) under the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 *et seq.* The sections that contain the new information collection requirements and the estimated time to fulfill each requirement are as follows:

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
230.3—Implementation: Interim Flue Extensions	82 owners/operators.	30 letters .....	30 minutes .....	15	\$450
Petitions for Special Consideration .....	82 owners/operators.	30 petitions .....	1 hour .....	30	1,020
Agency Silence .....	82 owners/operators.	1 notification .....	1 hour .....	1	30
230.6—Waivers .....	82 owners/operators.	2 waiver letters .....	1 hour .....	2	60
Grant of waiver filed for reassessment .....	82 owners/operators.	2 waiver letters .....	1 hour .....	2	60
230.12—Conditions for movement of Noncomplying Locomotives.	82 owners/operators.	10 tags .....	6 minutes .....	1	30
230.13—Inspection Reports: Recordkeeping .....	82 owners/operators.	3,650 forms .....	2 minutes .....	122	3,660
230.14—31 Service Day Inspection .....	82 owners/operators.	100 reports .....	20 minutes .....	33	990
FRA Notification .....	82 owners/operators.	2 notifications .....	5 minutes .....	.17	5
230.15—92 Day Service Inspection .....	82 owners/operators.	100 reports .....	20 minutes .....	33	990
230.16—Annual Inspection .....	82 owners/operators.	100 reports .....	30 minutes .....	50	1,500
FRA Notification .....	82 owners/operators.	100 notifications .....	5 minutes .....	8	240
230.17—1472 Service Day Inspection (Form No. 4).	82 owners/operators.	15 forms .....	30 minutes .....	8	240
Recordkeeping (FRA Form 3) .....	82 owners/operators.	15 reports .....	15 minutes .....	4	120
230.18—Service Day Report (FRA Form No. 5): Recordkeeping.	82 owners/operators.	150 reports .....	15 minutes .....	38	1,140
230.19—Posting of Copy: Recordkeeping .....	82 owners/operators.	300 forms .....	1 minute .....	5	150
230.20—Alteration Reports for Steam Locomotive Boilers (FRA Form No. 19).	82 owners/operators.	5 reports .....	1 hour .....	5	150
230.21—Steam Locomotive Number Change .....	82 owners/operators.	5 documents .....	2 minutes .....	.17	5
230.33—Welded Repairs and Alterations .....	82 owners/operators.	5 letters .....	50 minutes .....	1	30
Wastage and Flush Patches .....	82 owners/operators.	2 letters .....	10 minutes .....	2	60
230.34—Riveted Repairs and Alterations .....	82 owners/operators.	37 requests .....	5 minutes .....	3	90
230.41—Flexible Staybolts with Caps: Recordkeeping.	82 owners/operators.	10 entries .....	1 minute .....	.17	5
230.46—Badge Plates: Recordkeeping .....	82 owners/operators.	1 report .....	30 minutes .....	.50	15
230.47—Boiler Number: Recordkeeping .....	82 owners/operators.	1 report .....	15 minutes .....	.25	8
230.49 Setting of Safety Relief Valves .....	150 steam locomotives.	38 tags/labels .....	1 minute .....	1	30
230.75—Stenciling Dates of Tests and Cleaning: Recordkeeping.	82 owners/operators.	54 tests .....	1 minute .....	1	30
230.96—Main, Side, Valve Rods .....	82 owners/operators.	1 letter .....	10 minutes .....	.17	5
230.98—Driving, Trailing, and Engine Truck Axles: Journal Diameter Stamped.	82 owner/operators	1 stamp .....	15 minutes .....	.25	8
230.116—Oil Tanks .....	82 owners/operators.	150 signs .....	1 minute .....	3	90



All estimates include the time for reviewing instructions; searching existing data sources; gathering or maintaining the needed data; and reviewing the information. Pursuant to 44 U.S.C. 3506(c)(2)(B), the FRA solicited comments concerning: whether these information collection requirements are necessary for the proper performance of the function of FRA, including whether the information has practical utility; the accuracy of FRA's estimates of the burden of the information collection requirements; the quality, utility, and clarity of the information to be collected; and whether the burden of collection of information on those who are to respond, including through the use of automated collection techniques or other forms of information technology, may be minimized. For information or a copy of the paperwork package submitted to OMB contact Robert Brogan at 202-493-6292.

Organizations and individuals desiring to submit comments on the collection of information requirements should direct them to Mr. Robert Brogan, Federal Railroad Administration, 1120 Vermont Avenue, NW, Mail Stop 17, Washington, DC 20590.

OMB is required to make a decision concerning the collection of information requirements contained in this final rule between 30 and 60 days after publication of this document in the **Federal Register**. Therefore, comment addressed to OMB is best assured of having full effect if OMB receives it within 30 days of publication. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

FRA is not authorized to impose a penalty on persons for violating information collection requirements which do not display a current OMB control number, if required. FRA intends to obtain current OMB control numbers for any new information collection requirements resulting from this rulemaking action prior to the effective date of a final rule. The OMB control number, when assigned, will be announced by separate notice in the **Federal Register**.

#### *E. Federalism Implications*

This rule will not have a substantial effect on the states, on the relationship between the national government and the states, or the distribution of power and responsibilities among the various levels of government. Preemption of state regulation in the area of locomotive safety occurs as a result of the LBIA itself rather than through

FRA's issuance of a rule. Therefore, this rule, by itself, is not likely to increase the preemptive effect of the LBIA.

In developing this rule through the Railroad Safety Advisory Committee (which includes representatives of State organizations), FRA has fulfilled the objectives of consultation under Executive Order 13132 on Federalism. State representatives participated in the full RSAC's vote to recommend the proposed rule to the Administrator. FRA has taken care in the rule to explain that the agency believes that statutory preemption will not apply to insular tourist railroads over which FRA has never exercised jurisdiction.

#### *F. Compliance With the Unfunded Mandates Reform Act of 1995*

Pursuant to the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4) each federal agency "shall, unless otherwise prohibited by law, assess the effects of Federal Regulatory actions on State, local, and tribal governments, and the private sector (other than to the extent that such regulations incorporate requirements specifically set forth in law)." Section 201. Section 202 of the Act further requires that "before promulgating any general notice of proposed rulemaking that is likely to result in promulgation of any rule that includes any Federal mandate that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100,000,000 or more (adjusted annually for inflation) in any 1 year, and before promulgating any final rule for which a general notice of proposed rulemaking was published, the agency shall prepare a written statement \* \* \* detailing the effect on State, local and tribal governments and the private sector." The final rule issued today will not result in the expenditure, in the aggregate, of \$100,000,000 or more in any one year, and thus preparation of a statement was not required.

#### *G. Public Procedure*

In accordance with Executive Order 12866, FRA provided 60 days for comments. FRA believes that a 60 day comment period was appropriate to allow parties with interests not represented on the Tourist and Historic Working Group of the Railroad Safety Advisory Committee to comment on this rule. As noted earlier, FRA had not originally scheduled a public hearing, but held one in Corpus Christi, Texas on February 4, 1999, in response to timely received written requests to do so. FRA solicited written comments on all aspects of this rule and changes to this rule were made in response to

comments received in response to this notice.

#### **List of Subjects**

##### *49 CFR Part 209*

Administrative practice and procedure, Enforcement, Hazardous materials transportation, Penalties, Railroad safety.

##### *49 CFR Part 230*

Penalties, Railroad safety, Reporting and recordkeeping requirements, Steam locomotives.

#### **The Rule**

In consideration of the foregoing, FRA is amending Chapter II, Subtitle B of Title 49 of the Code of Federal Regulations as follows:

#### **PART 209—[AMENDED]**

1. The authority citation for part 209 is revised to read as follows:

**Authority:** 49 U.S.C. 20102, 20103, 20104, 20107, 20111, 20902, 21301-21311.

2. Appendix A to part 209 is amended by inserting, just before the last paragraph in the section headed, "The Extent and Exercise of FRA's Safety Jurisdiction," the following:

#### **Appendix A to Part 209—Interim Statement of Agency Policy Concerning Enforcement of the Federal Railroad Safety Laws**

\* \* \* \* \*

#### **THE EXTENT AND EXERCISE OF FRA'S SAFETY JURISDICTION**

\* \* \* \* \*

FRA exercises jurisdiction over tourist, scenic, and excursion railroad operations whether or not they are conducted on the general railroad system. There are two exceptions: (1) operations of less than 24-inch gage (which, historically, have never been considered railroads under the Federal railroad safety laws); and (2) operations that are off the general system and "insular" (defined below).

Insularity is an issue only with regard to tourist operations over trackage outside of the general system used exclusively for such operations. FRA considers a tourist operation to be insular if its operations are limited to a separate enclave in such a way that there is no reasonable expectation that the safety of any member of the public except a business guest, a licensee of the tourist operation or an affiliated entity, or a trespasser would be affected by the operation. A tourist operation will not be considered insular if one or more of the following exists on its line:

- A public highway-rail crossing that is in use;
- An at-grade rail crossing that is in use;
- A bridge over a public road or waters used for commercial navigation; or
- A common corridor with a railroad, *i.e.*, its operations are within 30 feet of those of any railroad.

When tourist operations are conducted on the general system, FRA exercises jurisdiction over them, and all of FRA's pertinent regulations apply to those operations unless a waiver is granted or a rule specifically excepts such operations (e.g., the passenger equipment safety standards contain an exception for these operations, 49 CFR 238.3(c)(3), even if conducted on the general system). When a tourist operation is conducted only on track used exclusively for that purpose it is not part of the general system. The fact that a tourist operation has a switch that connects it to the general system does not make the tourist operation part of the general system if the tourist trains do not enter the general system and the general system railroad does not use the tourist operation's trackage for any purpose other than delivering or picking up shipments to or from the tourist operation itself.

If a tourist operation off the general system is insular, FRA does not exercise jurisdiction over it, and none of FRA's rules apply. If, however, such an operation is not insular, FRA exercises jurisdiction over the operation, and some of FRA's rules (*i.e.*, those that specifically apply beyond the general system to such operations) will apply. For example, FRA's rules on accident reporting, steam locomotives, and grade crossing signals apply to these non-insular tourist operations (see 49 CFR 225.3, 230.2 and 234.3), as do all of FRA's procedural rules (49 CFR parts 209, 211, and 216) and the Federal railroad safety statutes themselves.

In drafting safety rules, FRA has a specific obligation to consider financial, operational, or other factors that may be unique to tourist operations. 49 U.S.C. 20103(f). Accordingly, FRA is careful to consider those factors in determining whether any particular rule will apply to tourist operations. Therefore, although FRA asserts jurisdiction quite broadly over these operations, we work to ensure that the rules we issue are appropriate to their somewhat special circumstances.

\* \* \* \* \*

3. Part 230 is revised to read as follows:

## **PART 230—STEAM LOCOMOTIVE INSPECTION AND MAINTENANCE STANDARDS**

### **Subpart A—General**

Sec.

- 230.1 Purpose and scope.
- 230.2 Applicability.
- 230.3 Implementation.
- 230.4 Penalties.
- 230.5 Preemptive effect.
- 230.6 Waivers.
- 230.7 Responsibility for compliance.
- 230.8 Definitions.
- 230.9 Information collection.

### **General Inspection Requirements**

- 230.11 Repair of non-complying conditions.
- 230.12 Movement of non-complying steam locomotives.
- 230.13 Daily inspection.
- 230.14 Thirty-one (31) service day inspection.

- 230.15 Ninety-two (92) service day inspection.
- 230.16 Annual inspection.
- 230.17 One thousand four hundred seventy-two (1472) service day inspection.

### **Recordkeeping Requirements**

- 230.18 Service days.
- 230.19 Posting of FRA Form No. 1 and FRA Form No. 3.
- 230.20 Alteration and repair report for steam locomotive boilers.
- 230.21 Steam locomotive number change.
- 230.22 Accident reports.

### **Subpart B—Boilers and Appurtenances**

- 230.23 Responsibility for general construction and safe working pressure.

### **Allowable Stress**

- 230.24 Maximum allowable stress.
- 230.25 Maximum allowable stress on stays and braces.

### **Strength of Materials**

- 230.26 Tensile strength of shell plates.
- 230.27 Maximum shearing strength of rivets.
- 230.28 Higher shearing strength of rivets.

### **Inspection and Repair**

- 230.29 Inspection and repair.
- 230.30 Lap-joint seam boilers.
- 230.31 Flues to be removed.
- 230.32 Time and method of inspection.
- 230.33 Welded repairs and alterations.
- 230.34 Riveted repairs and alterations.

### **Pressure Testing of Boilers**

- 230.35 Pressure testing.
- 230.36 Hydrostatic testing of boilers.
- 230.37 Steam test following repairs or alterations.

### **Staybolts**

- 230.38 Telltale holes.
- 230.39 Broken staybolts.
- 230.40 Time and method of staybolt testing.
- 230.41 Flexible staybolts with caps.

### **Steam Gauges**

- 230.42 Location of gauges.
- 230.43 Gauge siphon.
- 230.44 Time of testing.
- 230.45 Method of testing.
- 230.46 Badge plates.
- 230.47 Boiler number.

### **Safety Relief Valves**

- 230.48 Number and capacity.
- 230.49 Setting of safety relief valves.
- 230.50 Time of testing.

### **Water Glasses and Gauge Cocks**

- 230.51 Number and location.
- 230.52 Water glass valves.
- 230.53 Time of cleaning.
- 230.54 Testing and maintenance.
- 230.55 Tubular type water and lubricator glasses and shields.
- 230.56 Water glass lamps.

### **Injectors, Feedwater Pumps, and Flue Plugs**

- 230.57 Injectors and feedwater pumps.
- 230.58 Flue plugs.

### **Fusible Plugs**

- 230.59 Fusible plugs.

### **Washing Boilers**

- 230.60 Time of washing.
- 230.61 Arch tubes, water bar tubes, circulators and thermic siphons.

### **Steam Pipes**

- 230.62 Dry pipe.
- 230.63 Smoke box, steam pipes and pressure parts.

### **Steam Leaks**

- 230.64 Leaks under lagging.
- 230.65 Steam blocking view of engine crew.

### **Subpart C—Steam Locomotives and Tenders**

- 230.66 Design, construction, and maintenance.
- 230.67 Responsibility for inspection and repairs.

### **Speed Indicators**

- 230.68 Speed indicators.

### **Ash Pans**

- 230.69 Ash pans.

### **Brake and Signal Equipment**

- 230.70 Safe condition.
- 230.71 Orifice testing of compressors.
- 230.72 Testing main reservoirs.
- 230.73 Air gauges.
- 230.74 Time of cleaning.
- 230.75 Stenciling dates of tests and cleaning.
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- 230.106 Steam locomotive frame.
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**Appendix A to Part 230—Inspection Requirements****Appendix B to Part 230—Diagrams and Drawings****Appendix C to Part 230—FRA Inspection Forms****Appendix D to Part 230—Civil Penalty Schedule**

**Authority:** 49 U.S.C. 20103, 20701, 20702; 49 CFR 1.49.

**Subpart A—General****§ 230.1 Purpose and scope.**

This part prescribes minimum Federal safety standards for all steam-propelled locomotives operated on railroads to which this part applies. This part does not restrict a railroad from adopting and enforcing additional or more stringent requirements not inconsistent with this part.

**§ 230.2 Applicability.**

(a) Except as provided in paragraph (b) of this section, this part applies to all railroads that operate steam locomotives.

(b) This part does not apply to:

- (1) A railroad with track gage of less than 24 inches;
- (2) A railroad that operates exclusively freight trains and does so only on track inside an installation that is not part of the general system of transportation;
- (3) Rapid transit operations in an urban area that are not connected to the general system of transportation; or
- (4) A railroad that operates passenger trains and does so only on track inside an installation that is insular, i.e., its operations are limited to a separate enclave in such a way that there is no reasonable expectation that the safety of the public—except a business guest, a licensee of the railroad or an affiliated entity, or a trespasser—would be

affected by the operation. An operation will not be considered insular if one or more of the following exists on its line:

- (i) A public highway-rail crossing that is in use;
- (ii) An at-grade rail crossing that is in use;
- (iii) A bridge over a public road or waters used for commercial navigation; or
- (iv) A common corridor with another railroad, i.e., its operations are conducted within 30 feet of those of any other railroad.

(c) See appendix A of part 209 for a current statement of the FRA's policy on its exercise of jurisdiction.

**§ 230.3 Implementation.**

Except as provided in paragraphs (a) through (c) of this section, the locomotive owner and/or operator shall perform a 1472 service day inspection that meets the requirements of § 230.17 when the locomotive's flues would be required to be removed pursuant to § 230.10, of the regulations in effect prior to January 18, 2000. (See 49 CFR parts 200–999, revised October 1, 1978) At the time the locomotive owner and/or operator completes this inspection, it must begin to comply with the rest of the provisions of this part. Up until such time, and except as provided in paragraphs (a) through (c) of this section, compliance with the regulations in effect prior to January 18, 2000 (See 49 CFR parts 200–999, revised October 1, 1978) will constitute full compliance with this part. Any interested person may obtain the October 1, 1978 revision of 49 CFR parts 200–999 by contacting the Federal Railroad Administration, Office of Chief Counsel, 400 7th Street, SW, Washington, DC 20590.

(a) One year after January 18, 2000. The following sections of this part must be complied with by January 18, 2001: §§ 230.7, 230.51, 230.57, 230.68, 230.70, 230.85, 230.87, 230.115, and 230.116.

(b) *Interim flue removal extensions.* FRA will continue to consider requests for flue removal extensions under the provisions of § 230.10 of the regulations in effect prior to January 18, 2000 (See 49 CFR parts 200–999, revised October 1, 1978) until January 18, 2002.

(c) *Petition for special consideration.* The locomotive owner or operator may petition FRA for special consideration of this part's implementation with respect to any locomotive that has either fully or partially satisfied the requirements of § 230.17 within the three (3) year period prior to September 25, 1998—provided the locomotive is in

full compliance with § 230.17 by the time the petition is actually filed.<sup>1</sup>

(1) *Petition process.* Petitions must be filed by January 18, 2001 and must be accompanied by all relevant documentation to be considered, including a FRA Form No. 4 (see appendix C of this part) that has been calculated in accordance with § 230.17, and all records that demonstrate the number of days the locomotive has been in service. Based upon the documentation provided, FRA will calculate the number of "service days" the locomotive has accrued and will notify the petitioner of the number of service days that remain in the locomotive's 1472 service day cycle. Petitions should be sent to FRA by some form of registered mail to ensure a record of delivery. FRA will investigate these petitions and will respond to these petitions within one year of their receipt. FRA will send its response by some form of registered mail to ensure that a record of delivery is created. In its response, FRA may grant the petition or deny it. If FRA grants the petition, the entirety of the revised requirements will become effective upon receipt of FRA's response, unless FRA's response indicates otherwise. If FRA denies the petition, the rule will become effective as provided in the first paragraph of this section.

(2) *FRA silence.* Anyone who does not receive a response within one year of the date they filed their petition, whether through administrative or postal error, must notify FRA that the response has not been received. The notification should be provided to FRA by some form of registered mail to ensure a record of delivery. Upon receipt of this notification, FRA will ensure that a response is either issued, or re-issued, as soon as possible. In the interim, however, any operator who is at the end of their inspection cycle under the rules in effect prior to January 18, 2000 (See 49 CFR parts 200–999, revised October 1, 1978) will be allowed to remain in service without conducting the required inspection under § 230.17 for an additional six months, or until they receive FRA's decision, whichever occurs first.

<sup>1</sup> **Note:** As an example, where a locomotive has received a proper boiler inspection after September 25, 1995 pursuant to §§ 230.10 and 230.11 of the regulations in effect prior to January 18, 2000 but has not had its FRA Form No. 4 updated, the locomotive owner or operator may update and verify the FRA Form No. 4 for that locomotive, and submit a timely petition that requests retroactive credit for the boiler inspection. (See 49 CFR parts 200–999, revised October 1, 1978.)

**§ 230.4 Penalties.**

(a) Any person who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least \$500 and not more than \$11,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$22,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See appendix A of part 209 for a statement of agency civil penalty policy.

(b) Any person who knowingly and willfully falsifies a record or report required by this part may be subject to criminal penalties under 49 U.S.C. 21311.

**§ 230.5 Preemptive effect.**

The Locomotive Boiler Inspection Act (49 U.S.C. 20701–20703) preempts all State laws or regulations concerning locomotive safety. *Napier v. Atlantic Coast Line R.R.*, 272 U.S. 605 (1926). However, FRA believes Congress did not intend to preempt State laws or regulations concerning rail operations over which FRA does not exercise jurisdiction. Therefore, in issuing this part, it is FRA's intent that State laws or regulations applicable to those rail operations to which this part does not apply (*i.e.*, insular tourist operations) not be preempted.

**§ 230.6 Waivers.**

(a) A person subject to a requirement of this part may petition the Administrator of FRA for a waiver of compliance with such requirement. The filing of such a petition does not affect that person's responsibility for compliance with that requirement while the petition is being considered.

(b) Each petition for waiver under this section must be filed in the manner and contain the information required by part 211 of this chapter.

(c) If the Administrator finds that a waiver of compliance is in the public interest and is consistent with railroad safety, the Administrator may grant the waiver subject to any conditions the Administrator deems necessary. Where a waiver is granted, the Administrator publishes a notice containing the reasons for granting the waiver.

(d) All waivers of every form and type from any requirement of any order or regulation implementing the Locomotive Boiler Inspection Act, 36 Stat. 913, as amended, 49 U.S.C. 20702,

applicable to one or more steam locomotives, shall lapse on January 18, 2000 unless a copy of the grant of waiver is filed for reassessment prior to that date with the Office of Safety, Federal Railroad Administration, 400 Seventh Street, Washington, DC 20590. FRA will review the waiver and notify the applicant whether the waiver has been continued.

**§ 230.7 Responsibility for compliance.**

(a) The locomotive owner and/or operator is directly responsible for ensuring that all requirements of this part are satisfied, and is the entity primarily responsible for compliance with this part.

(b) Although the duties imposed by this part are generally stated in terms of the duties of a railroad or a steam locomotive owner and/or operator, any person, including a contractor for a railroad, who performs any function covered by this part must perform that function in accordance with this part.

(c) Chapter 207 of Title 49 of the United States Codes makes it unlawful for any railroad to use or permit to be used on its line any steam locomotive or tender unless the entire steam locomotive or tender and its parts and appurtenances are in proper condition and safe to operate in the service to which they are put, without unnecessary danger of personal injury and have been inspected and tested as required by this part.

**§ 230.8 Definitions.**

As used in this part, the terms listed in this section have the following definitions:

**Administrator.** The Administrator of the Federal Railroad Administration or the Administrator's delegate.

**Alteration.** Any change to the boiler which affects its pressure retention capability. Rating changes are considered alterations.

**ANSI.** American National Standards Institute.

**API.** American Petroleum Institute.

**ASME.** American Society of Mechanical Engineers.

**Boiler surfaces.** The boiler interior is all the space inside a boiler occupied by water or steam under pressure, and all associated surfaces inside that space exposed to that water and steam. The boiler exterior is the opposite surface of all components directly exposed to the boiler interior. This includes the fire side of the firebox sheets.

**Break.** A fracture resulting in complete separation into parts.

**Code of original construction.** The manufacturer's or industry code in effect when the boiler was constructed.

If the exact code is not known, the closest contemporary code may be used provided it does not pre-date the construction date of the boiler.

**Crack.** A fracture without complete separation into parts, except that castings with shrinkage cracks or hot tears that do not significantly diminish the strength of the member are not considered to be cracked.

**Dead locomotive.** A locomotive unable to produce tractive effort.

**Fire.** Anything that produces products of combustion that heat transferring components of the locomotive are exposed to.

**FRA.** The Federal Railroad Administration.

**Locomotive operator.** Person or entity which operates, but which does not necessarily own, one or more steam locomotives. This term means, for purposes of inspection and maintenance responsibility, the entity responsible for the day-to-day operation of the steam locomotive, or the delegate thereof. This entity may be a railroad or a person or persons who operate a steam locomotive under contract for a railroad.

**Locomotive owner.** Person or entity which owns, but which does not necessarily operate, one or more steam locomotives that is operated on a railroad to which this part applies. For purposes of inspection and maintenance responsibility, this term includes that entity's delegate as well.

**MAWP.** Maximum allowable working pressure as specified by the steam locomotive specification FRA Form No. 4. (See appendix C of this part.)

**NBIC.** National Board Inspection Code published by the National Board of Boiler and Pressure Vessel Inspectors.

**NDE.** Non-destructive Examination.

**NPS.** Nominal Pipe Size.

**Person.** An entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor.

**Railroad.** Any form of non-highway ground transportation that runs on rails or electromagnetic guideways and any entity providing such transportation, including commuter or other short-haul railroad passenger service in a metropolitan or suburban area and commuter railroad service that was operated by the Consolidated Rail Corporation on January 1, 1979; and high speed ground transportation

systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads; but does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

**Renewal.** Replacement in kind with a newly manufactured or remanufactured (restored to original tolerances) component. Materials shall be suitable for the service intended.

**Repair.** Any work which results in a restoration in kind.

**Serious injury.** An injury that results in the amputation of any appendage, the loss of sight in an eye, the fracture of a bone, or the confinement in a hospital for a period of more than 24 consecutive hours.

**Service day.** Any calendar day that the boiler has steam pressure above atmospheric pressure with fire in the firebox. In the case of a fireless steam locomotive, any calendar day that the boiler has steam pressure above atmospheric pressure.

**Stayed portion of the boiler.** That portion of the boiler designed to require support to retain internal pressure by the addition of strength members, such as staybolts, braces, diagonal stays, tubes, etc.

**Steam locomotive.** A self-propelled unit of equipment powered by steam that is either designed or used for moving other equipment. This includes a self-propelled unit designed or used to carry freight and/or passenger traffic.

**Unstayed Portion of the Boiler.** That portion of the boiler designed to be self-supported in retaining internal pressure without additional strength members such as staybolts, braces, diagonal stays, tubes, etc.

**Wastage.** A reduction in the thickness of a mechanical component, such as a pipe or sheet.

#### **§ 230.9 Information collection.**

(a) [Reserved].

(b) The information collection requirements are found in the following sections: §§ 230.3, 230.12 through 230.21, 230.33, 230.34, 230.41, 230.46, 230.47, 230.75, 230.96, 230.98, and 230.116.

#### **§ 230.10 [Reserved]**

### **General Inspection Requirements**

#### **§ 230.11 Repair of non-complying conditions.**

The steam locomotive owner and/or operator shall repair any steam locomotive that fails to comply with the conditions of this part, and shall approve any such repairs made, before

placing the locomotive back into service.

#### **§ 230.12 Movement of non-complying steam locomotives.**

(a) *General limitations on movement.* A steam locomotive with one or more non-complying conditions may be moved only as a light steam locomotive or a steam locomotive in tow, except as provided in paragraph (b) of this section. Cars essential to the movement of the steam locomotive and tender(s), including tool cars and a bunk car, may accompany light movements.

(b) *Conditions for movement.* Prior to movement, the steam locomotive owner and/or operator shall determine that it is safe to move the locomotive, determine the maximum speed and other restrictions necessary for safely conducting the movement, and notify in writing the engineer in charge of the defective steam locomotive and, if towed, the engineer in charge of the towing locomotive consist, as well as all other crew members in the cabs, of the presence of the non-complying steam locomotive and the maximum speed and other movement restrictions. In addition, a tag bearing the words "non-complying locomotive" shall be securely attached to each defective steam locomotive and shall contain the following information:

- (1) The steam locomotive number;
- (2) The name of the inspecting entity;
- (3) The inspection location and date;
- (4) The nature of the defect;
- (5) Movement restrictions, if any;
- (6) The destination; and
- (7) The signature of the person making the determinations required by this paragraph (b).

(c) *Yard movements.* A non-complying steam locomotive may be moved light or dead within a yard at speeds not in excess of 10 miles per hour without meeting the requirements of paragraph (b) of this section if the movement is solely for the purpose of repair. The locomotive owner and/or operator is responsible for ensuring that the movement may be safely made.

(d) *Non-complying conditions developed en route.* The locomotive owner and/or operator may continue in use a steam locomotive that develops a non-complying condition en route until the next daily inspection or the nearest forward point where the repairs necessary to bring it into compliance can be made, whichever is earlier. Before continuing en route, the steam locomotive owner and/or operator shall determine that it is safe to move the steam locomotive, determine the maximum speed and other restrictions necessary for safely conducting the

movement, and notify in writing the engineer in charge of the defective steam locomotive and, if towed, the engineer in charge of the towing steam locomotive consist, as well as all other crew members in the cabs, of the presence of the non-complying steam locomotive and the maximum speed and other movement restrictions.

(e) *Special notice for repair.* Nothing in this section authorizes the movement of a steam locomotive subject to a Special Notice for Repair unless the movement is made in accordance with the restrictions contained in the Special Notice.

#### **§ 230.13 Daily inspection.**

(a) *General.* An individual competent to conduct the inspection shall inspect each steam locomotive and its tender each day that they are offered for use to determine that they are safe and suitable for service. The daily inspection shall be conducted to comply with all sections of this part, and a daily inspection report filed, by an individual competent to conduct the inspection. See appendices A and B of this part.

(b) *Pre-departure.* At the beginning of each day the steam locomotive is used, an individual competent to do so shall, together with the daily inspection required in paragraph (a) of this section, inspect the steam locomotive and its tender and appurtenances to ensure that they are safe and suitable for service, paying special attention to the following items:

- (1) Water glasses and gauge cocks;
- (2) Boiler feedwater delivery systems, such as injectors and feedwater pumps; and
- (3) Air compressors and governors, and the air brake system.

(c) *Inspection reports.* The results of the daily inspection shall be entered on an FRA Form No. 2 (See appendix C of this part) which shall contain, at a minimum, the name of the railroad, the initials and number of the steam locomotive, the place, date and time of the inspection, the signature of the employee making the inspection, a description of the non-complying conditions disclosed by the inspection, conditions found in non-compliance during the day and repaired and the signature of the person who repaired the non-conforming conditions. This report shall be filed even if no non-complying conditions are detected. A competent individual shall sign the report, certifying that all non-complying conditions were repaired before the steam locomotive is operated. This report shall be filed and retained for at least 92 days at the location designated

by the steam locomotive owner and/or operator.

**§ 230.14 Thirty-one (31) service day inspection.**

(a) *General.* An individual competent to conduct the inspection shall perform the 31 service day inspection after the steam locomotive has accrued 31 service days. This inspection shall consist of all 31 service day inspection items and all daily inspection items. See appendix A of this part. Days in service shall be counted, recorded and readily available for inspection when requested by an FRA inspector.

(b) *FRA notification.* FRA Regional Administrators or their delegate(s) may require a steam locomotive owner or operator to provide FRA with timely notification before performing a 31 service day inspection. If the Regional Administrator or their delegate indicates their desire to be present for the 31 service day inspection, the steam locomotive owner and/or operator shall provide them a scheduled date and location for inspection. Once scheduled, the inspection must be performed at the time and place specified, unless the Regional Administrator and the steam locomotive owner and/or operator mutually agree to reschedule. If the Regional Administrator requests the inspection be performed on another date but the steam locomotive owner and/or operator and the Regional Administrator are unable to agree on a date for rescheduling, the inspection may be performed as scheduled.

(c) *Filing inspection reports.* Within 10 days of conducting the 31 service day inspection, the steam locomotive owner and/or operator shall file, for each steam locomotive inspected, a report of inspection (FRA Form No. 1), in the place where the steam locomotive is maintained and with the FRA Regional Administrator for that region. When the report of annual inspection (FRA Form No. 3), is filed, the FRA Form No. 1 does not have to be filed until the next 31 service day inspection. (See Appendix B of this part.)

**§ 230.15 Ninety-two (92) service day inspection.**

(a) *General.* An individual competent to conduct the inspection shall perform the 92 service day inspection after the steam locomotive has accrued 92 "service-days." This inspection shall include all daily, all 31 service day, and all 92 service day inspection items. See appendix A of this part. Days in service shall be counted, recorded, and readily available for inspection when requested by an FRA inspector.

(b) *Filing inspection reports.* Within 10 days of conducting the 92 service day inspection, the steam locomotive owner and/or operator shall file, for each steam locomotive inspected, a report of inspection (FRA Form No. 1), in the place the locomotive is maintained and with the FRA Regional Administrator for that region.

When the report of annual inspection (FRA Form No. 3), is filed, the FRA Form No. 1 does not have to be filed until the next 92 service day inspection. (See appendix C of this part.)

**§ 230.16 Annual inspection.**

(a) *General.* (1) An individual competent to conduct the inspection shall perform the annual inspection after 368 calendar days have elapsed from the time of the previous annual inspection. This inspection shall include all daily, all 31 service day, all 92 service day, and all annual inspection items. (See appendix B of this part.)

(2) *Fifth annual inspection.* An individual competent to do so shall perform a flexible staybolt and cap inspection in accordance with § 230.41 at each fifth annual inspection.

(b) *FRA notification.* FRA Regional Administrators shall be provided written notice at least one month prior to an annual inspection and shall be afforded an opportunity to be present. If the Regional Administrator or their delegate indicates a desire to be present, the steam locomotive owner and/or operator will provide a scheduled date and location for the inspection. Once scheduled, the inspection must be performed at the time and place specified, unless the Regional Administrator and the steam locomotive owner and/or operator mutually agree to reschedule. If the Regional Administrator requests the inspection be performed on another date but the steam locomotive owner and/or operator and the Regional Administrator are unable to agree on a date for rescheduling, the inspection may be performed as scheduled.

(c) *Filing inspection reports.* Within 10 days of completing the annual inspection, the steam locomotive owner and/or operator shall file, for each steam locomotive inspected, a report of inspection (FRA Form No. 3), in the place where the steam locomotive is maintained and with the FRA Regional Administrator for that region. (See appendix A of this part.)

**§ 230.17 One thousand four hundred seventy-two (1472) service day inspection.**

(a) *General.* Before any steam locomotive is initially put in service or

brought out of retirement, and after every 1472 service days or 15 years, whichever is earlier, an individual competent to conduct the inspection shall inspect the entire boiler. In the case of a new locomotive or a locomotive being brought out of retirement, the initial 15 year period shall begin on the day that the locomotive is placed in service or 365 calendar days after the first flue tube is installed in the locomotive, whichever comes first. This 1472 service day inspection shall include all annual, and 5th annual, inspection requirements, as well as any items required by the steam locomotive owner and/or operator or the FRA inspector. At this time, the locomotive owner and/or operator shall complete, update and verify the locomotive specification card (FRA Form No. 4), to reflect the condition of the boiler at the time of this inspection. See appendices A and B of this part.

(b) *Filing inspection reports.* Within 30 days of completing the 1472 service day inspection, the steam locomotive owner and/or operator shall, for each steam locomotive inspected, file in the place where the steam locomotive is maintained and with the FRA Regional Administrator for that region a report of inspection (FRA Form No. 3), and a completed FRA Form No. 4. See appendix C of this part.

**Recordkeeping Requirements**

**§ 230.18 Service days.**

(a) *Service day record.* For every steam locomotive currently in service, the steam locomotive owner and/or operator shall have available, and be able to show an FRA inspector upon request, a current copy of the service day record that contains the number of service days the steam locomotive has accrued since the last 31, 92, Annual and 1472 service day inspections.

(b) *Service day report.* By the 31st of every January, every steam locomotive owner and/or operator shall file a service day report, FRA Form No. 5, with the Regional Administrator accounting for the days the steam locomotive was in service from January 1 through December 31st of the preceding year. If the steam locomotive was in service zero (0) days during that period, a report must still be filed to prevent the steam locomotive from being considered retired by FRA. (See appendix B of this part.)

(c) *Retirement where no service day reports filed.* Where the steam locomotive owner and/or operator does not file the required service day report for a steam locomotive, that steam locomotive may be considered retired

by FRA. The steam locomotive owner and/or operator must complete all 1472 service day inspection items to return a retired steam locomotive to service.

**§ 230.19 Posting of FRA Form No. 1 and FRA Form No. 3.**

(a) *FRA Form No. 1.* The steam locomotive owner and/or operator shall place a copy of the 31 and 92 service day inspection report (FRA Form No. 1), properly filled out, under transparent cover in a conspicuous place in the cab of the steam locomotive before the inspected boiler is put into service. This FRA Form No. 1 will not be required for the first 31 service days following an annual inspection and the posting of an FRA Form No. 3. (See appendix B of this part.)

(b) *FRA Form No. 3.* In addition to the FRA Form No. 1, the steam locomotive owner and/or operator shall also maintain in the cab a current copy of FRA Form No. 3 in the manner described in paragraph (a) of this section. (See appendix C of this part.)

**§ 230.20 Alteration and repair report for steam locomotive boilers.**

(a) *Alterations.* When an alteration is made to a steam locomotive boiler, the steam locomotive owner and/or operator shall file an alteration report (FRA Form No. 19), detailing the changes to the locomotive with the FRA Regional Administrator within 30 days from the date the work was completed. This form shall be attached to, and maintained with, the FRA Form No. 4 until such time as a new FRA Form No. 4 reflecting the alteration is submitted to the Regional Administrator. Alteration reports shall be filed and maintained for the life of the boiler. (See appendix B of this part.)

(b) *Welded and riveted repairs to unstayed portions of the boiler.* Whenever welded or riveted repairs are performed on unstayed portions of a steam locomotive boiler, the steam locomotive owner and/or operator shall file with the FRA Regional Administrator, within 30 days from the time the work was completed, a repair report, FRA Form No. 19, that details the work done to the steam locomotive. Repair reports shall be filed and maintained for the life of the boiler. (See appendix B of this part.)

(c) *Welded and riveted repairs to stayed portions of the boiler.* Whenever welded or riveted repairs are performed on stayed portions of a steam locomotive boiler, the steam locomotive owner and/or operator shall complete a repair report (FRA Form No. 19), detailing the work done. Repair reports

shall be maintained for the life of the boiler. (See appendix C of this part.)

**§ 230.21 Steam locomotive number change.**

When a steam locomotive number is changed, the steam locomotive owner and/or operator must reflect the change in the upper right-hand corner of all documentation related to the steam locomotive by showing the old and new numbers:

Old No. 000  
New No. XXX.

**§ 230.22 Accident reports.**

In the case of an accident due to failure, from any cause, of a steam locomotive boiler or any part or appurtenance thereof, resulting in serious injury or death to one or more persons, the railroad on whose line the accident occurred shall immediately make a telephone report of the accident by calling the National Response Center (toll free) at Area Code 800-424-0201. The report shall state the nature of the accident, the number of persons killed or seriously injured, the place at which it occurred, and the location where the steam locomotive may be inspected. Confirmation of this report shall be immediately mailed to the Associate Administrator for Safety, Federal Railroad Administration, Washington, DC 20590, and contain a detailed report of the accident, including, to the extent known, the causes and a complete list of the casualties.

**Subpart B—Boilers and Appurtenances**

**§ 230.23 Responsibility for general construction and safe working pressure.**

The steam locomotive owner and operator are responsible for the general design and construction of the steam locomotive boilers under their control. The steam locomotive owner shall establish the safe working pressure for each steam locomotive boiler, after giving full consideration to the general design, workmanship, age, and overall condition of the complete boiler unit. The condition of the boiler unit shall be determined by, among other factors, the minimum thickness of the shell plates, the lowest tensile strength of the plates, the efficiency of the longitudinal joint, the inside diameter of the course, and the maximum allowable stress value allowed. The steam locomotive operator shall not place the steam locomotive in service before ensuring that the steam locomotive's safe working pressure has been established.

**Allowable Stress**

**§ 230.24 Maximum allowable stress.**

(a) *Maximum allowable stress value.* The maximum allowable stress value on any component of a steam locomotive boiler shall not exceed 1/4 of the ultimate tensile strength of its material.

(b) *Safety factor.* When it is necessary to use the code of original construction in boiler calculations, the safety factor value shall not be less than 4.

**§ 230.25 Maximum allowable stress on stays and braces.**

The maximum allowable stress per square inch of net cross sectional area on fire box and combustion chamber stays shall be 7,500 psi. The maximum allowable stress per square inch of net cross sectional area on round, rectangular, or gusset braces shall be 9,000 psi.

**Strength of Materials**

**§ 230.26 Tensile strength of shell plates.**

When the tensile strength of steel or wrought-iron shell plates is not known, it shall be taken at 50,000 psi for steel and 45,000 psi for wrought iron.

**§ 230.27 Maximum shearing strength of rivets.**

The maximum shearing strength of rivets per square inch of cross sectional area shall be taken as follows:

Rivets	Pounds per square inch
Iron Rivets in Single Shear .....	38,000
Iron Rivets in Double Shear .....	76,000
Steel Rivets in Single Shear .....	44,000
Steel Rivets in Double Shear .....	88,000

**§ 230.28 Higher shearing strength of rivets.**

A higher shearing strength may be used for rivets when it can be shown through testing that the rivet material used is of such quality as to justify a higher allowable shearing strength.

**Inspection and Repair**

**§ 230.29 Inspection and repair.**

(a) *Responsibility.* The steam locomotive owner and/or operator shall inspect and repair all steam locomotive boilers and appurtenances under their control. They shall immediately remove from service any boiler that has developed cracks in the barrel. The steam locomotive owner and/or operator shall also remove the boiler from service whenever either of them, or the FRA inspector, considers it necessary due to other defects.



(b) *Repair standards.* (1) All defects disclosed by inspection shall be repaired in accordance with accepted industry standards—which may include established railroad practices, or NBIC or API established standards—before the steam locomotive is returned to service. The steam locomotive owner and/or operator shall not return the steam locomotive boiler or appurtenances to service unless they are in good condition and safe and suitable for service.

(2) Any welding to unstayed portions of the boiler made pursuant to § 230.33 shall be made in accordance with an accepted national standard for boiler repairs. The steam locomotive owner and/or operator shall not return the steam locomotive boiler or appurtenances to service unless they are in good condition and safe and suitable for service.

#### § 230.30 Lap-joint seam boilers.

Every boiler having lap-joint longitudinal seams without reinforcing plates shall have sufficient lagging, jacketing, flues, and tubes removed at every annual inspection so that an inspection of the entire joint, inside and out, can be made, taking special care to detect grooving or cracks at the edges of the seams.

#### § 230.31 Flues to be removed.

(a) *Inspection of the boiler interior.* During the 1472 service day inspection, the steam locomotive owner and/or operator shall remove all flues of steam locomotive boilers in service, except as provided in paragraph (b) of this section, for the purpose of inspecting the entire interior of the boiler and its bracing. After removing the flues, the steam locomotive owner and/or operator shall enter the boiler to remove scale from the interior and thoroughly clean and inspect it.

(b) *NDE testing.* If the boiler can be thoroughly cleaned and inspected without removing the superheater flues, and it can be shown through appropriate NDE testing methods that they are safe and suitable for service, their removal may not be required at this time. Their removal may be required, however, if the FRA inspector, or the steam locomotive owner and/or operator, considers it necessary due to identifiable safety concerns.

#### § 230.32 Time and method of inspection.

(a) *Time of inspection.* The entire boiler shall completely be inspected at the 1472 service day inspection. The jacket, lagging and any other components interfering with the provision of inspection access shall be

removed at this time. Those portions of the boiler that are exposed and able to be inspected as required by the daily, 31 service day, annual and fifth annual inspections shall be inspected at those times. The interior of the boiler also shall be inspected at each annual inspection, after the completion of any hydrostatic test above MAWP, and whenever a sufficient number of flues are removed to allow examination. The jacket, lagging and any other components shall also be removed to provide inspection access whenever the FRA inspector, or the steam locomotive owner and/or operator, considers it necessary due to identifiable safety concerns.

(b) *Method of inspection.*—(1) *Entire boiler.* During the 1472 service day inspection, the entire boiler shall be examined for cracks, pitting, grooving, or indications of overheating and for damage where mud has collected, or heavy scale formed. The edges of plates, all laps, seams, and points where cracks and defects are likely to develop, shall be thoroughly inspected. Rivets shall be inspected for corrosion and looseness.

(2) *Boiler interior.* When inspecting the boiler interior, it must be seen that braces and stays are taut, that pins are properly secured in place, and that each is in condition to support its proportion of the load. Washout plugs shall be removed for access and visual inspection of the water side of the firebox sheets. Washout plug threads, sleeves and threaded openings shall be examined at this time.

(3) *Boiler exterior.* A thorough inspection shall be made of the entire exterior of the boiler while under hydrostatic pressure.

#### § 230.33 Welded repairs and alterations.

(a) *Unstayed portions of the boiler containing alloy steel or carbon steel with a carbon content over 0.25 percent.* Prior to welding on unstayed portions of the boiler, the steam locomotive owner and/or operator shall submit a written request for approval to the FRA Regional Administrator. If the approval is granted, the steam locomotive owner and/or operator shall perform any welding to unstayed portions of the boiler in accordance with an accepted national standard for boiler repairs. The steam locomotive owner and/or operator shall satisfy reporting requirements in § 230.20 at this time.

(b) *Unstayed portions of the boiler containing carbon steel not exceeding 0.25 percent carbon.* The steam locomotive owner and/or operator shall perform any welding to unstayed portions of the boiler in accordance with an accepted national standard for

boiler repairs. The steam locomotive owner and/or operator shall satisfy reporting requirements in § 230.20 at this time.

(c) *Wastage.* The steam locomotive owner and/or operator shall submit a written request for approval to the FRA Regional Administrator before performing weld build up on wasted areas of unstayed surfaces of the boiler that exceed a total of 100 square inches or the smaller of 25 percent of minimum required wall thickness or 1/2 inch. Wasted sheets shall not be repaired by weld build up if the wasted sheet has been reduced to less than 60 percent of the minimum required thickness as required by this part.

(d) *Flush patches.* The steam locomotive owner and/or operator shall submit a written request for approval to the FRA Regional Administrator for the installation of flush patches of any size on unstayed portions of the boiler.

(e) *Stayed portions of the boiler.* The steam locomotive owner and/or operator shall perform welded repairs or alterations on stayed portions of the boiler in accordance with established railroad practices, or an accepted national standard for boiler repairs. The steam locomotive owner and/or operator shall satisfy the reporting requirements in § 230.20 at this time.

#### § 230.34 Riveted repairs and alterations.

(a) *Alterations to unstayed portions of the boiler.* Prior to making riveted alterations on unstayed portions of the boiler, the steam locomotive owner and/or operator shall submit a written request for approval to the FRA Regional Administrator. If approval is granted, the steam locomotive owner and/or operator shall perform any riveting to unstayed portions of the boiler in accordance with established railroad practices or an accepted national standard for boiler repairs. The steam locomotive owner and/or operator shall satisfy reporting requirements in § 230.20 at this time.

(b) *Repairs to unstayed portions of the boiler.* The steam locomotive owner and/or operator shall perform any riveted repairs to unstayed portions of the boiler in accordance with established railroad practices, or an accepted national standard for boiler repairs. The steam locomotive owner and/or operator shall satisfy reporting requirements in § 230.20 at this time.

(c) *Repairs to stayed portions of the boiler.* The steam locomotive owner and/or operator shall perform riveted repairs or alterations on stayed portions of the boiler in accordance with established railroad practices or an accepted national standard for boiler

repairs. The steam locomotive owner and/or operator shall satisfy reporting requirements in § 230.20 at this time.

#### Pressure Testing of Boilers

##### § 230.35 Pressure testing.

The temperature of the steam locomotive boiler shall be raised to at least 70 deg. F any time hydrostatic pressure is applied to the boiler.

##### § 230.36 Hydrostatic testing of boilers.

(a) *Time of test.* The locomotive owner and/or operator shall hydrostatically test every boiler at the following times:

- (1) During the 1472 service day inspection, and at every annual inspection thereafter;
- (2) After making any alteration to the boiler;
- (3) After installing a flush patch on an unstayed portion of the boiler; and
- (4) After any riveting on an unstayed portion of the boiler.

(b) *Method of testing.* The metal temperature of the boiler shall be between 70 degrees Fahrenheit and 120 degrees Fahrenheit each time it is subjected to any hydrostatic pressure. Hydrostatic testing required by these rules shall be conducted at 25 percent above the MAWP.

(c) *Internal inspection.* An internal inspection of the boiler shall be conducted following any hydrostatic test where the pressure exceeds MAWP.

##### § 230.37 Steam test following repairs or alterations.

Upon completion of any repair or alteration, the locomotive owner and/or operator shall conduct a steam test of the boiler with steam pressure raised to between 95 percent and 100 percent of the MAWP. At this time, the boiler shall be inspected to ensure that it is in a safe and suitable condition for service.

#### Staybolts

##### § 230.38 Telltale holes.

(a) *Staybolts less than 8 inches long.* All staybolts shorter than 8 inches, except flexible bolts, shall have telltale holes  $\frac{3}{16}$  inch to  $\frac{7}{32}$  inch diameter and at least  $1\frac{1}{4}$  inches deep in the outer end.

(b) *Reduced body staybolts.* On reduced body staybolts, the telltale hole shall extend beyond the fillet and into the reduced section of the staybolt. Staybolts may have through telltale holes.

(c) *Telltale holes kept open.* All telltale holes, except as provided for in § 230.41, must be kept open at all times.

##### § 230.39 Broken staybolts.

(a) *Maximum allowable number of broken staybolts.* No boiler shall be allowed to remain in service with two broken staybolts located within 24 inches of each other, as measured inside the firebox or combustion chamber on a straight line. No boiler shall be allowed to remain in service with more than 4 broken staybolts inside the entire firebox and combustion chamber, combined.

(b) *Staybolt replacement.* Broken staybolts must be replaced during the 31 service day inspection, if detected at that time. Broken staybolts detected in between 31 service day inspections must be replaced no later than 30 calendar days from the time of detection. When staybolts 8 inches or less in length are replaced, they shall be replaced with bolts that have telltale holes  $\frac{3}{16}$  inch to  $\frac{7}{32}$  inch in diameter and at least  $1\frac{1}{4}$  inches deep at each end, or that have telltale holes  $\frac{3}{16}$  inch to  $\frac{7}{32}$  inch in diameter their entire length. At the time of replacement of broken staybolts, adjacent staybolts shall be inspected.

(c) *Assessment of broken staybolts.* Telltale holes leaking, plugged, or missing shall be counted as broken staybolts.

(d) *Prohibited methods of closing telltale holes.* Welding, forging, or riveting broken staybolt ends is prohibited as a method of closing telltale holes.

##### § 230.40 Time and method of staybolt testing.

(a) *Time of hammer testing.*—(1) General. All staybolts shall be hammer tested at every 31 service day inspection, except as provided in paragraph (a)(2) of this section. All staybolts also shall be hammer tested under hydrostatic pressure any time hydrostatic pressure above the MAWP specified on the boiler specification form (FRA Form No. 4), is applied to the boiler. (See appendix B of this part.)

(2) Exception for inaccessible staybolts. The removal of brickwork or grate bearers for the purpose of hammer testing staybolts during each 31 service day inspection will not be required if the staybolts behind these structural impediments have a telltale hole  $\frac{3}{16}$  inch to  $\frac{7}{32}$  inch in diameter their entire length. Whenever the brickwork or grate bearers are removed for any other reason, however, the bolts shall be inspected at that time.

(b) *Method of hammer testing.* If staybolts are tested while the boiler contains water, the hydrostatic pressure must be not less than 95 percent of the MAWP. The steam locomotive owner

and/or operator shall tap each bolt with a hammer and determine broken bolts from the sound or the vibration of the sheet. Whenever staybolts are tested while the boiler is not under pressure, such as during the 31 service day inspection, the staybolt test must be made with all the water drained from the boiler.

##### § 230.41 Flexible staybolts with caps.

(a) *General.* Flexible staybolts with caps shall have their caps removed during every 5th annual inspection for the purpose of inspecting the bolts for breakage, except as provided in paragraph (b) of this section.

(b) *Drilled flexible staybolts.* For flexible staybolts that have telltale holes between  $\frac{3}{16}$  inch and  $\frac{7}{32}$  inch in diameter, and which extend the entire length of the bolt and into the head not less than one third of the diameter of the head, the steam locomotive owner and/or operator need not remove the staybolt caps if it can be established, by an electrical or other suitable method, that the telltale holes are open their entire length. Any leakage from these telltale holes during the hydrostatic test indicates that the bolt is broken and must be replaced. Before the steam locomotive is placed in service, the inner ends of all telltale holes shall be closed with a fireproof porous material that will keep the telltale holes free of foreign matter and permit steam or water to exit the telltale hole when the bolt is broken or fractured.

(c) *Recordkeeping.* The removal of flexible staybolt caps and other tests shall be reported on FRA Form No. 3. (See appendix B of this part.)

(d) *Testing at request of FRA inspector.* Staybolt caps also shall be removed, or any of the tests in this section made, whenever the FRA inspector or the steam locomotive owner and/or operator considers it necessary due to identifiable safety concerns about the condition of staybolts, staybolt caps or staybolt sleeves.

#### Steam Gauges

##### § 230.42 Location of gauges.

Every boiler shall have at least one steam gauge which will correctly indicate the working pressure. The gauge shall be positioned so that it will be kept reasonably cool and can conveniently be read by the engine crew.

##### § 230.43 Gauge siphon.

The steam gauge supply pipe shall have a siphon on it of ample capacity to prevent steam from entering the gauge. The supply pipe shall directly

enter the boiler and be maintained steam tight. The supply pipe and its connections shall be cleaned each time the gauge is tested.

**§ 230.44 Time of testing.**

Steam gauges shall be tested prior to being installed or being reapplied, during the 92 service day inspection, and whenever any irregularity is reported.

**§ 230.45 Method of testing.**

Steam gauges shall be compared with an accurate test gauge or dead weight tester. While under test load at the MAWP of the boiler to which the gauge will be applied, the gauge shall be set to read that pressure as accurately as the physical limitations of the gauge will allow. Under test the gauge shall read within the manufacturer's tolerance at all points on the gauge up to 25 percent above the allowed pressure. If the manufacturer's tolerance is not known, the gauge must read within 2 percent full scale accuracy at all points on the gauge up to 25 percent above allowed pressure.

**§ 230.46 Badge plates.**

A metal badge plate showing the allowed steam pressure shall be attached to the boiler backhead in the cab. If boiler backhead is lagged, the lagging and jacket shall be cut away so that the plate can be seen.

**§ 230.47 Boiler number.**

(a) *Generally.* The builder's number of the boiler, if known, shall be stamped on the steam dome or manhole flange. If the builder's number cannot be obtained, an assigned number, which shall be used in making out specification cards, shall be stamped on the steam dome or manhole flange.

(b) *Numbers after January 10, 1912.* Numbers which are stamped after January 10, 1912 shall be located on the front side of the steam dome or manhole flange at the upper edge of the vertical surface, oriented in a horizontal manner, and have figures at least  $\frac{3}{8}$  inch high.

(c) *Name of manufacturer or owner.* The number shall be preceded by the name of the manufacturer if the original number is known or the name of the steam locomotive owner if a new number is assigned.

**Safety Relief Valves**

**§ 230.48 Number and capacity.**

(a) *Number and capacity.* Every boiler shall be equipped with at least two safety relief valves, suitable for the service intended, that are capable of preventing an accumulation of pressure

greater than 6 percent above the MAWP under any conditions of service. An FRA inspector may require verification of sufficient safety valve relieving capacity.

(b) *Determination of capacity.* Safety relief valve capacity may be determined by making an accumulation test with the fire in good, bright condition and all steam outlets closed. Additional safety relief valve capacity shall be provided if the safety relief valves allow an excess pressure of more than 6 percent above the MAWP during this test.

**§ 230.49 Setting of safety relief valves.**

(a) *Qualifications of individual who adjusts.* Safety relief valves shall be set and adjusted by a competent person who is thoroughly familiar with the construction and operation of the valve being set.

(b) *Opening pressures.* At least one safety relief valve shall be set to open at a pressure not exceeding the MAWP. Safety relief valves shall be set to open at pressures not exceeding 6 psi above the MAWP.

(c) *Setting procedures.* When setting safety relief valves, two steam gauges shall be used, one of which must be so located that it will be in full view of the persons engaged in setting such valves; and if the pressure indicated by the gauges varies more than 3 psi they shall be removed from the boiler, tested, and corrected before the safety relief valves are set. Gauges shall in all cases be tested immediately before the safety relief valves are set or any change made in the setting. When setting safety relief valves, the water level shall not be higher than  $\frac{3}{4}$  of the length of the visible water glass, as measured from the bottom of the glass.

(d) *Labeling of lowest set pressure.*

The set pressure of the lowest safety relief valve shall be indicated on a tag or label attached to the steam gauge so that it may be clearly read while observing the steam gauge.

**§ 230.50 Time of testing.**

All safety relief valves shall be tested, and adjusted if necessary, under steam at every 92 service day inspection, and also whenever any irregularity is reported.

**Water Glasses and Gauge Cocks**

**§ 230.51 Number and location.**

Every boiler shall be equipped with at least two water glasses. The lowest reading of the water glasses shall not be less than 3 inches above the highest part of the crown sheet. If gauge cocks are used, the reading of the lowest gauge cock shall not be less than 3 inches

above the highest part of the crown sheet.

**§ 230.52 Water glass valves.**

All water glasses shall be equipped with no more than two valves capable of isolating the water glass from the boiler. They shall also be equipped with a drain valve capable of evacuating the glass when it is so isolated.

**§ 230.53 Time of cleaning.**

The spindles of all water glass valves and of all gauge cocks shall be removed and valves and cocks thoroughly cleaned of scale and sediment at every 31 service day inspection, and when testing indicates that the apparatus may be malfunctioning. In addition, the top and bottom passages of the water column shall be cleaned and inspected at each annual inspection.

**§ 230.54 Testing and maintenance.**

(a) *Testing.* All water glasses must be blown out, all gauge cocks must be tested, and all passages verified to be open at the beginning of each day the locomotive is used, and as often as necessary to ensure proper functioning.

(b) *Maintenance.* Gauge cocks, water column drain valves, and water glass valves must be maintained in such condition that they can easily be opened and closed by hand, without the aid of a wrench or other tool.

**§ 230.55 Tubular type water and lubricator glasses and shields.**

(a) *Water glasses.* Tubular type water glasses shall be renewed at each 92 service day inspection.

(b) *Shields.* All tubular water glasses and lubricator glasses must be equipped with a safe and suitable shield which will prevent the glass from flying in case of breakage. This shield shall be properly maintained.

(c) *Location and maintenance.* Water glasses and water glass shields shall be so located, constructed, and maintained that the engine crew can at all times have an unobstructed view of the water in the glass from their proper positions in the cab.

**§ 230.56 Water glass lamps.**

All water glasses must be supplied with a suitable lamp properly located to enable the engine crew to easily see the water in the glass.

**Injectors, Feedwater Pumps, and Flue Plugs**

**§ 230.57 Injectors and feedwater pumps.**

(a) *Water delivery systems required.*

Each steam locomotive must be equipped with at least two means of delivering water to the boiler, at least one of which is a live steam injector.

(b) *Maintenance and testing.* Injectors and feedwater pumps must be kept in good condition, free from scale, and must be tested at the beginning of each day the locomotive is used, and as often as conditions require, to ensure that they are delivering water to the boiler. Boiler checks, delivery pipes, feed water pipes, tank hose and tank valves must be kept in good condition, free from leaks and from foreign substances that would obstruct the flow of water.

(c) *Bracing.* Injectors, feedwater pumps, and all associated piping shall be securely braced so as to minimize vibration.

#### **§ 230.58 Flue plugs.**

(a) *When plugging is permitted.* Flues greater than 2¼ inches in outside diameter (OD) shall not be plugged. Flues 2¼ inches in outside diameter (OD) or smaller may be plugged following failure, provided only one flue is plugged at any one time. Plugs must be removed and proper repairs made no later than 30 days from the time the plug is applied.

(b) *Method of plugging.* When used, flue plugs must be made of steel. The flue must be plugged at both ends. Plugs must be tied together by means of a steel rod not less than 5/8 inch in diameter.

#### **Fusible Plugs**

#### **§ 230.59 Fusible plugs.**

If boilers are equipped with fusible plugs, the plugs shall be removed and cleaned of scale each time the boiler is washed but not less frequently than during every 31 service day inspection. Their removal shall be noted on the FRA Form No. 1 or FRA Form No. 3. (See appendix B of this part.)

#### **Washing Boilers**

#### **§ 230.60 Time of washing.**

(a) *Frequency of washing.* All boilers shall thoroughly be washed as often as the water conditions require, but not less frequently than at each 31 service day inspection. The date of the boiler wash shall be noted on the FRA Form No. 1 or FRA Form No. 3. (See appendix B of this part.)

(b) *Plug removal.* All washout plugs, arch tube plugs, thermic siphon plugs, circulator plugs and water bar plugs must be removed whenever locomotive boilers are washed.

(c) *Plug maintenance.* All washout plugs, washout plug sleeves and threaded openings shall be maintained in a safe and suitable condition for service and shall be examined for defects each time the plugs are removed.

(d) *Fusible plugs cleaned.* Fusible plugs shall be cleaned in accordance with § 230.59.

#### **§ 230.61 Arch tubes, water bar tubes, circulators and thermic siphons.**

(a) *Frequency of cleaning.* Each time the boiler is washed, arch tubes and water bar tubes shall thoroughly be cleaned mechanically, washed, and inspected. Circulators and thermic siphons shall thoroughly be cleaned, washed and inspected.

(b) *Defects.* Arch tubes and water bar tubes found blistered, bulged, or otherwise defective shall be renewed. Circulators and thermic siphons found blistered, bulged or otherwise defective shall be either repaired or renewed.

(c) *Method of examination.* Arch tubes, water bar tubes and circulators shall be examined using an appropriate NDE method that accurately measures wall thickness at each annual inspection. All arch brick shall be removed for this inspection. If any are found with wall thickness reduced below that required to render them safe and suitable for the service intended at the MAWP specified on the boiler specification FRA Form No. 4, they must be replaced or repaired. (See appendix B of this part.)

#### **Steam Pipes**

#### **§ 230.62 Dry pipe.**

Dry pipes subject to pressure shall be examined at each annual inspection to measure wall thickness. Dry pipes with wall thickness reduced below that required to render the pipe suitable for the service intended at the MAWP must be replaced or repaired.

#### **§ 230.63 Smoke box, steam pipes and pressure parts.**

The smoke box, steam pipes and pressure parts shall be inspected at each annual inspection, or any other time that conditions warrant. The individual conducting the inspection must enter the smoke box to conduct the inspection, looking for signs of leaks from any of the pressure parts therein and examining all draft appliances.

#### **Steam Leaks**

#### **§ 230.64 Leaks under lagging.**

The steam locomotive owner and/or operator shall take out of service at once any boiler that has developed a leak under the lagging due to a crack in the shell, or to any other condition which may reduce safety. Pursuant to § 230.29, the boiler must be repaired before being returned to service.

#### **§ 230.65 Steam blocking view of engine crew.**

The steam locomotive owner and/or operator shall keep the boiler, and its piping and appurtenances, in such repair that they do not emit steam in a

manner that obscures the engine crew's vision.

### **Subpart C—Steam Locomotives and Tenders**

#### **§ 230.66 Design, construction, and maintenance.**

The steam locomotive owner and operator are responsible for the general design, construction and maintenance of the steam locomotives and tenders under their control.

#### **§ 230.67 Responsibility for inspection and repairs.**

The steam locomotive owner and/or operator shall inspect and repair all steam locomotives and tenders under their control. All defects disclosed by any inspection shall be repaired in accordance with accepted industry standards, which may include established railroad practices, before the steam locomotive or tender is returned to service. The steam locomotive owner and/or operator shall not return the steam locomotive or tender to service unless they are in good condition and safe and suitable for service.

#### **Speed Indicators**

#### **§ 230.68 Speed indicators.**

Steam locomotives that operate at speeds in excess of 20 miles per hour over the general system of railroad transportation shall be equipped with speed indicators. Where equipped, speed indicators shall be maintained to ensure accurate functioning.

#### **Ash Pans**

#### **§ 230.69 Ash pans.**

Ash pans shall be securely supported from mud-rings or frames with no part less than 2½ inches above the rail. Their operating mechanism shall be so arranged that they may be safely operated and securely closed.

#### **Brake and Signal Equipment**

#### **§ 230.70 Safe condition.**

(a) *Pre-departure inspection.* At the beginning of each day the locomotive is used, the steam locomotive operator shall ensure that:

- (1) The brakes on the steam locomotive and tender are in safe and suitable condition for service;
- (2) The air compressor or compressors are in condition to provide an ample supply of air for the locomotive service intended;
- (3) The devices for regulating all pressures are properly performing their functions;
- (4) The brake valves work properly in all positions; and

(5) The water has been drained from the air-brake system.

(b) *Brake pipe valve required.* Each steam locomotive shall have a brake pipe valve attached to the front of the tender, the rear of the back cab wall, or adjacent to the exit of a vestibuled cab.

The words "Emergency Brake Valve" shall be clearly displayed near the valve.

**§ 230.71 Orifice testing of compressors.**

(a) *Frequency of testing.* The compressor or compressors shall be tested for capacity by orifice test as

often as conditions may require, but not less frequently than once every 92 service days.

(b) *Orifice testing criteria.* (1) Compressors in common use, as listed in the following table, shall have orifice test criteria as follows:

Make	Compressor size	Single strokes per minute	Diameter of orifice (in inches)	Air pressure maintained (in pounds)
Westinghouse .....	9½ .....	120	1¼	60
Westinghouse .....	11 .....	100	¾	60
Westinghouse .....	150 CFM 8½ CC .....	100	9/32	60
Westinghouse .....	120 CFM 8½ .....	100	15/64	60
New York .....	2a .....	120	5/32	60
New York .....	6a .....	100	13/64	60
New York .....	5b .....	100	15/64	60

**Note:** This table shall be used for altitudes to and including 1,000 feet. For altitudes over 1,000 feet the speed of compressor may be increased 5 single strokes per minute for each 1,000 feet increase in altitude.

(2) For compressors not listed in the table in paragraph (b)(1) of this section, the air pressure to be maintained shall be no less than 80 percent of the manufacturer's rated capacity for the compressor.

**§ 230.72 Testing main reservoirs.**

(a) *Hammer and hydrostatic testing.* Except as described in paragraphs (b) through (d) of this section, every main reservoir, except those cast integrally with the frame, shall be hammer and hydrostatically tested during each annual inspection. The reservoir shall be hammer tested while empty and with no pressure applied. If no defective areas are detected, a hydrostatic test of MAWP shall be applied.

(b) *Drilling of main reservoirs.* (1) Only welded main reservoir originally constructed to withstand at least five times the MAWP may be drilled over its entire surface with telltale holes that are 3/16 of an inch in diameter. The holes shall be spaced not more than 12 inches apart, measured both longitudinally and circumferentially, and drilled from the outer surface to an extreme depth determined by the following formula:  

$$D = (.6PR / (S - .6P))$$

Where:

D = Extreme depth of telltale holes in inches but in no case less than one-sixteenth inch;  
P = certified working pressure in psi;  
S = 1/5 of the minimum specified tensile strength of the material in psi; and  
R = inside radius of the reservoir in inches.

(2) One row of holes shall be drilled lengthwise of the reservoir on a line intersecting the drain opening. When main reservoirs are drilled as described in paragraph (b)(1) of this section, the hydrostatic and hammer tests described

in paragraph (a) of this section are not required during the annual inspection. Whenever any telltale hole shall have penetrated the interior of any reservoir, the reservoir shall be permanently withdrawn from service.

(c) *Welded main reservoirs without longitudinal lap seams.* For welded main reservoirs that do not have longitudinal lap seams, an appropriate NDE method that can measure the wall thickness of the reservoir may be used instead of the hammer test and hydrostatic test required in paragraph (a) of this section. The spacing of the sampling points for wall thickness shall not be greater than 12 inches longitudinally and circumferentially. The reservoir shall permanently be withdrawn from service where the NDE testing reveals wall thickness less than the value determined by the following formula:  

$$t = (PR / (S - .6P))$$

Where:

t = Minimum value for wall thickness;  
P = Certified working pressure in psi;  
S = 1/5 of the minimum specified tensile strength of the material in psi, or 10,000 psi if the tensile strength is unknown; and  
R = Inside radius of the reservoir in inches.

(d) *Welded or riveted longitudinal lap seam main reservoirs.* (1) For welded or riveted longitudinal lap seam main reservoirs, an appropriate NDE method that can measure wall thickness of the reservoir shall be used instead of, or in addition to, the hammer test and hydrostatic test. The spacing of the sampling points for wall thickness shall not be greater than 12 inches longitudinally and circumferentially. Particular care shall be taken to measure along the longitudinal seam on both

plates at an interval of no more than 6 inches longitudinally. The reservoir shall be withdrawn permanently from service where NDE testing reveals wall thickness less than the value determined by the following formula:

$$t = (PR / (0.5S - 0.6P))$$

Where:

t = Minimum value for wall thickness;  
P = Certified working pressure in psi;  
S = 1/5 of the minimum specified tensile strength of the material in psi, or 10,000 psi if the tensile strength of steel is unknown; and  
R = Inside radius of the reservoir in inches.

(2) Repairs of reservoirs with reduced wall thickness are prohibited.

**§ 230.73 Air gauges.**

(a) *Location.* Air gauges shall be so located that they may be conveniently read by the engineer from his or her usual position in the cab. No air gauge may be more than 3 psi in error.

(b) *Frequency of testing.* Air gauges shall be tested prior to reapplication following removal, as well as during the 92 service day inspection and whenever any irregularity is reported.

(c) *Method of testing.* Air gauges shall be tested using an accurate test gauge or dead weight tester designed for this purpose.

**§ 230.74 Time of cleaning.**

All valves in the air brake system, including related dirt collectors and filters, shall be cleaned and tested in accordance with accepted brake equipment manufacturer's specifications, or as often as conditions require to maintain them in a safe and suitable condition for service, but not less frequently than after 368 service

days or during the second annual inspection, whichever occurs first.

**§ 230.75 Stenciling dates of tests and cleaning.**

The date of testing and cleaning and the initials of the shop or station at which the work is done, shall legibly be stenciled in a conspicuous place on the tested parts or placed on a card displayed under a transparent cover in the cab of the steam locomotive.

**§ 230.76 Piston travel.**

(a) *Minimum piston travel.* The minimum piston travel shall be sufficient to provide proper brake shoe clearance when the brakes are released.

(b) *Maximum piston travel.* The maximum piston travel when steam locomotive is standing shall be as follows:

Type of wheel brake	Maximum piston travel (in inches)
Cam Type Driving Wheel Brake	3½
Other forms of Driving Wheel Brake .....	6
Engine Truck Brake .....	8
Tender Brake .....	9

**§ 230.77 Foundation brake gear.**

(a) *Maintenance.* Foundation brake gear shall be maintained in a safe and suitable condition for service. Levers, rods, brake beams, hangers, and pins shall be of ample strength, and shall not be fouled in any way which will affect the proper operation of the brake. All pins shall be properly secured in place with cotter pine, split keys, or nuts. Brake shoes must be properly applied and kept approximately in line with the tread of the wheel.

(b) *Distance above the rails.* No part of the foundation brake gear of the steam locomotive or tender shall be less than 2½ inches above the rails.

**§ 230.78 Leakage.**

(a) *Main reservoirs and related piping.* Leakage from main reservoir and related piping shall be tested at every 92 service day inspection and shall not exceed an average of 3 psi per minute in a test of 3 minutes duration that is made after the pressure has been reduced to 60 percent of the maximum operating pressure.

(b) *Brake cylinders.* Leakage from brake cylinders shall be tested at every 92 service day inspection. With a full service application from maximum brake pipe pressure, and with communication to the brake cylinders closed, the brakes on the steam locomotive and tender must remain applied for a minimum of 5 minutes.

(c) *Brake pipes.* Steam locomotive brake pipe leakage shall be tested at the beginning of each day the locomotive is used, and shall not exceed 5 psi per minute.

**§ 230.79 Train signal system.**

Where utilized, the train signal system, or any other form of on-board communication, shall be tested and known to be in safe and suitable condition for service at the beginning of each day the locomotive is used.

**Cabs, Warning Signals, Sanders and Lights**

**§ 230.80 Cabs.**

(a) *General provisions.* Cabs shall be securely attached or braced and maintained in a safe and suitable condition for service. Cab windows of steam locomotives shall provide an undistorted view of the track and signals for the crew from their normal position in the cab. Cab floors shall be kept free of tripping or slipping hazards. The cab climate shall be maintained to provide an environment that does not unreasonably interfere with the engine crew's performance of their duties under ordinary conditions of service.

(b) *Steam pipes.* Steam pipes shall not be fastened to the cab. New construction or renewals made of iron or steel pipe greater than ⅛ inch NPS that are subject to boiler pressure in cabs shall have a minimum wall thickness equivalent to schedule 80 pipe, with properly rated valves and fittings. Live steam heating radiators must not be fastened to the cab. Exhaust steam radiators may be fastened to the cab.

(c) *Oil-burning steam locomotives.* If the cab is enclosed, oil burning steam locomotives that take air for combustion through the fire-door opening shall have a suitable conduit extending from the fire-door to the outside of the cab.

**§ 230.81 Cab aprons.**

(a) *General provisions.* Cab aprons shall be of proper length and width to ensure safety. Cab aprons shall be securely hinged, maintained in a safe and suitable condition for service, and roughened, or other provision made, to afford secure footing.

(b) *Width of apron.* The cab apron shall be of a sufficient width to prevent, when the drawbar is disconnected and the safety chains or the safety bars are taut, the apron from dropping between the steam locomotive and tender.

**§ 230.82 Fire doors.**

(a) *General provisions.* Each steam locomotive shall have a fire door which shall latch securely when closed and which shall be maintained in a safe and

suitable condition for service. Fire doors on all oil-burning locomotives shall be latched securely with a pin or key.

(b) *Mechanically operated fire doors.* Mechanically operated fire doors shall be so constructed and maintained that they may be operated by pressure of the foot on a pedal, or other suitable appliance, located on the floor of the cab or tender at a suitable distance from the fire door, so that they may be conveniently operated by the person firing the steam locomotive.

(c) *Hand-operated doors.* Hand operated fire doors shall be so constructed and maintained that they may be conveniently operated by the person firing the steam locomotive.

**§ 230.83 Cylinder cocks.**

Each steam locomotive shall be equipped with cylinder cocks which can be operated from the cab of the steam locomotive. All cylinder cocks shall be maintained in a safe and suitable condition for service.

**§ 230.84 Sanders.**

Steam locomotives shall be equipped with operable sanders that deposit sand on the rail head in front of a set of driving wheels. Sanders shall be tested at the beginning of each day the locomotive is used.

**§ 230.85 Audible warning device.**

(a) *General provisions.* Each steam locomotive shall be equipped with an audible warning device that produces a minimum sound level of 96db(A) at 100 feet in front of the steam locomotive in its direction of travel. The device shall be arranged so that it may conveniently be operated by the engineer from his or her normal position in the cab.

(b) *Method of measurement.* Measurement of the sound level shall be made using a sound level meter conforming, at a minimum, to the requirements of ANSI S1.4-1971, Type 2, and set to an A-weighted slow response. While the steam locomotive is on level, tangent track, the microphone shall be positioned 4 feet above the ground at the center line of the track and shall be oriented with respect to the sound source in accordance with the microphone manufacturer's recommendations.

**§ 230.86 Required illumination.**

(a) *General provisions.* Each steam locomotive used between sunset and sunrise shall be equipped with an operable headlight that provides illumination sufficient for a steam locomotive engineer in the cab to see, in a clear atmosphere, a dark object as large as a man of average size standing

at least 800 feet ahead and in front of such headlight. If a steam locomotive is regularly required to run backward for any portion of its trip other than to pick up a detached portion of its train or to make terminal movements, it shall also be equipped on its rear end with an operable headlight that is capable of providing the illumination described in this paragraph (a).

(b) *Dimming device.* Such headlights shall be provided with a device whereby the light from same may be diminished in yards and at stations or when meeting trains.

(c) *Where multiple locomotives utilized.* When two or more locomotives are used in the same train, the leading locomotive only will be required to display a headlight.

#### **§ 230.87 Cab lights.**

Each steam locomotive shall have cab lights that sufficiently illuminate the control instruments, meters and gauges to allow the engine crew to make accurate readings from their usual and proper positions in the cab. These lights shall be so located and constructed that the light will shine only on those parts requiring illumination and does not interfere with the engine crew's vision of the track and signals. Each steam locomotive shall also have a conveniently located additional lamp that can be readily turned on and off by the persons operating the steam locomotive and that provides sufficient illumination to read train orders and timetables.

#### **Throttle and Reversing Gear**

##### **§ 230.88 Throttles.**

Throttles shall be maintained in safe and suitable condition for service, and efficient means shall be provided to hold the throttle lever in any desired position.

##### **§ 230.89 Reverse gear.**

(a) *General provisions.* Reverse gear, reverse levers, and quadrants shall be maintained in a safe and suitable condition for service. Reverse lever latch shall be so arranged that it can be easily disengaged, and provided with a spring which will keep it firmly seated in quadrant. Proper counterbalance shall be provided for the valve gear.

(b) *Air-operated power reverse gear.* Steam locomotives that are equipped with air operated power reverse gear shall be equipped with a connection whereby such gear may be operated by steam or by an auxiliary supply of air in case of failure of the main reservoir air pressure. The operating valve handle for such connection shall be conveniently located in the cab of the locomotive and

shall be plainly marked. If an independent air reservoir is used as the source of the auxiliary supply for the reverse gear, it shall be provided with means to automatically prevent loss of pressure in event of failure of the main reservoir air pressure.

(c) *Power reverse gear reservoirs.* Power reverse gear reservoirs, if provided, must be equipped with the means to automatically prevent the loss of pressure in the event of a failure of main air pressure and have storage capacity for not less than one complete operating cycle of control equipment.

#### **Draw Gear and Draft Systems**

##### **§ 230.90 Draw gear between steam locomotive and tender.**

(a) *Maintenance and testing.* The draw gear between the steam locomotive and tender, together with the pins and fastenings, shall be maintained in safe and suitable condition for service. The pins and drawbar shall be removed and tested for defects using an appropriate NDE method at every annual inspection. Where visual inspection does not disclose any defects, an additional NDE testing method shall be employed. Suitable means for securing the drawbar pins in place shall be provided. Inverted drawbar pins shall be held in place by plate or stirrup.

(b) *Safety bars and chains generally.* One or more safety bar(s) or two or more safety chains shall be provided between the steam locomotive and tender. The combined strength of the safety chains or safety bar(s) and their fastenings shall be not less than 50 percent of the strength of the drawbar and its connections. These shall be maintained in safe and suitable condition for service, and inspected at the same time draw gear is inspected.

(c) *Minimum length of safety chains or bars.* Safety chains or safety bar(s) shall be of the minimum length consistent with the curvature of the railroad on which the steam locomotive is operated.

(d) *Lost motion.* Lost motion between steam locomotives and tenders not equipped with spring buffers shall be kept to a minimum and shall not exceed 1/2 inch.

(e) *Spring buffers.* When spring buffers are used between steam locomotives and tenders the spring shall be applied with not less than 3/4 inch compression, and shall at all times be under sufficient compression to keep the chafing faces in contact.

##### **§ 230.91 Chafing irons.**

Chafing irons that permit proper curving shall be securely attached to the steam locomotive and tender, and shall

be maintained to permit lateral and vertical movement.

##### **§ 230.92 Draw gear and draft systems.**

Couplers, draft gear and attachments on steam locomotives and tenders shall be securely fastened, and maintained in safe and suitable condition for service.

#### **Driving Gear**

##### **§ 230.93 Pistons and piston rods.**

(a) *Maintenance and testing.* Pistons and piston rods shall be maintained in safe and suitable condition for service. Piston rods shall be inspected for cracks each time they are removed, and shall be renewed if found defective.

(b) *Fasteners.* Fasteners (keys, nuts, etc.) shall be kept tight and shall have some means to prevent them from loosening or falling out of place.

##### **§ 230.94 Crossheads.**

Crossheads shall be maintained in a safe and suitable condition for service, with not more than 1/4 inch vertical or 5/16 inch lateral clearance between crossheads and guides.

##### **§ 230.95 Guides.**

Guides shall be securely fastened and maintained in a safe and suitable condition for service.

##### **§ 230.96 Main, side, and valve motion rods.**

(a) *General.* Main, side or valve motion rods developing cracks or becoming otherwise defective shall be removed from service immediately and repaired or renewed.

(b) *Repairs.* Repairs, and welding of main, side or valve motion rods shall be made in accordance with an accepted national standard. The steam locomotive owner and/or operator shall submit a written request for approval to the FRA Regional Administrator prior to welding defective main rods, side rods, and valve gear components.

(c) *Bearings and bushings.* Bearings and bushings shall so fit the rods as to be in a safe and suitable condition for service, and means shall be provided to prevent bushings from turning in the rod. Straps shall fit and be securely bolted to rods. Floating bushings need not be provided with means to prevent bushings from turning.

(d) *Side motion of rods.* The total amount of side motion of each rod on its crank pin shall not exceed 1/4 inch.

(e) *Oil and grease cups.* Oil and grease cups shall be securely attached to rods, and grease cup plugs shall be equipped with a suitable fastening that will prevent them from being ejected.

(f) *Main rod bearings.* The bore of main rod bearings shall not exceed pin



diameters more than  $\frac{3}{32}$  inch at front or back end. The total lost motion at both ends shall not exceed  $\frac{5}{32}$  inch.

(g) *Side rod bearings.* The bore of side rod bearings shall not exceed pin diameters more than  $\frac{5}{32}$  inch on main pin nor more than  $\frac{3}{16}$  inch on other pins.

#### § 230.97 Crank pins.

(a) *General provisions.* Crank pins shall be securely applied. Securing the fit of a loose crank pin by shimming, prick punching, or welding is not permitted.

(b) *Maintenance.* Crank pin collars and collar fasteners shall be maintained in a safe and suitable condition for service.

#### Running Gear

##### § 230.98 Driving, trailing, and engine truck axles.

(a) *Condemning defects.* Driving, trailing, and engine truck axles with any of the following defects shall be removed from service immediately and repaired (see appendix A of this part for inspection requirements):

- (1) Bent axle;
- (2) Cut journals that cannot be made to run cool without turning;
- (3) Transverse seams in iron or steel axles;
- (4) Seams in axles causing journals to run hot;
- (5) Axles that are unsafe on account of usage, accident or derailment;

(6) Any axle worn  $\frac{1}{2}$  inch or more in diameter below the original/new journal diameter, except as provided in paragraph (a)(7) of this section;

(7) Any driving axles other than main driving axles with an original or new diameter greater than 6 inches that are worn  $\frac{3}{4}$  inch or more in diameter below the original/new diameter.

(b) *Journal diameter stamped.* For steam locomotives with plain bearings, the original/new journal diameter shall be stamped on one end of the axle no later than January 18, 2005.

##### § 230.99 Tender truck axles.

The minimum diameters of axles for various axle loads shall be as follows:

Axle load (in pounds)	Minimum diameter of journal (in inches)	Minimum diameter of wheel seat (in inches)	Minimum diameter of center (in inches)
50000 .....	5 $\frac{1}{2}$	7 $\frac{3}{8}$	6 $\frac{7}{16}$
38000 .....	5	6 $\frac{3}{4}$	5 $\frac{7}{8}$
31000 .....	4 $\frac{1}{2}$	6 $\frac{1}{4}$	5 $\frac{5}{16}$
22000 .....	3 $\frac{3}{4}$	5	4 $\frac{3}{8}$
15000 .....	3 $\frac{1}{4}$	4 $\frac{5}{8}$	3 $\frac{7}{8}$

##### § 230.100 Defects in tender truck axles and journals.

(a) *Tender truck axle condemning defects.* Tender truck axles with any of the following defects shall be removed from service immediately and repaired:

- (1) Axles that are bent;
- (2) Collars that are broken, cracked, or worn to  $\frac{1}{4}$  inch or less in thickness;
- (3) Truck axles that are unsafe on account of usage, accident, or derailment;

(4) A fillet in the back shoulder that is worn out; or

(5) A gouge between the wheel seats that is more than  $\frac{1}{8}$  of an inch in depth.

(b) *Tender truck journal condemning defects.* Tender truck journals with any of the following defects shall be removed from service immediately and repaired:

- (1) Cut journals that cannot be made to run cool without turning;
- (2) Seams in axles causing journals to run hot;
- (3) Overheating, as evidenced by pronounced blue black discoloration;
- (4) Transverse seams in journals of iron or steel axles; or
- (5) Journal surfaces having any of the following:
  - (i) A circumferential score;
  - (ii) Corrugation;
  - (iii) Pitting;
  - (iv) Rust;
  - (v) Etching.

##### § 230.101 Steam locomotive driving journal boxes.

(a) *Driving journal boxes.* Driving journal boxes shall be maintained in a safe and suitable condition for service. Not more than one shim may be used between the box and bearing.

(b) *Broken bearings.* Broken bearings shall be renewed.

(c) *Loose bearings.* Loose bearings shall be repaired or renewed.

##### § 230.102 Tender plain bearing journal boxes.

Plain bearing journal boxes with the following defects shall be removed from service immediately and repaired:

- (a) A box that does not contain visible free oil;
- (b) A box lid that is missing, broken, or open except to receive servicing;
- (c) A box containing foreign matter, such as dirt, sand, or coal dust that can reasonably be expected to damage the bearing; or have a detrimental effect on the lubrication of the journal and bearing;
- (d) A lubricating pad that:
  - (1) Is missing;
  - (2) Is not in contact with the journal;
  - (3) Has a tear extending half the length or width of the pad, or more, except by design;
  - (4) Shows evidence of having been scorched, burned, or glazed;
  - (5) Contains decaying or deteriorated fabric that impairs proper lubrication of the pad;

(6) Has an exposed center core (except by design); or

(7) Has metal parts contacting the journal;

(e) A plain bearing that:

- (1) Is missing, cracked, broken;
- (2) Has a bearing liner loose;
- (3) Has a broken out piece; or
- (4) Has indications of having been overheated, as evidenced by:
  - (i) Melted babbitt;
  - (ii) Smoke from hot oil; or
  - (iii) Journal surface damage; or
- (f) A plain bearing wedge that:
  - (1) Is missing, cracked or broken; or
  - (2) Is not located in its design position.

##### § 230.103 Tender roller bearing journal boxes.

Tender roller bearing journal boxes shall be maintained in a safe and suitable condition.

##### § 230.104 Driving box shoes and wedges.

Driving box shoes and wedges shall be maintained in a safe and suitable condition for service.

##### § 230.105 Lateral motion.

(a) *Condemning limits.* The total lateral motion or play between the hubs of the wheels and the boxes on any pair of wheels shall not exceed the following limits:

	Inches
Engine truck wheels (with swing centers) .....	1

	Inches
Engine truck wheels (with rigid centers) .....	1½
Trailing truck wheels .....	1
Driving wheels .....	¾

(b) *Limits increased.* These limits may be increased on steam locomotives operating on track where the curvature exceeds 20 degrees when it can be shown that conditions require additional lateral motion.

(c) *Non-interference with other parts.* The lateral motion shall in all cases be kept within such limits that the driving wheels, rods, or crank pins will not interfere with other parts of the steam locomotive.

### Trucks, Frames and Equalizing System

#### § 230.106 Steam locomotive frame.

(a) *Maintenance and inspection.* Frames, decks, plates, tailpieces, pedestals, and braces shall be maintained in a safe and suitable condition for service, and shall be cleaned and thoroughly inspected as often as necessary to maintain in a safe and suitable condition for service with cleaning intervals, in any case, not to exceed every 1472 service days.

(b) *Broken frames.* Broken frames properly patched or secured by clamps or other suitable means which restores the rigidity of the frame are permitted.

#### § 230.107 Tender frame and body.

(a) *Maintenance.* Tender frames shall be maintained in a safe and suitable condition for service.

(b) *Height difference.* The difference in height between the deck on the tender and the cab floor or deck on the steam locomotive shall not exceed 1½ inches.

(c) *Gangway minimum width.* The minimum width of the gangway between steam locomotive and tender, while standing on tangent track, shall be 16 inches.

(d) *Tender frame condemning defects.* A tender frame with any of the following defects shall be removed from service immediately and repaired:

(1) Portions of the tender frame or body (except wheels) that have less than a 2½ inches clearance from the top of rail;

(2) Tender center sill that is broken, cracked more than 6 inches, or permanently bent or buckled more than 2½ inches in any six foot length;

(3) Tender coupler carrier that is broken or missing;

(4) Tender center plate, any portion of which is missing or broken or that is not properly secured; or

(5) Tender that has a broken side sill, crossbearer, or body bolster.

#### § 230.108 Steam locomotive leading and trailing trucks.

(a) *Maintenance.* Trucks shall be maintained in safe and suitable condition for service. Center plates shall fit properly, and the male center plate shall extend into the female center plate not less than ¾ inch. All centering devices shall be properly maintained and shall not permit lost motion in excess of ½ inch.

(b) *Safety chain required.* A suitable safety chain shall be provided at each front corner of all four wheel engine trucks.

(c) *Clearance required.* All parts of trucks shall have sufficient clearance to prevent them from interfering with any other part of the steam locomotive.

#### § 230.109 Tender trucks.

(a) *Tender truck frames.* A tender truck frame shall not be broken, or have a crack in a stress area that affects its structural integrity. Tender truck center plates shall be securely fastened, maintained in a safe and suitable condition for service, and provided with a center pin properly secured. The male center plate must extend into the female center plate at least ¾ inch. Shims may be used between truck center plates.

(b) *Tender truck bolsters.* Truck bolsters shall be maintained approximately level.

(c) *Condemning defects for springs or spring rigging.* Springs or spring rigging with any of the following defects shall be taken out of service immediately and renewed or properly repaired:

(1) An elliptical spring with its top (long) leaf or any other five leaves in the entire spring pack broken;

(2) A broken coil spring or saddle;

(3) A coil spring that is fully compressed;

(4) A broken or cracked equalizer, hanger, bolt, gib or pin;

(5) A broken coil spring saddle; and

(6) A semi-elliptical spring with a top (long) leaf broken or two leaves in the top half broken, or any three leaves in the entire spring broken.

(d) *Tender securing arrangement.* Where equipped, tender devices and/or securing arrangements intended to prevent the truck and tender body from separating in case of derailment shall be maintained in a safe and suitable condition for service.

(e) *Side bearings and truck centering devices.* Where equipped, side bearings and truck centering devices shall be maintained in a safe and suitable condition for service.

(f) *Friction side bearings.* Friction side bearings shall not be run in contact, and shall not be considered to be in contact if there is clearance between them on

either side when measured on tangent level track.

(g) *Side bearings.* All rear trucks shall be equipped with side bearings. When the spread of side bearings is 50 inches, their maximum clearance shall be ¾ inch on each side for rear trucks and ¾ inch on each side for front trucks, where used. When the spread of the side bearings is increased, the maximum clearance shall be increased proportionately.

#### § 230.110 Pilots.

(a) *General provisions.* Pilots shall be securely attached, properly braced, and maintained in a safe and suitable condition for service.

(b) *Minimum and maximum clearance.* The minimum clearance of pilot above the rail shall be 3 inches and the maximum clearance shall be 6 inches measured on tangent level track.

#### § 230.111 Spring rigging.

(a) *Arrangement of springs and equalizers.* Springs and equalizers shall be arranged to ensure the proper distribution of weight to the various wheels of the steam locomotive, maintained approximately level and in a safe and suitable condition for service. Adjusting weights by shifting weights from one pair of wheels to another is permissible.

(b) *Spring or spring rigging condemning defects.* Springs or spring rigging with any of the following defects shall be removed from service immediately and renewed or properly repaired:

(1) Top leaf broken or two leaves in top half or any three leaves in spring broken. (The long side of a spring to be considered the top.) Broken springs not exceeding these requirements may be repaired by applying clips providing the clips can be made to remain in place;

(2) Any spring with leaves excessively shifting in the band;

(3) Broken coil springs; or

(4) Broken driving box saddle, equalizer, hanger, bolt, or pin.

### Wheels and Tires

#### § 230.112 Wheels and tires.

(a) *Mounting.* Wheels shall be securely mounted on axles. Prick punching or shimming the wheel fit will not be permitted. The diameter of wheels on the same axle shall not vary more than ⅜ inch.

(b) *Gage.* Wheels used on standard gage track will be out of gage if the inside gage of flanges, measured on base line is less than 53 inches or more than 53⅝ inches. Wheels used on less than standard gage track will be out of gage if the inside gage of flanges, measured

on base line, is less than the relevant track gage less 3½ inches or more than the relevant track gage less 3⅞ inches.

(c) *Flange distance variance.* The distance back to back of flanges of wheels mounted on the same axle shall not vary more than ¼ inch.

(d) *Tire thickness.* Wheels may not have tires with a minimum thickness

less than that indicated in the table in this paragraph (d). When retaining rings are used, measurements of tires to be taken from the outside circumference of the ring, and the minimum thickness of tires may be as much below the limits specified earlier in this paragraph (d) as the tires extend between the retaining

rings, provided it does not reduce the thickness of the tire to less than 1⅛ inches from the throat of flange to the counterbore for the retaining rings. The required minimum thickness for tires, by wheel center diameter and weight per axle, is as follows:

Weight per axle (weight on drivers divided by number of pairs of driving wheels)	Diameter of wheel center (inches)	Minimum thickness (inches)
30,000 pounds and under .....	44 and under .....	1¼
	Over 44 to 50 .....	1⅝
	Over 50 to 56 .....	1¾
	Over 56 to 62 .....	1⅞
	Over 62 to 68 .....	1½
	Over 68 to 74 .....	1⅞
	Over 74 .....	1⅝
Over 30,000 to 35,000 pounds .....	44 and under .....	1⅝
	Over 44 to 50 .....	1¾
	Over 50 to 56 .....	1⅞
	Over 56 to 62 .....	1½
	Over 62 to 68 .....	1⅞
	Over 68 to 74 .....	1⅝
	Over 74 .....	1⅞
Over 35,000 to 40,000 pounds .....	44 and under .....	1¾
	Over 44 to 50 .....	1⅞
	Over 50 to 56 .....	1½
	Over 56 to 62 .....	1⅞
	Over 62 to 68 .....	1⅝
	Over 68 to 74 .....	1⅞
	Over 74 .....	1¾
Over 40,000 to 45,000 pounds .....	44 and under .....	1⅞
	Over 44 to 50 .....	1½
	Over 50 to 56 .....	1⅞
	Over 56 to 62 .....	1⅝
	Over 62 to 68 .....	1⅞
	Over 68 to 74 .....	1¾
	Over 74 .....	1⅞
Over 45,000 to 50,000 pounds .....	44 and under .....	1½
	Over 44 to 50 .....	1⅞
	Over 50 to 56 .....	1⅝
	Over 56 to 62 .....	1⅞
	Over 62 to 68 .....	1¾
	Over 68 to 74 .....	1⅞
	Over 74 .....	1⅞
Over 50,000 to 55,000 pounds .....	44 and under .....	1⅞
	Over 44 to 50 .....	1⅝
	Over 50 to 56 .....	1⅞
	Over 56 to 62 .....	1¾
	Over 62 to 68 .....	1⅞
	Over 68 to 74 .....	1⅞
	Over 74 .....	1⅞
Over 55,000 pounds .....	44 and under .....	1⅝
	Over 44 to 50 .....	1⅞
	Over 50 to 56 .....	1¾
	Over 56 to 62 .....	1⅞
	Over 62 to 68 .....	1⅞
	Over 68 to 74 .....	1⅞
	Over 74 .....	2

(e) *Tire width.* Flanged tires shall be no less than 5½ inches wide for standard gage and no less than 5 inches wide for narrow gage. Plain tires shall be no less than 6 inches wide for standard gage and no less than 5½ inches wide for narrow gage.

#### § 230.113 Wheels and tire defects.

Steam locomotive and tender wheels or tires developing any of the defects listed in this section shall be removed from service immediately and repaired. Except as provided in § 230.114, welding on wheels and tires is prohibited. A wheel that has been

welded is a welded wheel for the life of the wheel.

(a) *Cracks or breaks.* Wheels and tires may not have a crack or break in the flange, tread, rim, plate, hub or brackets.

(b) *Flat spots.* Wheels and tires may not have a single flat spot that is 2½ inches or more in length, or two

adjoining spots that are each two or more inches in length.

(c) *Chipped flange.* Wheels and tires may not have a gouge or chip in the flange that is more than 1½ inches in length and ½ inch in width.

(d) *Broken rims.* Wheels and tires may not have a circumferentially broken rim if the tread, measured from the flange at a point ⅝ inch above the tread, is less than ¾ inches in width.

(e) *Shelled-out spots.* Wheels and tires may not have a shelled-out spot 2½ inches or more in length, or two adjoining spots that are each two or more inches in length, or so numerous as to endanger the safety of the wheel.

(f) *Seams.* Wheels and tires may not have a seam running lengthwise that is within ¾ inches of the flange.

(g) *Worn flanges.* Wheels and tires may not have a flange worn to a ⅓ inch thickness or less, as measured at a point ⅝ inch above the tread.

(h) *Worn treads.* Wheels and tires may not have a tread worn hollow ⅓ inch or more.

(i) *Flange height.* Wheels and tires may not have a flange height of less than 1 inch nor more than 1½ inches, as measured from the tread to the top of the flange.

(j) *Rim thickness.* Wheels may not have rims less than 1 inch thick.

(k) *Wheel diameter.* Wheels may not have wheel diameter variance, for wheels on the same axle or in the same driving wheel base, greater than ⅜ inch, when all tires are turned or new tires applied to driving and trailing wheels. When a single tire is applied, the diameter must not vary more than ⅜ inch from that of the opposite wheel on the same axle. When a single pair of tires is applied the diameter must be within ⅜ inch of the average diameter of the wheels in the driving wheel base to which they are applied.

#### § 230.114 Wheel centers.

(a) *Filling blocks and shims.* Driving and trailing wheel centers with divided rims shall be properly fitted with iron or steel filling blocks before the tires are applied, and such filling blocks shall be properly maintained. When shims are inserted between the tire and the wheel center, not more than two thicknesses of shims may be used, one of which must extend entirely around the wheel. The shim which extends entirely around the wheel may be in three or four pieces, providing they do not lap.

(b) *Wheel center condemning defects.* Wheel centers with any of the following defects shall be removed from service immediately and repaired:

- (1) Wheels centers loose on axle;
- (2) Broken or defective tire fastenings;

(3) Broken or cracked hubs, plates, bolts or spokes, except as provided in paragraph (b)(4) of this section; or

(4) Driving or trailing wheel center with three adjacent spokes or 25 percent or more of the spokes in the wheel broken.

(c) *Wheel center repairs.* Wheel centers may be repaired by welding or brazing provided that the defect can properly be so repaired and, following the repair, the crankpin and axle shall remain tight in the wheel. Banding of the hub is permitted.

(d) *Counterbalance maintenance.* Wheel counterbalances shall be maintained in a safe and suitable condition for service.

#### Steam Locomotive Tanks

##### § 230.115 Feed water tanks.

(a) *General provisions.* Tanks shall be maintained free from leaks, and in safe and suitable condition for service.

Suitable screens must be provided for tank wells or tank hose and shall be maintained in a manner that allows the unobstructed flow of water. Feed water tanks shall be equipped with a device that permits the measurement of the quantity of water in the tender feed water tank from the cab or tender deck of the steam locomotive. Such device shall be properly maintained.

(b) *Inspection frequency.* As often as conditions warrant but not less frequently than every 92 service days, the interior of the tank shall be inspected, and cleaned if necessary.

(c) *Top of tender.* Top of tender behind fuel space shall be kept clean, and means provided to carry off excess water. Suitable covers shall be provided for filling holes.

##### § 230.116 Oil tanks.

The oil tanks on oil burning steam locomotives shall be maintained free from leaks. The oil supply pipe shall be equipped with a safety cut-off device that:

- (a) Is located adjacent to the fuel supply tank or in another safe location;
- (b) Closes automatically when tripped and that can be reset without hazard; and
- (c) Can be hand operated from clearly marked locations, one inside the cab and one accessible from the ground on each exterior side of the steam locomotive.

#### Appendix A to Part 230—Inspection Requirements

The lists in this appendix are intended as guidance only. Adherence to this list does not relieve the steam locomotive owner and/or operator of responsibility for either: (1) Completing the inspection and maintenance

requirements described in this part; or (2) ensuring that the steam locomotive, tender and its parts and appurtenances are safe and suitable for service.

##### Daily Inspection Requirements; § 230.13

1. Observance of lifting pressure of the lowest safety valve.
2. Testing of water glasses and gauge cocks.\*
3. Inspection of tubular water glass shields.
4. Inspection of all cab lamps.\*
5. Inspection of boiler feedwater delivery systems.\*
6. Inspection of lagging for indication of leaks.
7. Inspection for leaks obstructing vision of engine crew.
8. Observance of compressor(s) and governor to ascertain proper operation.\*
9. Inspection of brake and signal equipment.\*
10. Inspection of brake cylinders for piston travel.
11. Inspection of foundation brake gear.
12. Inspection of sanders.\*
13. Inspection of draw gear and chafing irons.
14. Inspection of draft gear.
15. Inspection of crossheads and guides.
16. Inspection of piston rods and fasteners.
17. Inspection of main, side, and valve motion rods.
18. Inspection of headlights and classification lamps.\*
19. Inspection of running gear.
20. Inspection of tender frames and tanks.
21. Inspection of tender trucks for amount of side bearing clearance.

**Note:** All items marked (\*) should be checked at the beginning of each day the locomotive is used.

##### 31 Service Day Inspection Requirements; § 230.14

1. Washing of boiler.
2. Cleaning and inspection of water glass valves and gauge cocks.
3. Cleaning, washing and inspection of arch tubes, water bar tubes, circulators and siphons.
4. Removal and inspection of all washout and water tube plugs.
5. Testing of all staybolts.
6. Removal, cleaning and inspection of fusible plugs (if any).

##### 92 Service Day Inspection Requirements; § 230.15

1. Removal and testing of all air and steam gauges.
2. Cleaning of steam gauge siphon pipe.
3. Renewal of tubular water glasses.
4. Testing and adjusting of safety relief valves.
5. Testing of main reservoir and brake cylinder leakage.
6. Entering and inspection of tender tank interior.

##### Annual Inspection Requirements; § 230.16

1. Testing of thickness of arch and water bar tubes (arch brick to be removed)
2. Hydrostatic testing of boiler.
3. Testing of all staybolts.
4. Interior inspection of boiler.

5. Thickness verification of dry pipes.  
6. Smoke box inspection.  
7. Main reservoir hammer or UT testing and hydrostatic testing (for non-welded and drilled main reservoirs)  
8. Removal and inspection of steam locomotive drawbar(s) and pins (NDE testing other than merely visual)  
9. Inspection of longitudinal lap joint boiler seams.

*5 Year Inspection Requirements; § 230.16*  
1. Inspection of flexible staybolt caps and sleeves.  
*1472 Service Day Inspection Requirements; § 230.17*  
1. Removal of boiler flues (as necessary) and cleaning of boiler interior.

2. Removal of jacket and lagging and inspection of boiler interior and exterior.  
3. Hydrostatic testing of boiler.  
4. Thickness verification (boiler survey) and recomputation and update of steam locomotive specification card, (FRA Form No. 4).

**BILLING CODE 4610-06-P**

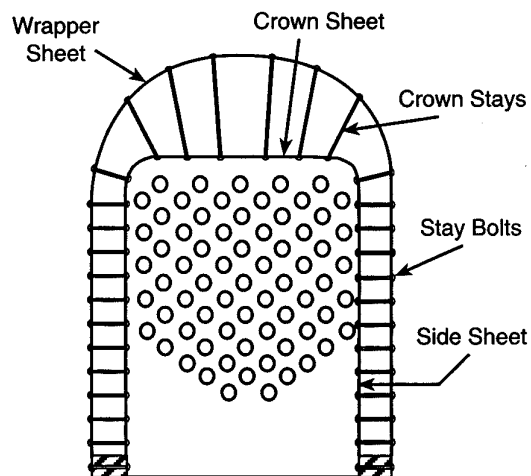
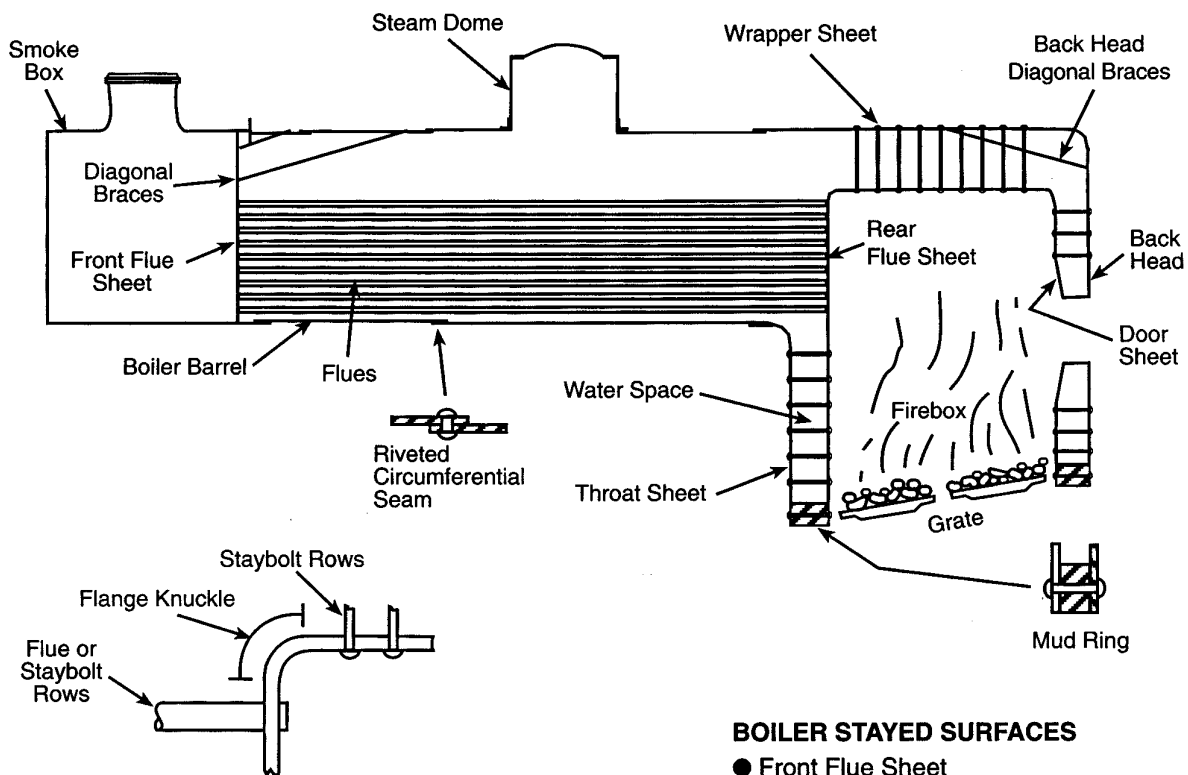
## Appendix B to Part 230—Diagrams and Drawings

Reference 230.8

Drawing 1

### BOILER: STAYED AND UNSTAYED SURFACES

#### Section Through Locomotive Boiler



SECTION THROUGH FIREBOX

#### BOILER STAYED SURFACES

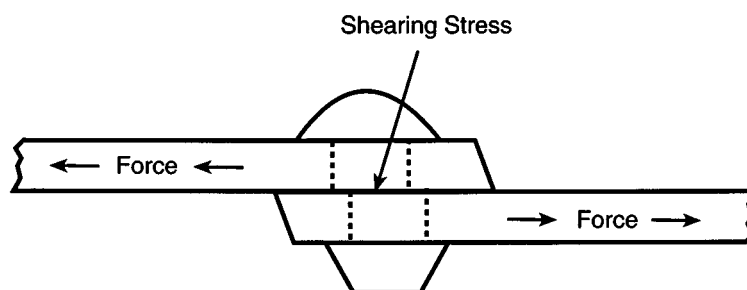
- Front Flue Sheet
- Rear Flue Sheet
- Wrapper Sheet
- Door Sheet
- Side Sheets
- Crown Sheet
- Throat Sheet
- Back Head
- Stayed Section of Thermic Syphons

#### BOILER UNSTAYED SURFACES

- Boiler Barrel
- Steam Dome
- Arch Tubes
- Thermic Syphon Neck
- Firebox Circulators
- Knuckle Section of Flanged Sheet

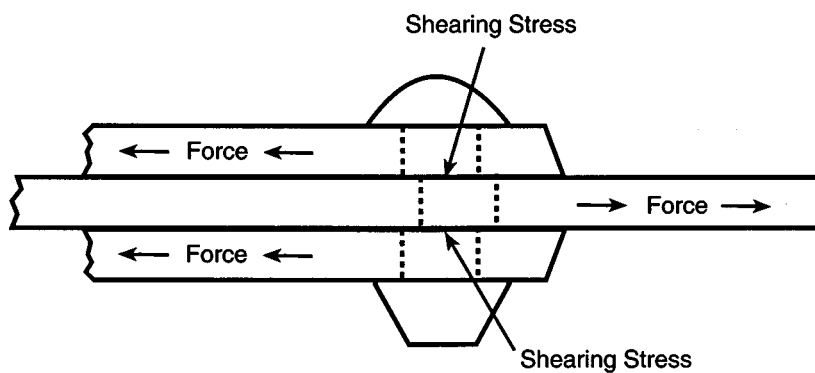
Reference 230.27  
Drawing 2

## RIVET IN SINGLE SHEAR



Reference 230.27  
Drawing 3

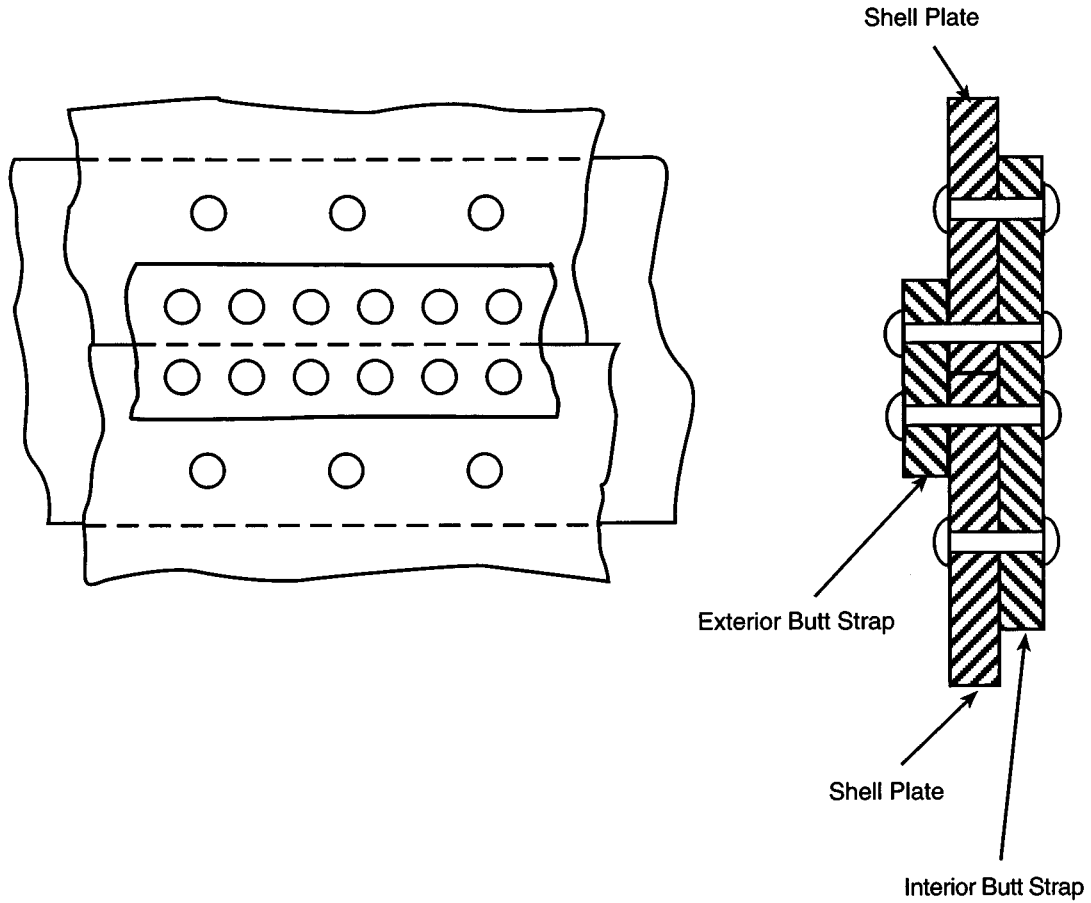
## RIVET IN DOUBLE SHEAR





Reference 230.34(b)  
Drawing 4

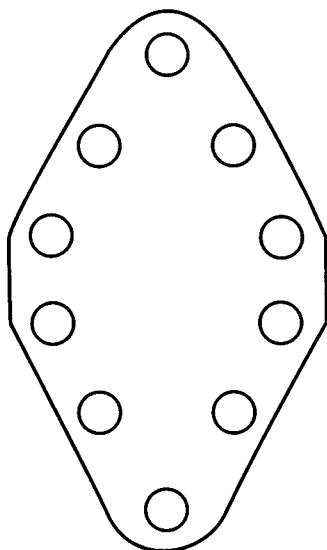
## RIVETED BUTT SEAM



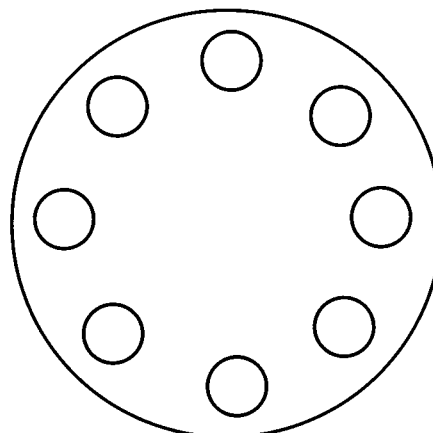
Reference 230.34(a)  
Drawing 5

## RIVETED BOILER PATCH

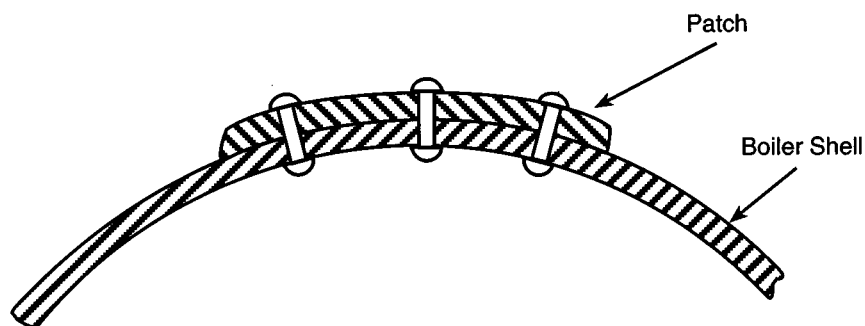
**Diagonal Riveted Patch**



**Circular Riveted Patch**



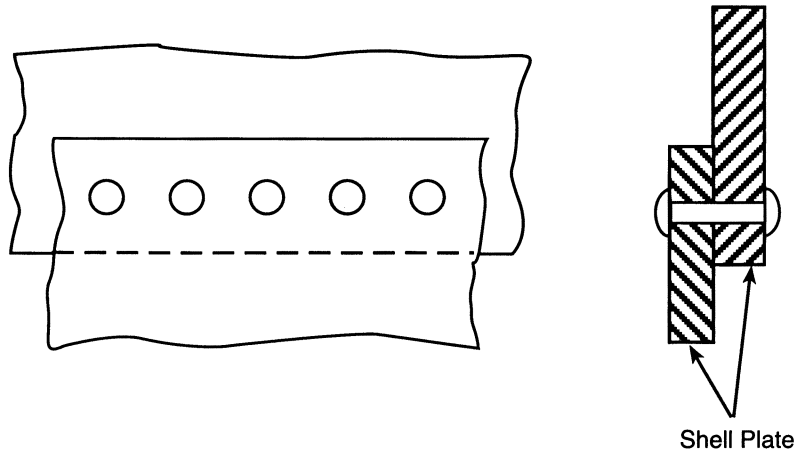
**Typical Riveted Patch Installation**



**Patch may be installed on Boiler Shell Interior or Exterior**

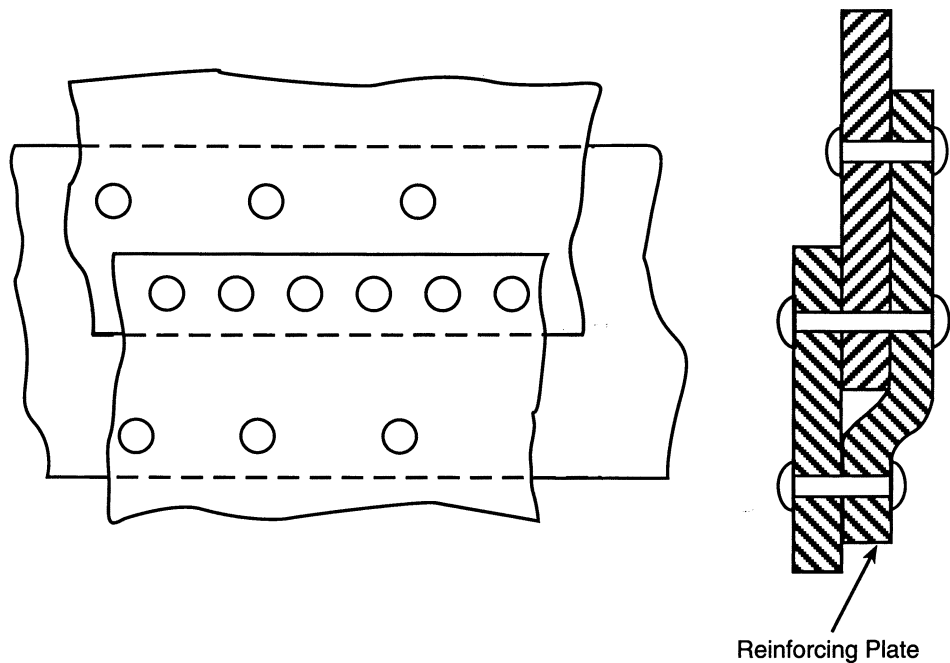
Reference 230.30  
Drawing 6

## RIVETED LAP SEAM



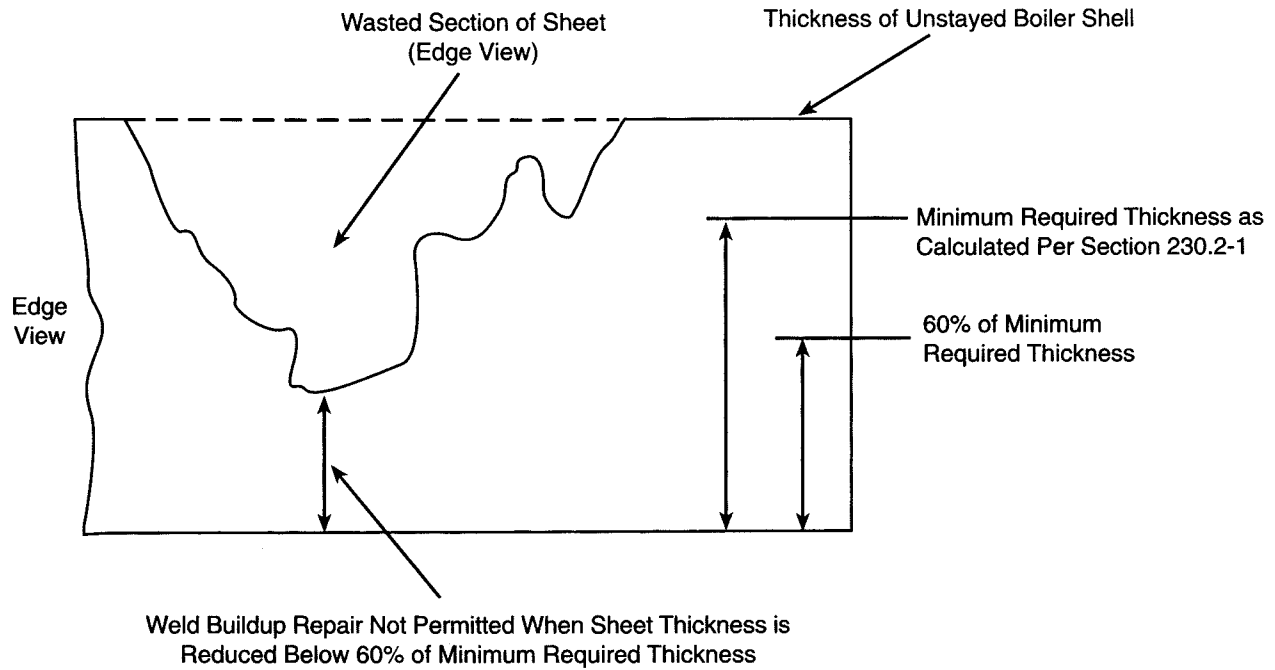
Reference 230.30  
Drawing 7

## RIVETED LAP SEAM WITH REINFORCING PLATE



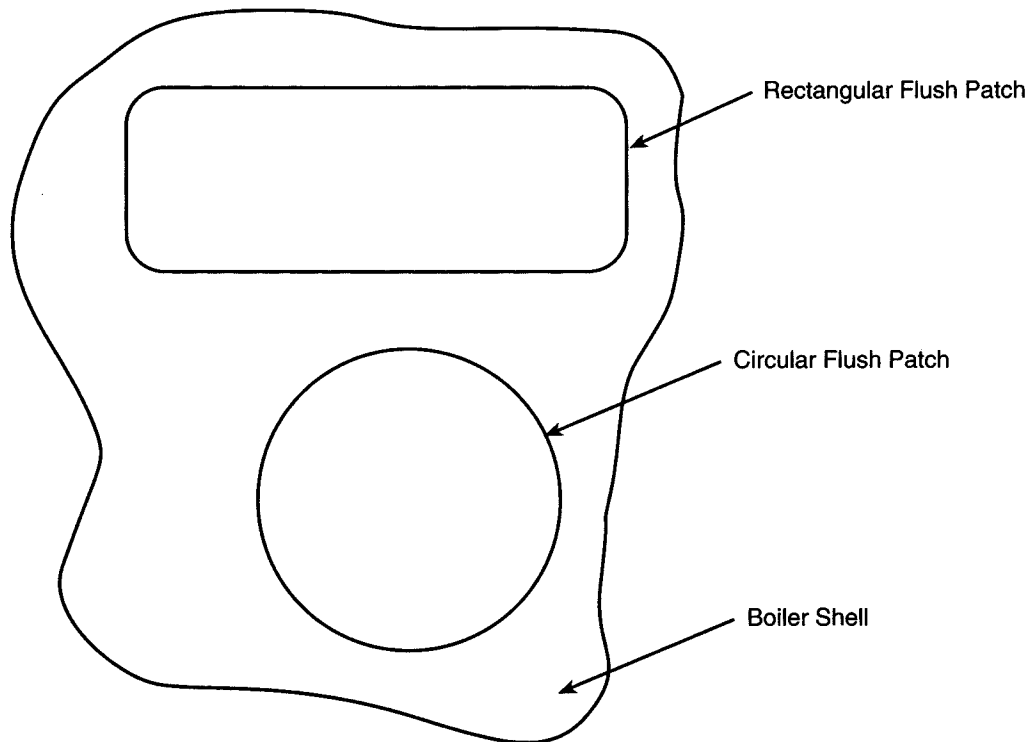
Reference 230.33(c)  
Drawing 8

## WELD BUILDUP REPAIR OF WASTED UNSTAYED BOILER SHEET

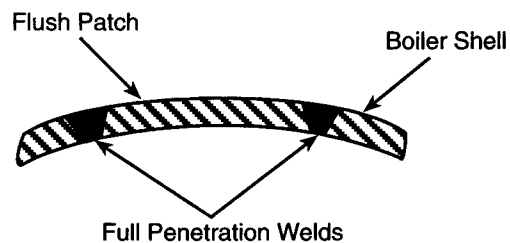


Reference 230.33(d)  
Drawing 9

## FLUSH PATCHES ON UNSTAYED SECTION OF BOILER SHELL

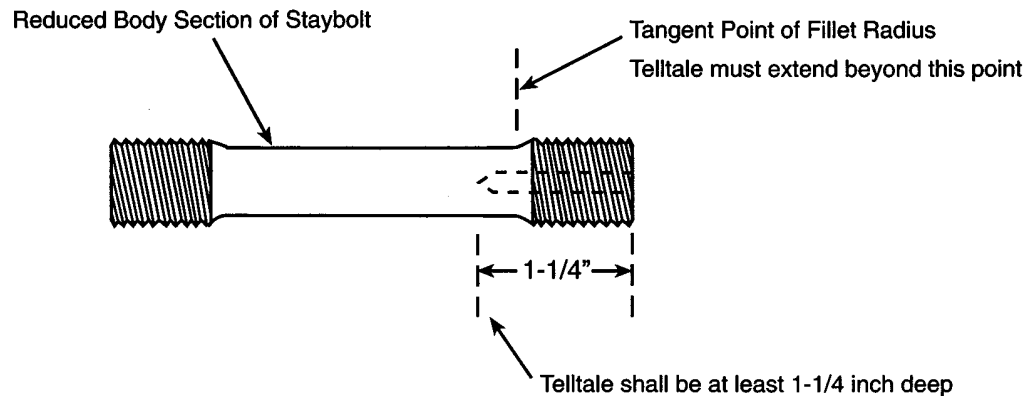


### Typical Flush Patch Installation



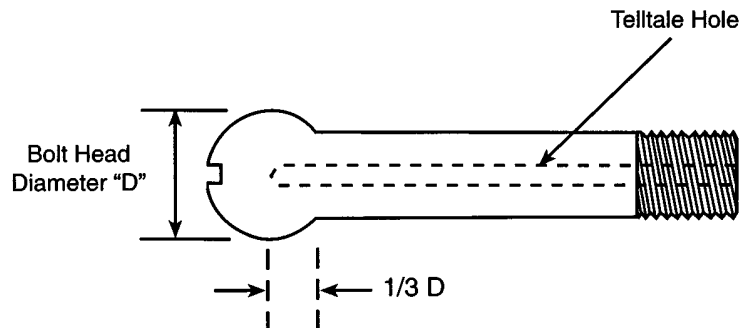
Reference 230.38(b)  
Drawing 10

## ARRANGEMENT OF TELLTALE HOLE IN REDUCED-BODY STAYBOLT



Reference 230.41(b)  
Drawing 11

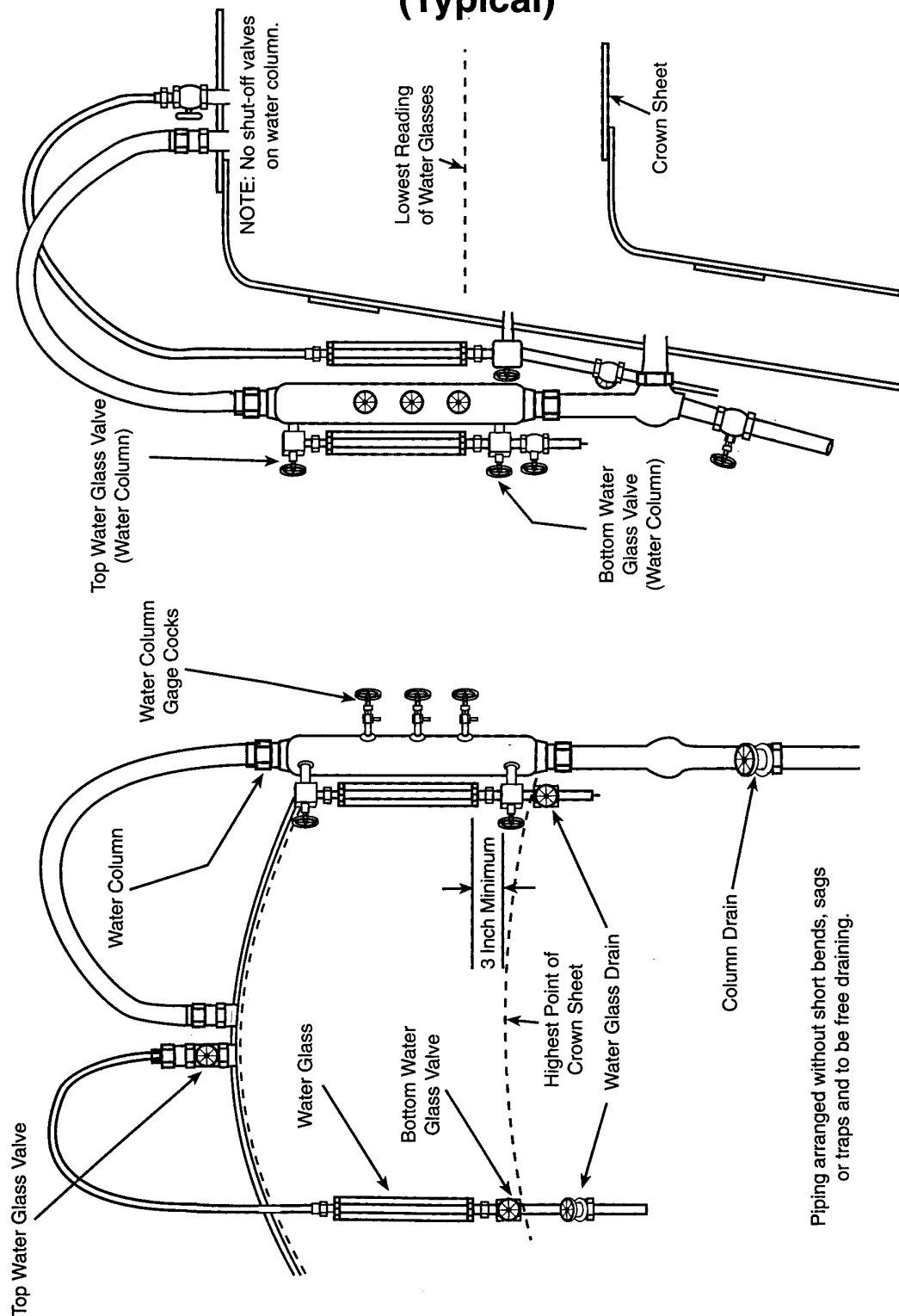
## ARRANGEMENT OF TELLTALE HOLE IN HOLLOW FLEXIBLE STAYBOLT



Minimum Telltale Hole Depth into Bolt Head  
To Equal 1/3 of Bolt Head Diameter (1/3 D)

Reference 230.51  
Drawing 12

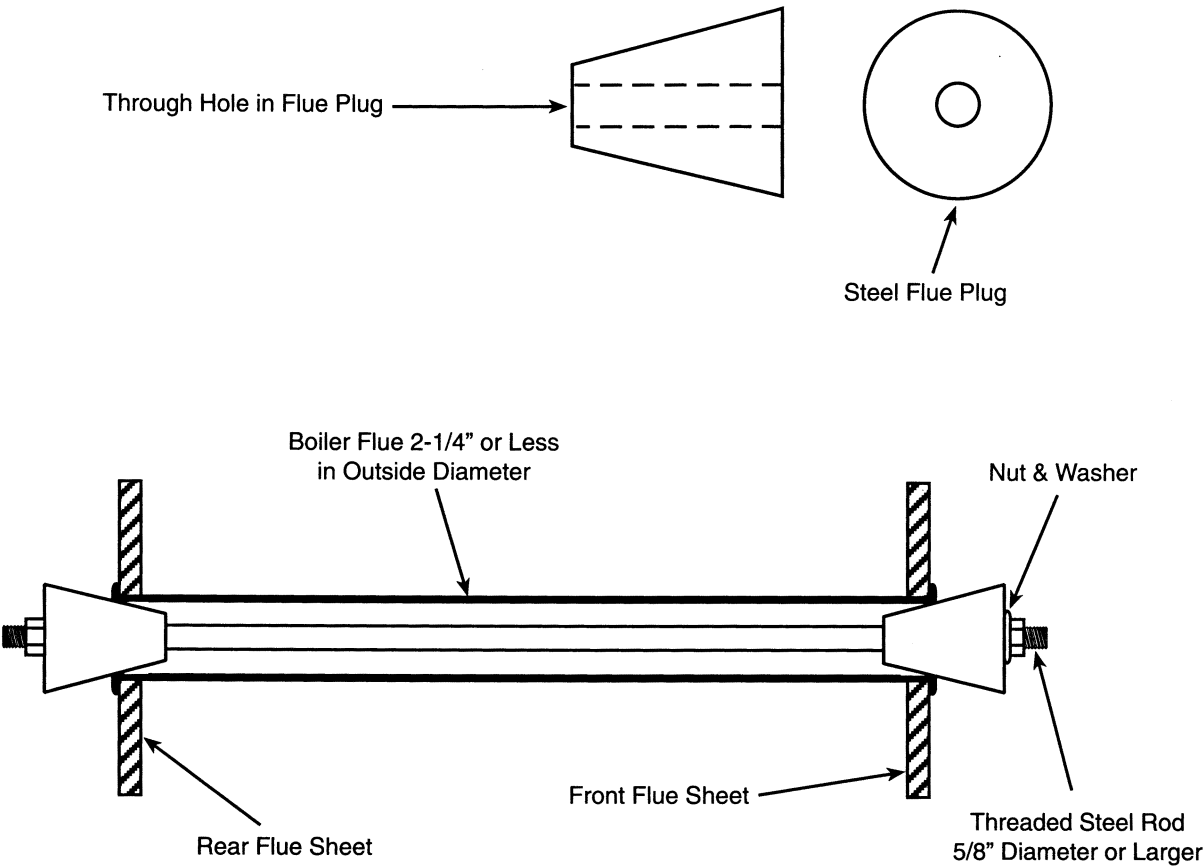
## GENERAL ARRANGEMENT OF WATER GLASS AND WATER COLUMN VALVES (Typical)





Reference 230.58(b)  
Drawing 13

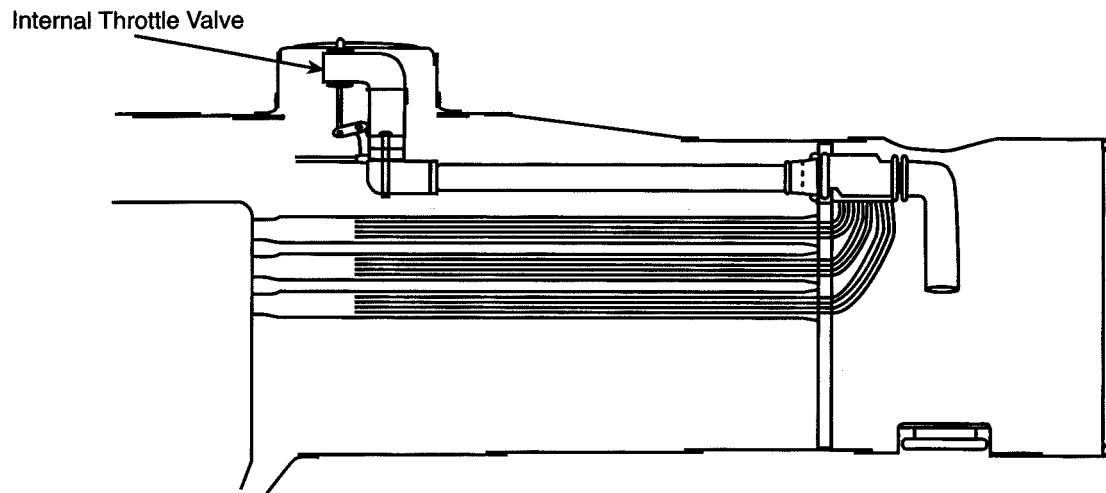
INSTALLATION OF FLUE PLUG



Reference 230.62  
Drawing 14

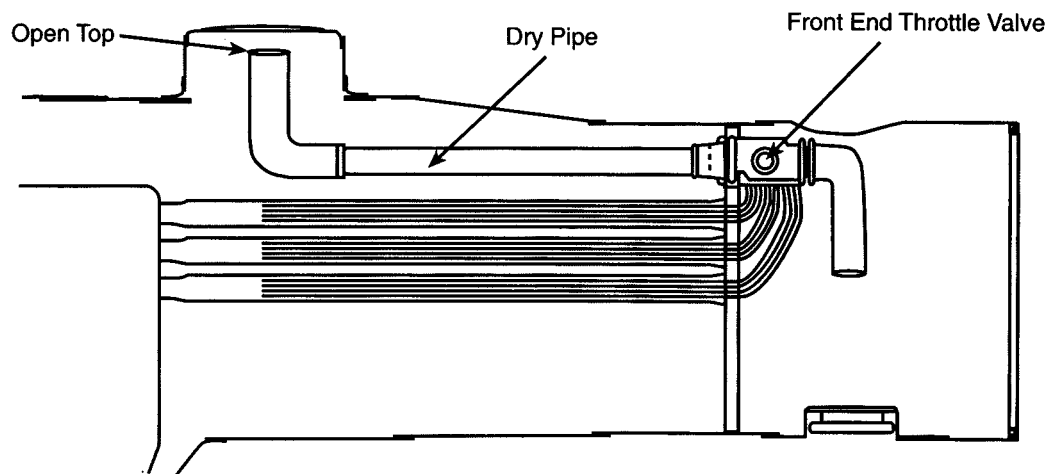
## DRY PIPE

### Arrangement of Dry Pipe Subject to Pressure



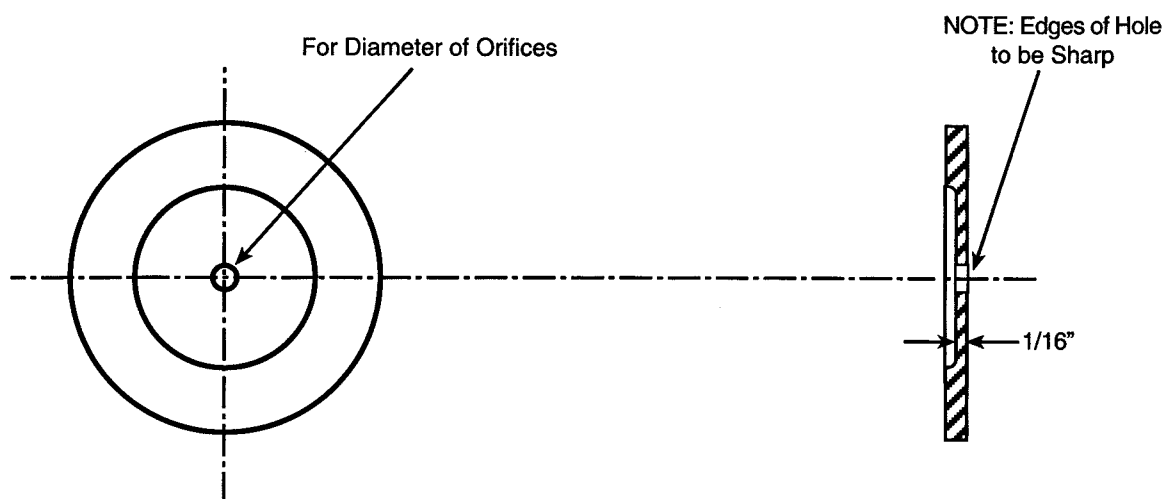
Reference 230.62  
Drawing 15

### Arrangement of Dry Pipe Not Subject to Pressure



Reference 230.71(b)  
Drawing 16

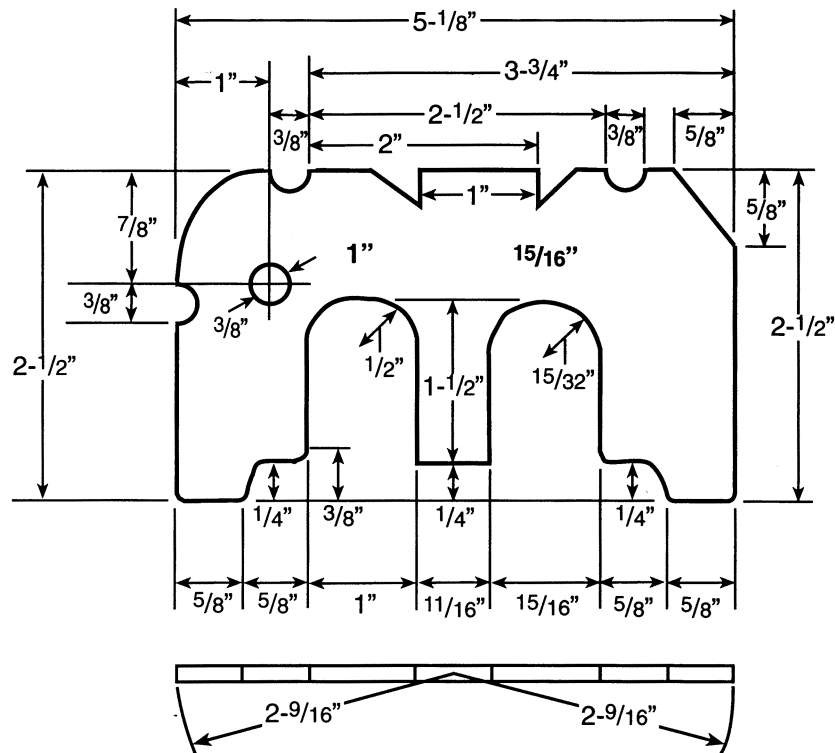
## ORIFICE



Reference 230.113  
Drawing 17

## WHEEL DEFECT GAUGE

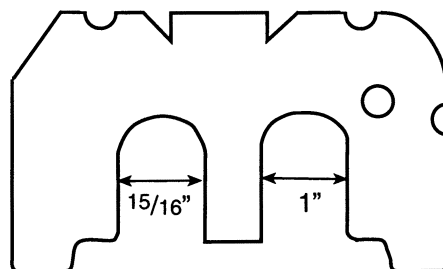
This gauge to be used in determining flat spots, worn flanges, and broken rims.



Reference 230.113  
Drawing 18

## WHEEL DEFECT GAUGE

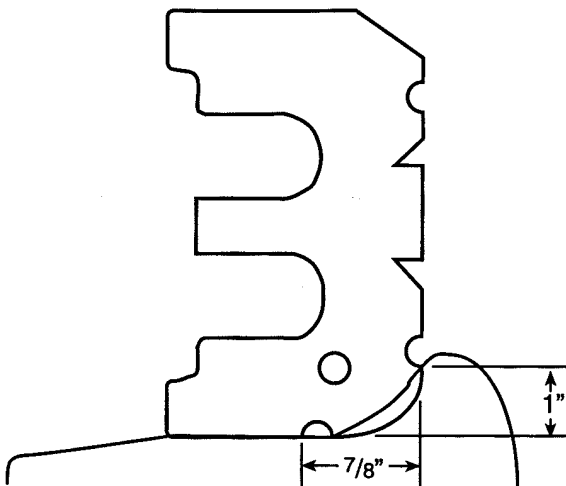
Method of gauging worn Flanges.



Reference 230.113  
Drawing 19

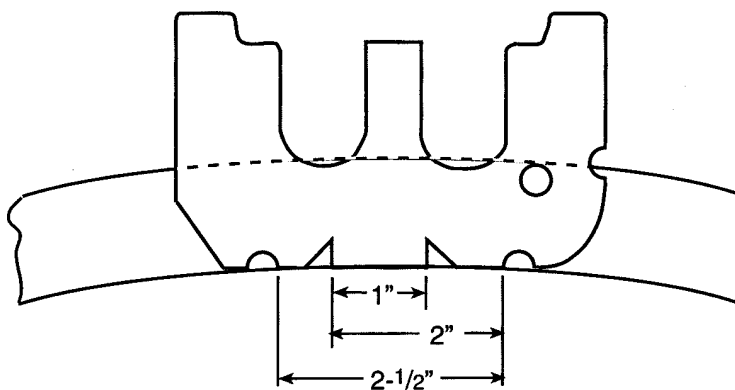
## WHEEL DEFECT GAUGE

Method of gauging worn flanges.



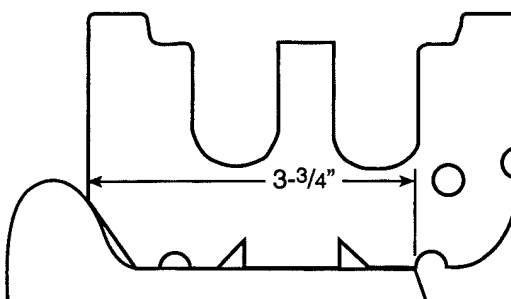
Reference 230.113  
Drawing 20

Method of gauging shelled and flat spots.



Reference 230.113  
Drawing 21

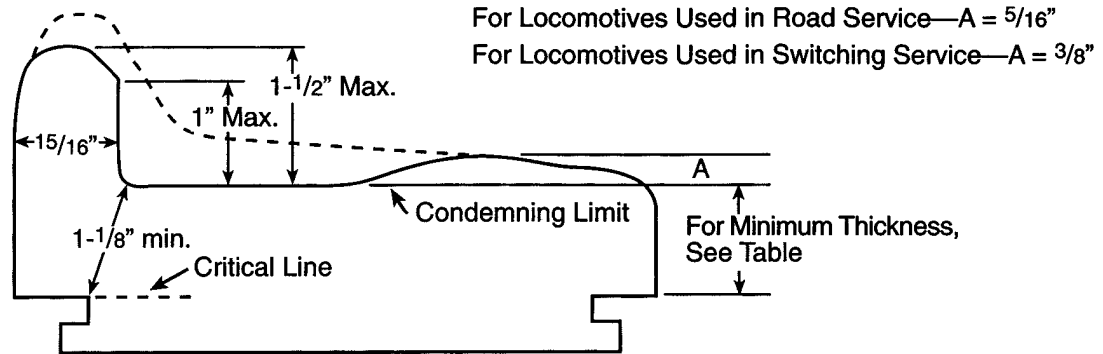
Method of gauging broken rims.



Reference 230.112  
Drawing 22

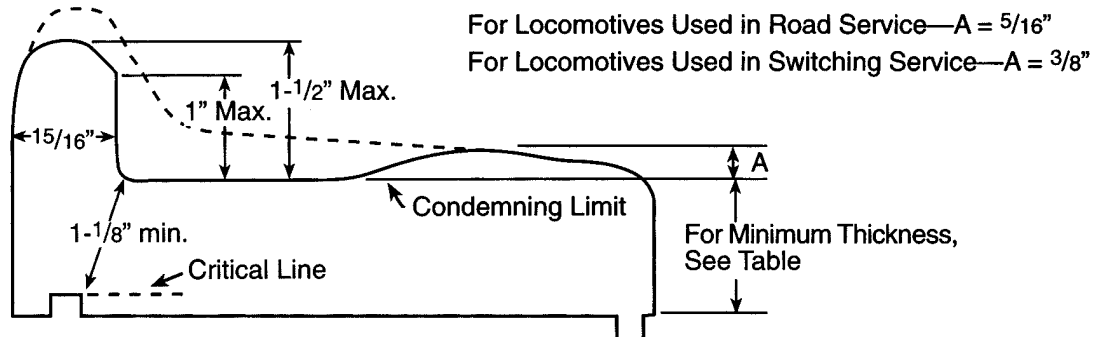
## STEEL TIRE

### Retaining ring type fastening. Driving and trailing wheels.



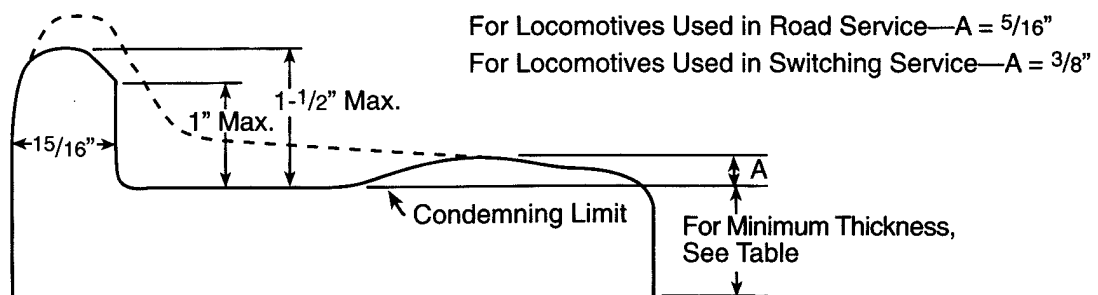
Reference 230.112  
Drawing 23

### Shrinkage fastening with shoulder and retaining segments. Driving and trailing wheels.



Reference 230.112  
Drawing 24

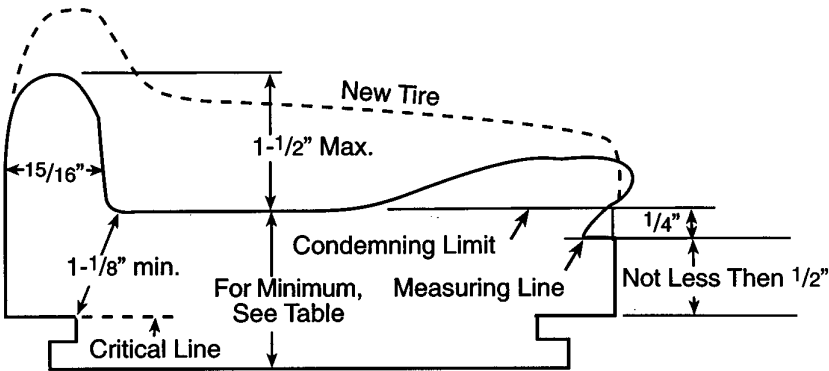
### Shrinkage fastening. Driving and trailing wheels.



Reference 230.112  
Drawing 25

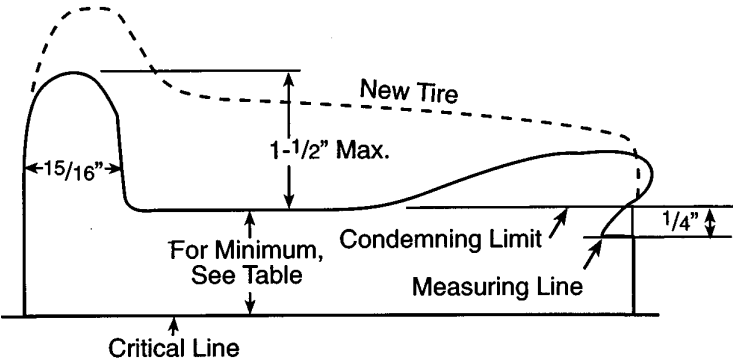
STEEL TIRE

Retaining ring type fastening. Minimum thickness for steel tires. Engine and tender.



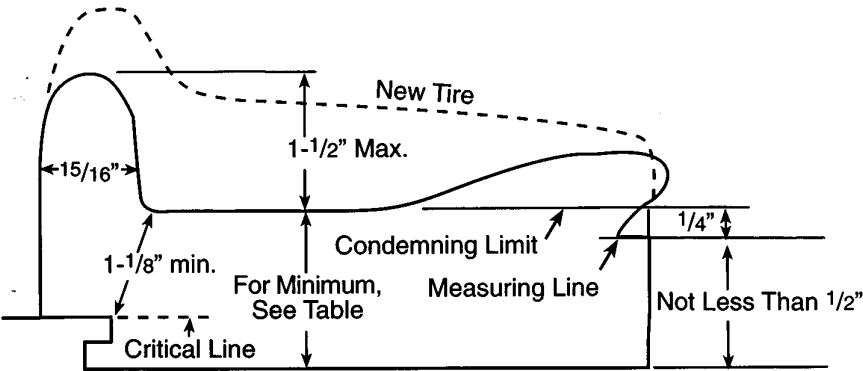
Reference 230.112  
Drawing 26

Shrinkage fastening only. Minimum thickness for steel tires. Engine and tender.



Reference 230.112  
Drawing 27

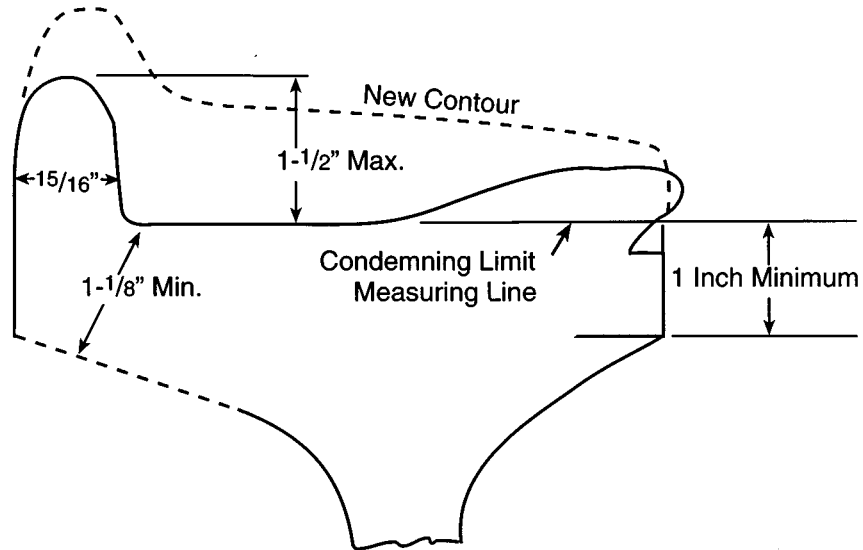
Retaining ring fastening. Minimum thickness for steel tires. Engine and tender.



Reference 230.113(j)  
Drawing 28

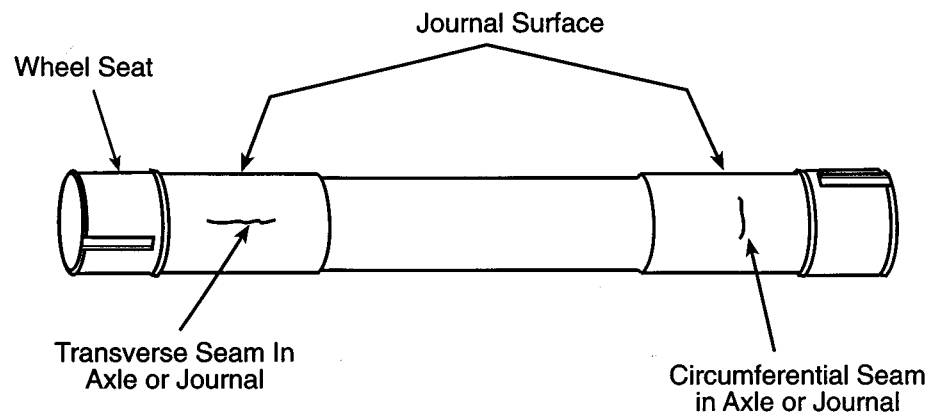
## STEEL WHEELS

Minimum thickness of rim. Engine and tender truck wheels.



Reference 230.98  
Drawing 29

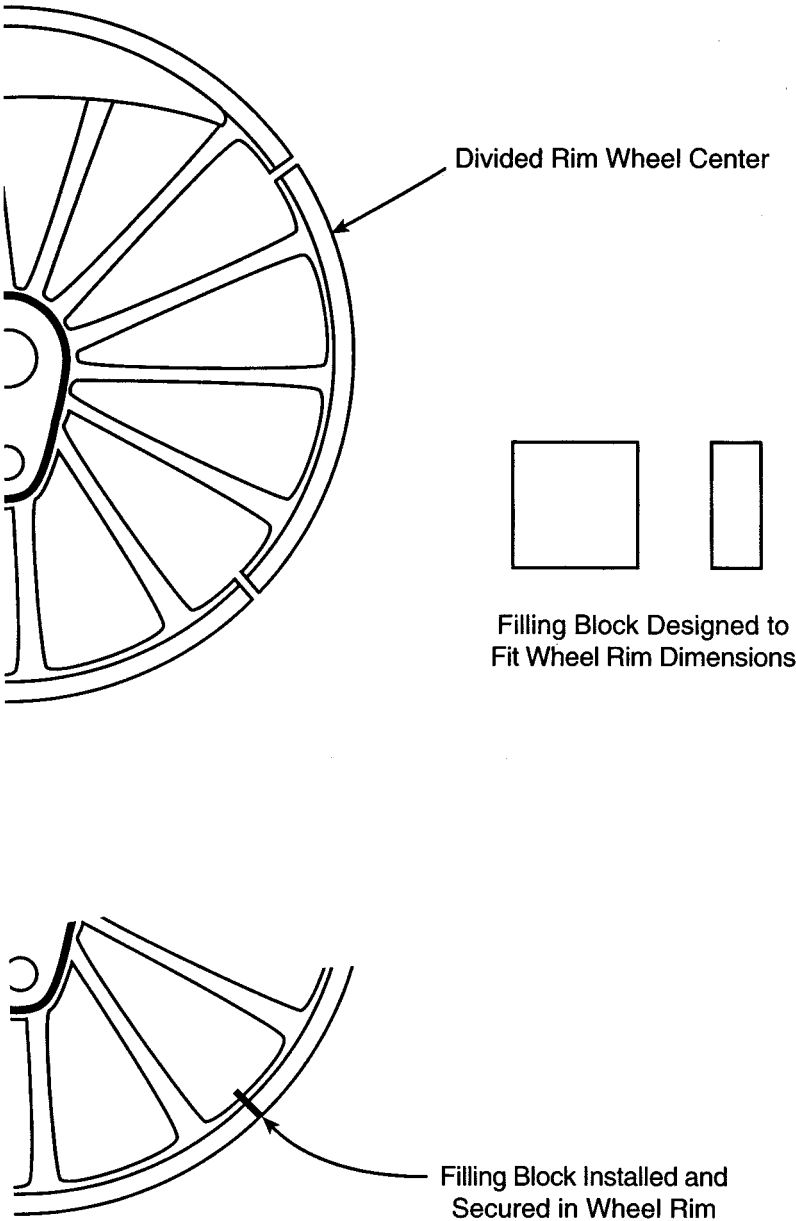
## SEAMS IN AXLES





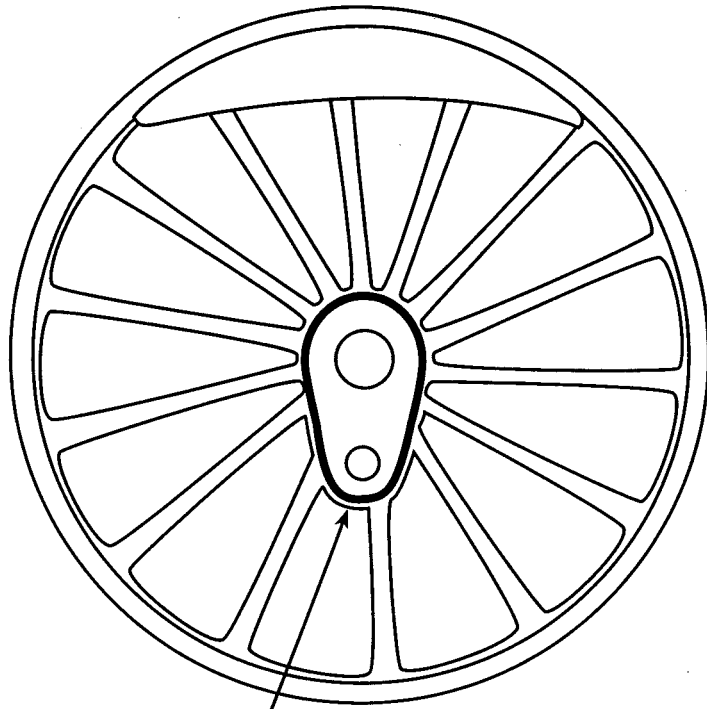
Reference 230.114(a)  
Drawing 30

FILLING BLOCK FOR DIVIDED-RIM WHEEL CENTER



Reference 230.114(c)  
Drawing 31

## BANDED WHEEL HUB



Steel Band Applied to Repair  
Cracked Wheel Hub

Appendix C - FRA Inspection Forms

Form No. 1

**31 and 92 Service Day Inspection Report**

Date of \_\_\_\_\_ Owner \_\_\_\_\_ Locomotive Initials \_\_\_\_\_  
 Inspection \_\_\_\_\_ Operator \_\_\_\_\_ Locomotive No. \_\_\_\_\_

**31 and 92 Service Day Requirements**

**Instructions:** Non-complying conditions shall be repaired and this report approved before the locomotive is returned to service. Where condition is called for, enter either: (1) **Good** - No defects which could be discovered by a reasonable inspection; (2) **Fair** - Functioning less than optimally but safe and suitable and not in violation of the regulations; or (3) **Poor** - Not in compliance with the regulations. In any case N/A means - not applicable.

Was boiler washed? \_\_\_\_\_ Were steam leaks repaired? \_\_\_\_\_  
 Were water gauge and valve passages cleaned? \_\_\_\_\_ Condition of draft system and draw gear. \_\_\_\_\_  
 Were gauge cock passages cleaned? \_\_\_\_\_ Condition of running gear. \_\_\_\_\_  
 Were all washout plugs removed and inspected? \_\_\_\_\_ Condition of driving gear. \_\_\_\_\_  
 Were arch tubes, circulators, siphons and water bar tubes Condition of spring/equalizing system. \_\_\_\_\_  
 cleaned and inspected? \_\_\_\_\_ Condition of tender running gear. \_\_\_\_\_  
 Were fusible plugs removed, cleaned & inspected? \_\_\_\_\_ Condition of brake equipment. \_\_\_\_\_  
 Were staybolts hammer tested? \_\_\_\_\_ Were injectors tested and in good condition? \_\_\_\_\_  
 Were all broken staybolts replaced? \_\_\_\_\_ Was feedwater pump tested and in good condition? \_\_\_\_\_

**92 Service Day Requirements**

Date of previous 92 Service Day Inspection \_\_\_\_\_ Were tubular water glasses renewed? \_\_\_\_\_  
 Safety relief valves pop at \_\_\_\_\_ psi \_\_\_\_\_ psi \_\_\_\_\_ psi Were air compressor(s) orifice tested? \_\_\_\_\_  
 Were all steam gauges tested? \_\_\_\_\_ Was main reservoir tested for leakage? \_\_\_\_\_  
 Were all air brake gauges tested? \_\_\_\_\_ Were brake cylinders tested for leakage? \_\_\_\_\_  
 Were steam gauge siphon pipe(s) cleaned? \_\_\_\_\_ Was tender tank entered and inspected? \_\_\_\_\_  
 If no 92 Service Day Inspection is done, enter number of service days used since last 92 Service Day Insp. \_\_\_\_\_

INSPECTOR

The above work has been performed and the report is  
 approved. \_\_\_\_\_

OFFICER IN CHARGE

INSPECTOR



**Form No. 3****Annual Inspection Report**

Date of \_\_\_\_\_ Owner \_\_\_\_\_ Locomotive Initials \_\_\_\_\_  
 Inspection \_\_\_\_\_ Operator \_\_\_\_\_ Locomotive No. \_\_\_\_\_

**Instructions:** Non-complying conditions shall be repaired and this report approved before the locomotive is returned to service. Where condition is called for, enter either: (1) **Good** - No defects which could be discovered by a reasonable inspection; (2) **Fair** - Functioning less than optimally but safe and suitable and not in violation of the regulations; or (3) **Poor** - Not in compliance with the regulations. In any case N/A means - not applicable.

Boiler hydrostatically tested to \_\_\_\_\_ psi, at a water temperature of \_\_\_\_\_ degrees F.  
 Was boiler washed? \_\_\_\_\_ Were steam gauge siphon pipe(s) cleaned? \_\_\_\_\_  
 Were water gauge and valve passages cleaned? \_\_\_\_\_ Were steam leaks repaired? \_\_\_\_\_  
 Were gauge cock passages cleaned? \_\_\_\_\_ Were tubular water glasses renewed? \_\_\_\_\_  
 Were all washout plugs removed and inspected? \_\_\_\_\_ Were fusible plugs removed, cleaned & inspected? \_\_\_\_\_  
 Were arch tubes, circulators, siphons and water bar tubes Flexi caps removed on (date) \_\_\_\_\_  
 cleaned and inspected? \_\_\_\_\_ Were all air brake gauges tested? \_\_\_\_\_  
 Thickness of arch tubes \_\_\_\_\_; Water bar tubes \_\_\_\_\_ Main reservoir hydro \_\_\_\_\_ psi, hammer \_\_\_\_\_  
 Dry pipe thickness \_\_\_\_\_; Circulator thickness \_\_\_\_\_ NDE \_\_\_\_\_, Drilled \_\_\_\_\_  
 Were water column passages cleaned and inspected? \_\_\_\_\_ Were brake cylinders tested for leakage? \_\_\_\_\_  
 Was boiler entered and inspected? \_\_\_\_\_ Was main reservoir tested for leakage? \_\_\_\_\_  
 Were drilled flexible staybolt telltale holes tested? \_\_\_\_\_ Were air compressor(s) orifice tested? \_\_\_\_\_  
 Were staybolts hammer tested? \_\_\_\_\_ Condition of driving gear. \_\_\_\_\_  
 Were all broken staybolts replaced? \_\_\_\_\_ Condition of running gear. \_\_\_\_\_  
 Were longitudinal lap seams inspected? \_\_\_\_\_ Condition of draft system and draw gear. \_\_\_\_\_  
 Was smoke box entered and inspected? \_\_\_\_\_ Condition of spring/equalizing system. \_\_\_\_\_  
 Safety relief valves pop at \_\_\_\_\_ psi \_\_\_\_\_ psi \_\_\_\_\_ Condition of brake equipment. \_\_\_\_\_  
 Were injectors tested and in good condition? \_\_\_\_\_ Condition of tender running gear. \_\_\_\_\_  
 Was feedwater pump tested and in good condition? \_\_\_\_\_ Was tender tank entered and inspected? \_\_\_\_\_  
 Were all steam gauges tested? \_\_\_\_\_

INSPECTOR

The above work has been performed and the report is approved. \_\_\_\_\_

OFFICER IN CHARGE

INSPECTOR

**Locomotive Air Brake Cleaning, Testing and Inspection Record**

EQUIPMENT	SERVICE PERIOD	Previous Inspection	Current Annual Date	Inspection Date	Inspection Date	Inspection Date	Inspection Date	Notes
AIR COMPRESSOR ORIFICE TEST	92 service day							
AIR GAUGES	92 service day							
MAIN RESERVOIR LEAKAGE	92 service day							
BRAKE CYLINDER LEAKAGE	92 service day							
FILTERS	Annual Inspection							
DIRT COLLECTORS	Annual Inspection							
MAIN RESERVOIR HYDRO, HAMMER, NDE	Annual Inspection							
BRAKE VALVES	368 service days or second							

## FRA Form 4

**BOILER SPECIFICATION CARD**

Locomotive No. \_\_\_\_\_; Boiler No. \_\_\_\_\_; Date built \_\_\_\_\_  
 Boiler built by: \_\_\_\_\_  
 Owned by: \_\_\_\_\_  
 Operated by: \_\_\_\_\_  
 Type of boiler: \_\_\_\_\_; Dome, where located: \_\_\_\_\_

**BOILER SURVEY DATA**

Where condition is called for, use: **New** - New material at the time of the boiler survey; **Good** - Little or no wear and/or corrosion; **Fair** - Obvious wear and/or corrosion.

**Boiler Shell Sheets**

Material:	Type of Material (wrought iron, carbon steel, or alloy steel)	Carbon Content	Condition
1st course (front)	_____	_____	_____
2nd course	_____	_____	_____
3rd course	_____	_____	_____
Rivets	_____	n/a	n/a

Documentation of how material was determined shall be attached to this form.

Measurements:	At Seam	Thinnest	ID	ID
Front flue sheet, thickness	n/a	_____	_____	_____
1st course, thickness	_____	_____	_____	_____
2nd course, thickness	_____	_____	_____	_____
3rd course, thickness	_____	_____	_____	_____

When courses are not cylindrical give ID at each end

Is boiler shell circular at all points? \_\_\_\_\_

If shell is flattened, state location and amount \_\_\_\_\_

Are all flattened areas of shell stayed adequately for the pressure allowed by this form? \_\_\_\_\_

Water Space at Mud Ring: Sides \_\_\_\_\_, Front \_\_\_\_\_, Back \_\_\_\_\_

Width of water space at sides of fire box measured at center line of boiler: Front \_\_\_\_\_, Back \_\_\_\_\_

**Firebox and Wrapper Sheets**

Firebox sheets:	Thickness	Material	Condition
Rear flue sheet	_____	_____	_____
Crown	_____	_____	_____
Sides	_____	_____	_____
Door	_____	_____	_____
Combustion chamber	_____	_____	_____
Inside throat	_____	_____	_____
<b>Wrapper sheets:</b>			
Throat	_____	_____	_____
Back head	_____	_____	_____
Roof	_____	_____	_____
Sides	_____	_____	_____

**Steam Dome**

Dome is made of \_\_\_\_\_ pieces (not including seam welts, if any), Top opening diameter \_\_\_\_\_  
 Middle cylindrical portion - ID \_\_\_\_\_, Opening in boiler shell, longitudinally - \_\_\_\_\_

Dome sheets:	Thickness	Material	Condition
Base	_____	_____	_____
Middle cylindrical portion	_____	_____	_____
Top	_____	_____	_____
Lid	_____	_____	_____
Boiler shell liner for steam dome opening:	_____	_____	_____
Is liner part of longitudinal seam?	_____		

**Arch Tubes, Flues, Circulators, Thermic Siphons, Water Bar Tubes, Superheaters, and Dry Pipe**

Arch tubes: OD \_\_\_\_\_, wall thickness \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_

**Flues:**

OD \_\_\_\_\_, wall thickness \_\_\_\_\_, length \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_  
 OD \_\_\_\_\_, wall thickness \_\_\_\_\_, length \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_  
 OD \_\_\_\_\_, wall thickness \_\_\_\_\_, length \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_

Circulators: OD \_\_\_\_\_, wall thickness \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_

Thermic siphons: number \_\_\_\_\_; plate thickness \_\_\_\_\_; condition \_\_\_\_\_  
 neck OD \_\_\_\_\_, neck thickness \_\_\_\_\_; condition \_\_\_\_\_

Water bar tubes: OD \_\_\_\_\_, wall thickness \_\_\_\_\_

**Superheater units directly connected to boiler with no intervening valve:**

Type \_\_\_\_\_, Tube OD \_\_\_\_\_, wall thickness \_\_\_\_\_; number \_\_\_\_\_; condition \_\_\_\_\_

**Dry pipe subject to pressure:**

OD \_\_\_\_\_, wall thickness \_\_\_\_\_, material \_\_\_\_\_; condition \_\_\_\_\_

**Stay Bolts, Crown Bar Rivets, and Braces****Stay bolts:**

Smallest crown stay diameter \_\_\_\_\_, avg. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_  
 Smallest stay bolt diameter \_\_\_\_\_, avg. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_  
 Smallest combustion chamber stay bolt dia. \_\_\_\_\_,  
 avg. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_

**Measurement at smallest diameter****Crown bar bolts & rivets:**

Roof sheet rivets, smallest dia. \_\_\_\_\_, ave. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_  
 Roof sheet bolts, smallest dia. \_\_\_\_\_, ave. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_  
 Crown sheet rivets, smallest dia. \_\_\_\_\_, ave. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_  
 Crown sheet bolts, smallest dia. \_\_\_\_\_, ave. spacing \_\_\_\_\_ X \_\_\_\_\_; condition \_\_\_\_\_

Braces:	Total Cross Sectional Area of Braces			
	Number	Total Area Stayed	Actual	Equivalent Direct Stay
Backhead	_____	_____	_____	_____
Throat sheet	_____	_____	_____	_____
Front tube sheet	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

### Safety Valves, Heating Surface, and Grate Area

<b>Safety valves:</b>	Total number of safety valves on locomotive _____	
Valve Size	Manufacturer	No. valves of this size and manufacture
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

### Heating Surface:

Heating surface, as part of a circulating system in contact on one side with water or wet steam being heated and on the other side with gas or refractory being cooled, shall be measured on the side receiving heat.

Firebox and Combustion Chamber	_____	square feet
Flue Sheets (less flue ID areas)	_____	square feet
Flues	_____	square feet
Circulators	_____	square feet
Arch Tubes	_____	square feet
Thermic Siphons	_____	square feet
Water Bar Tubes	_____	square feet
Superheaters (front end throttle only)	_____	square feet
Other	_____	square feet
<b>Total Heating Surface</b>	_____	square feet

**Grate area:** \_\_\_\_\_ square feet

### Water Level Indicators, Fusible Plugs, and Low Water Alarms

Height of lowest reading of gauge glasses above crown sheet: \_\_\_\_\_

Height of lowest reading of gauge cocks above crown sheet: \_\_\_\_\_

Is boiler equipped with fusible plug(s)? \_\_\_\_\_, number \_\_\_\_\_

Is boiler equipped with low water alarm(s)? \_\_\_\_\_, number \_\_\_\_\_



**Calculations****Staybolt stresses:**

Stay bolt under greatest load, maximum stress \_\_\_\_\_ psi  
 Location \_\_\_\_\_

Crown stay under greatest load, maximum stress \_\_\_\_\_ psi  
 Location \_\_\_\_\_

Combustion chamber stay bolt under greatest load, maximum stress \_\_\_\_\_ psi  
 Location \_\_\_\_\_

**Braces:**

Round or rectangular brace under greatest load, maximum stress \_\_\_\_\_ psi  
 Location \_\_\_\_\_

Gusset brace under greatest load, maximum stress \_\_\_\_\_ psi  
 Location \_\_\_\_\_

**Boiler shell plate tension:**

Greatest tension on net section of plate in longitudinal seam \_\_\_\_\_ psi  
 Location (course #) \_\_\_\_\_ ; Seam Efficiency \_\_\_\_\_

**Boiler plate and components, minimum thickness required @ tensile strength:**

Front tube sheet	_____ @ _____	Rear flue sheet	_____ @ _____
1st course at seam	_____ @ _____	1st course not at seam	_____ @ _____
2nd course at seam	_____ @ _____	2nd course not at seam	_____ @ _____
3rd course at seam	_____ @ _____	3rd course not at seam	_____ @ _____
Roof sheet	_____ @ _____	Crown sheet	_____ @ _____
Side wrapper sheets	_____ @ _____	Firebox side sheets	_____ @ _____
Back head	_____ @ _____	Door sheet	_____ @ _____
Throat sheet	_____ @ _____	Inside throat sheet	_____ @ _____
Combustion chamber	_____ @ _____	Dome, top	_____ @ _____
Dome, middle	_____ @ _____	Dome, base	_____ @ _____
Arch tubes	_____ @ _____	Dome, lid	_____ @ _____
Water bar tubes	_____ @ _____	Thermic siphons	_____ @ _____
Dry pipe	_____ @ _____	Circulators	_____ @ _____

If tensile strength used is greater than 50,000 psi for steel or greater than 45,000 psi for wrought iron, supporting documentation must be furnished.

**Boiler Steam Generating Capacity:** \_\_\_\_\_ pounds per hour

The following may be used as a guide for estimating steaming capacity:

Pounds of Steam Per Hour Per Square Foot of Heating Surface:

Hand fired	8 lbs. per hr.
Stoker fired	10 lbs. per hr.
Oil, gas or pulverized fuel fired	14 lbs. per hr.

## Record of Alterations

### Description of Alteration

Date of Alteration

[illegible]

Record of Waivers

Waiver No.	Section No. Affected	Scope and Content of Waiver

Calculations done by: \_\_\_\_\_;      Verified by: \_\_\_\_\_

Data used to verify the foregoing specifications is current and accurate. Based upon the information contained in this document and all necessary calculations, this boiler of Locomotive (Initial & number)\_\_\_\_\_ is safe for a working pressure of \_\_\_\_\_psi.

\_\_\_\_\_ Date \_\_\_\_\_;      \_\_\_\_\_ Date \_\_\_\_\_

Locomotive Owner

Locomotive Operator

Make working sketch here or attach drawing of longitudinal and circumferential seams used in shell of boiler, indicating on which courses used and give calculated efficiency of weakest longitudinal seam.

**Form No. 5****Locomotive Service Day Record**

Locomotive Initial and No. \_\_\_\_\_ owned by \_\_\_\_\_ and operated by \_\_\_\_\_ was placed in service following a 1472 Service Day Inspection on (start date) \_\_\_\_\_. This locomotive shall not be operated after (date) \_\_\_\_\_, or it shall not be operated after it has accumulated 1472 service days from the above start date, whichever comes first, at which time it shall be due for a 1472 Service Day Inspection.

	Year											
Serv. days since last insp.												
Annual Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
92 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
92 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
92 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
31 Service Day Date												
Serv. days since last insp.												
Annual Date												
TOTAL												

A copy of this record shall be filed with the Regional Administrator after 31 December and prior to 31 January of each year.

Signed \_\_\_\_\_ Officer in Charge

FRA Form 19

Report of  
ALTERATION ☐  
or  
Welded or Riveted REPAIR ☐

Locomotive Initials \_\_\_\_\_ Locomotive No. \_\_\_\_\_; Boiler No. \_\_\_\_\_;

Owned by \_\_\_\_\_

Operated by \_\_\_\_\_

Date work completed \_\_\_\_\_

Description of work: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Stress Calculations: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Attach drawings used in the repair or alteration or make drawings on back of this form.

Work done by: \_\_\_\_\_;

Certified by: \_\_\_\_\_

## Appendix D to Part 230—Civil Penalty Schedule

Section	Violation	Willful violation
<b>Subpart A—General</b>		
230.11 Repair of non-complying conditions:		
(a) Failure to repair non-complying steam locomotive prior to use in service .....	\$1,000	\$2,500
(b) Failure of owner and/or operator to approve repairs made prior to use of steam locomotive .....	1,000	1,500
230.12 Movement of non-complying steam locomotive:	(1)	(1)
230.13 Daily inspection:		
(a) (b):		
(1) Inspection overdue .....	1,500	3,000
(2) Inspection not performed by qualified person .....	1,000	1,500
(c) Inspection report not made, improperly executed or not retained .....	1,000	1,500
230.14 Thirty-one service day inspection:		
(a):		
(1) Inspection overdue .....	1,500	3,000
(2) Inspection not performed by qualified person .....		
(b) Failure to notify FRA .....	1,000	1,500
(c) Inspection report not made, improperly executed, not properly filed .....	1,000	1,500
230.15 Ninety-two service day inspection:		
(a):		
(1) Inspection overdue .....	1,500	3,000
(2) Inspection not performed by qualified person .....	1,000	1,500
(b) Inspection report not made, improperly executed, not properly filed .....	1,000	1,500
230.16 Annual inspection:		
(a):		
(1) Inspection overdue .....	1,500	3,000
(2) Inspection not performed by qualified person .....	1,000	1,500
(b) Failure to notify FRA .....	1,000	1,500
(c) Inspection report not made, improperly executed, not properly filed .....	1,000	1,500
230.17 One thousand four hundred seventy-two service day inspection:		
(a):		
(1) Inspection overdue .....	1,500	3,000
(2) Inspection not performed by qualified person .....	1,250	2,000
(b) Inspection report not made, improperly executed, not properly maintained, not properly filed .....	1,000	1,500
230.18 Service days:		
(a) Service day record not available for inspection .....	1,000	1,500
(b) Failure to file service day report with FRA Regional Administrator .....	1,000	1,500
(c) Failure to complete all 1,472 service day inspection items prior to returning retired steam locomotive to service .....	1,500	3,000
230.19 Posting of forms:		
(a) FRA Form No. 1:		
(1) FRA Form No. 1 not properly filled out .....	1,000	1,500
(2) FRA Form No. 1 not properly displayed .....	1,000	1,500
(b) FRA Form No. 3:		
(1) FRA Form No. 3 not properly filled out .....	1,000	1,500
(2) FRA Form No. 3 not properly displayed .....	1,000	1,500
230.20 Alteration and repair reports:		
(a) Alterations:		
(1) Failure to properly file FRA Form No. 19 with FRA Regional Administrator .....	1,000	1,500
(2) FRA Form No. 19 not properly filled out .....	1,000	1,500
(3) FRA Form No. 19 not properly maintained .....	1,000	1,500
(b) Repairs to unstayed portions of the boiler:		
(1) FRA Form No. 19 not properly filled out .....	1,000	1,500
(2) FRA Form No. 19 not properly maintained .....	1,000	1,500
(c) Repairs to stayed portions of the boiler:		
(1) FRA Form No. 19 not properly filled out .....	1,000	1,500
(2) FRA Form No. 19 not properly maintained .....	1,000	1,500
230.21 Failure to properly document steam locomotive number Change .....	1,000	1,500
<b>Subpart B—Boilers and Appurtenances</b>		
230.22 Failure to properly report accident resulting from failure of steam locomotive boiler or part or appurtenance thereof .....	1,500	2,500
230.23 Responsibility for general construction and safe working pressure:		
(a) Failure to properly establish safe working pressure for steam locomotive boiler .....	5,000	10,000
(b) Placing steam locomotive in service before safe working pressure for boiler has been established .....	5,000	10,000
230.24 Maximum allowable stress values on boiler components:		
(a) Use of materials not of sufficient tensile strength .....	1,000	2,000
(b) Use of a safety factor value of less than 4 when using the code of original construction in boiler calculations .....	2,000	4,000
230.25 Maximum allowable stresses on stays and braces:		
(a) Exceeding allowable stress values on fire box and/or combustion chamber .....	1,000	2,000
(b) Exceeding allowable stress values on round, rectangular or gusset braces .....	1,000	2,000
230.29 Inspection and repair:		

Section	Violation	Willful violation
(a):		
(1) Failure of owner and/or operator to inspect and repair any steam locomotive boiler and/or appurtenance under control thereof .....	1,500	3,000
(2) Failure to remove steam locomotive from service when considered necessary to do so .....	2,500	5,000
(b):		
(1) Failure of perform repairs in accordance with accepted industry standards .....	2,000	4,000
(2) Owner and/or operator returning steam locomotive boiler and/or appurtenances to service before they are in good condition and safe and suitable for service .....	2,000	4,000
230.30 Lap-joint seam boilers, Failure to properly inspect .....	2,000	4,000
230.31 Flues to be removed:		
(a):		
(1) Failure to remove all flues when inspecting boiler .....	1,500	3,000
(2) Failure to enter boiler and clean and inspect .....	1,500	3,000
(b) Failure to remove superheater flues when deemed necessary to do so .....	1,000	2,000
230.32 Time and method of inspection:		
(a) Failure to perform 1,472 service day inspection when required to do so .....	1,500	3,000
(b) Failure to properly inspect boiler during 1,472 service day inspection .....	1,500	3,000
230.33 Welded repairs and alterations:		
(a) Failure to obtain permission before welding on unstayed portions of boiler containing alloy or carbon steel with carbon content over .25 percent carbon .....	1,500	3,000
(b) Failure to perform welding on unstayed portions of boiler containing carbon steel not exceeding .25 percent carbon in accordance with a nationally accepted standard for boiler repairs .....	1,500	3,000
(c):		
(1) Failure to submit written request for approval before performing weld buildup on wasted areas of unstayed boiler surfaces that exceed 100 square inches or the smaller of 25 percent of minimum required wall thickness or 1/2 inch .....	1,500	3,000
(2) Repairing wasted sheets .....	1,500	3,000
230.34 Riveted repairs and alterations:		
(a) Failure to obtain approval before making riveted alterations on unstayed portions of the boiler; failure to do riveting in accordance with established railroad practices or accepted national standards for boiler repairs ....	1,500	3,000
(b) Failure to perform riveted repairs on unstayed boiler portions in accordance with established railroad practices or accepted national standards for boiler repairs .....	1,500	3,000
(c) Failure to perform riveted repairs on stayed boiler portions in accordance with established railroad practices or accepted national standards for boiler repairs .....	1,000	2,000
230.35 Failure to raise temperature of steam locomotive boiler to 70 degrees F. before applying hydrostatic pressure to the boiler .....	1,000	2,000
230.36 Hydrostatic testing of boilers:		
(a) Failure to perform hydrostatic test of boiler as required .....	1,500	3,000
(b) Failure to properly perform hydrostatic test .....	1,500	3,000
(c) Failure to properly inspect boiler after conducting hydrostatic test above MAWP .....	1,500	3,000
230.37 Failure to perform proper steam test or inspection of boiler after completion of repair or alteration to boiler ..	1,000	2,000
230.38 Telltale holes:		
(a) Failure to have telltale holes as required in staybolts .....	1,000	2,000
(b) Failure to have proper telltale holes in reduced body staybolts .....	1,000	2,000
(c) Failure to keep telltales holes when so required .....	1,000	2,000
230.39 Broken staybolts:		
(a) Boiler in service with excess number of broken staybolts .....	1,500	3,000
(b) Failure to replace staybolts when required to do so; to properly replace staybolts when so required; to inspect adjacent staybolts when replacing broken staybolts .....	1,500	3,000
(c) Failure to count leaking, plugged, or missing telltale holes as broken staybolts .....	1,500	3,000
(d) Closing telltale holes by prohibited means .....	1,500	3,000
230.40 Time and method of staybolt testing:		
(a) Failure to hammer test staybolts when so required .....	1,000	2,000
(b) Failure to properly hammer test staybolts .....	1,000	2,000
230.41 Flexible staybolts with caps:		
(a) Failure to inspect flexible staybolts as required .....	1,000	2,000
(b) Failure to replace broken flexible staybolts; failure to close inner ends of telltale holes as required .....	1,000	2,000
(c) Failure to report removal of flexible staybolts caps and other tests on FRA Form No. 3 when so required ....	1,000	2,000
(d) Failure to remove staybolt caps or otherwise test when FRA inspector or steam locomotive owner and/or operator consider it necessary to do so .....	1,000	2,000
230.42 Failure to have accurate boiler steam gauge where engine crew can conveniently read .....	2,000	4,000
230.43 Failure to have gauge siphon of proper capacity on steam gauge supply pipe; failure to properly clean, maintain the steam gauge supply pipe .....	1,000	2,000
230.44 Failure to test steam gauge when so required .....	1,000	2,000
230.45 Failure to properly test and/or set steam gauge .....	1,000	2,000
230.46 Failure to attach to boiler backhead metal badge plate showing allowable steam pressure .....	1,000	1,500
230.47 Boiler Number:		
(a) (b) (c) Failure to stamp builder's number on boiler when number is known .....	1,000	1,500
230.48 Number and capacity of safety relief valves:		
(a) Failure to equip steam locomotive boiler with proper safety relief valves .....	2,500	5,000
(b) Failure to provide additional safety relief valve capacity when so required .....	3,000	6,000
230.49 Setting of safety relief valves:		
(a) Safety relief valve(s) set and/or adjusted by person not competent to do so .....	2,500	5,000

Section	Violation	Willful violation
(b) Safety relief valve(s) not set to open at prescribed pressure(s) .....	2,500	5,000
(c) Safety relief valve(s) not properly set .....	3,000	6,000
(d) Set pressure of lowest safety relief valve not properly indicated .....	1,000	2,000
230.50 Failure to test and adjust safety relief valves when required to do so .....	1,500	3,000
230.51 Failure to equip steam locomotive boiler with at least 2 properly installed water glasses .....	1,000	2,000
230.52 Failure to properly equip water glasses .....	2,000	4,000
230.53 Failure to properly clean water glass valves and/or gauge cocks when required to do so .....	1,000	2,000
230.54 Testing and maintenance:		
(a) Failure to properly test water glasses and/or gauge cocks .....	1,000	2,000
(b) Failure to properly maintain gauge cocks, water column drain valves, and/or water glass valves .....	1,500	3,000
230.55 Tubular type water and lubricator glasses and shields:		
(a) Failure to renew tubular type water glasses as required .....	1,000	2,000
(b) Failure to properly shield tubular water glasses and/or lubricator glasses .....	1,000	2,000
(c) Failure to properly locate and/or maintain water glasses and/or water glass shields .....	1,000	2,000
230.56 Failure to equip water glass with suitable lamp .....	1,000	2,000
230.57 Injectors and feedwater pumps:		
(a) Failure to equip steam locomotive with proper means for delivering water to the boiler .....	3,000	6,000
(b) Failure to properly test and/or maintain injectors, feedwater pumps, boiler checks, delivery pipes, feed water pipes, tank hose, tank valves .....	2,500	5,000
(c) Failure to properly brace injectors, feedwater pumps, and/or associated piping .....	1,000	2,000
230.58 Flue plugs:		
(a) Plugging flue plugs when not otherwise permitted .....	1,000	2,000
(b) Improperly plugging flue plugs, when otherwise permitted .....	1,000	2,000
230.59 Failure to remove and properly clean fusible boiler plugs when required to do so; failure to properly note removal .....	1,500	3,000
230.60 Time of washing:		
(a) Failure to thoroughly wash boiler when required to do so .....	1,000	2,000
(b) Failure to remove washout plugs, arch tube plugs, thermic siphon plugs, circulator plugs, water bar plugs when washing locomotive boiler .....	1,500	3,000
(c) Failure to examine and/or properly maintain washout plugs washout plug sleeves, threaded openings .....	1,500	3,000
(d) Failure to clean fusible plugs when required to do so .....	1,500	3,000
230.61 Arch tubes, water bar tubes, circulators and thermic siphons:		
(a) Failure to clean, wash, inspect arch tubes, water bar tubes, circulators and thermic siphons as required .....	1,000	2,000
(b) Failure to renew arch tubes, water bar tubes; failure to repair or renew circulators, thermic siphons when required .....	1,500	3,000
(c) Failure to properly inspect and/or replace as necessary arch tubes, water bar tubes, circulators .....	1,500	3,000
230.62 Failure to properly inspect and/or repair or replace as necessary dry pipes subject to pressure .....	2,500	5,000
230.63 Failure to properly inspect smoke box, steam pipes, pressure parts when required to do so .....	1,500	3,000
230.64 Failure to remove from service steam locomotive boiler leaking under lagging from condition which may reduce safety and/or repair the boiler before returning to service .....	1,500	3,000
230.65 Failure to keep steam locomotive boiler, piping, appurtenances in repair so steam does not obscure vision .....	1,000	2,000
230.66 Failure to properly oversee general design, construction, maintenance of steam locomotive(s) and tender(s) .....	1,000	2,000
230.67 Failure to ensure all steam locomotives and tenders are properly inspected and repaired and/or all defects are properly repaired and steam locomotive and/or tender are in good condition, safe and suitable for service before being returned to service .....	2,500	5,000
230.68 Failure to equip steam locomotive that operates in excess of 20 miles per hour over the general system with speed indicator maintained to ensure accurate functioning .....	1,000	1,500
230.69 Failure to equip steam locomotive with properly supported ash pan with operating mechanism that may be safely operated and securely closed .....	1,000	2,000
230.70 Safe condition:		
(a) Failure to perform proper pre-departure inspection when so required .....	1,000	2,000
(b) Failure to properly equip steam locomotive with brake pipe valve clearly identified as "Emergency Brake Valve" .....	1,000	2,000
230.71 Orifice testing of air compressors:		
(a)(b):		
Failure to properly test and/or maintain air compressor(s) capacity .....	1,000	2,000
230.72 Testing main reservoirs:		
(a) Failure to properly test main reservoir(s) when required .....	1,000	2,000
(b) Impermissibly or improperly drilling main reservoir .....	1,000	2,000
(c) Impermissibly using NDE method to measure wall thickness of main reservoir .....	1,000	2,000
(d) Failure to use appropriate method of NDE testing of wall thickness of welded or riveted longitudinal lap seam main reservoir(s); failure to withdraw main reservoir(s) from service when testing reveals insufficient wall thickness .....	1,500	3,000
230.73 Air gauges:		
(a) Failure to equip steam locomotive with properly located air gauge(s) that are no more than 3 psi in error ....	1,000	1,500
(b) Failure to test air gauge(s) when so required .....	1,000	1,500
(c) Failure to properly test air gauge(s) .....	1,000	1,500
230.74 Failure to properly clean and/or test all air brake valves, related dirt collectors, filters when required to do so .....	1,000	1,500
230.75 Failure to properly stencil or display date of testing and cleaning and initials of shop or station performing work .....	1,000	1,500
230.76 Piston travel:		



Section	Violation	Willful violation
(a) Insufficient minimum piston travel .....	1,000	1,500
(b) Excessive piston travel when steam locomotive is stationary .....	1,000	2,000
230.77 Foundation brake gear:		
(a) Failure to properly maintain foundation brake gear .....	1,000	2,000
(b) Foundation brake gear less than 2.5 inches above rail .....	1,000	2,000
230.78 Leakage:		
(a):		
(1) Failure to test for leakage from main reservoir or related piping as required .....	1,000	1,500
(2) Failure to repair excessive leakage from main reservoir or related piping leakage .....	1,000	2,000
(b) Failure to test for brake cylinder as required .....	1,000	1,500
(c):		
(1) Failure to test for leakage from steam locomotive brake pipe as required .....	1,000	2,000
(2) Failure to repair excessive brake pipe leakage .....	1,000	2,000
230.79 Train signal system:		
(1) Failure to test the train signal system or other form of on-board communication as required .....	1,000	1,500
(2) Failure to repair train signal system or other on-board communication when not safe or suitable for service .....	1,000	1,500
230.80 Cabs:		
(a) Steam locomotive cab not safe and suitable for service .....	1,000	2,000
(b) Steam pipes: Construction, attachment .....	1,000	2,000
(c) Oil-burning steam locomotive, cab-enclosed .....	1,000	1,500
230.81 Cab aprons:		
(a) Cab apron, general provisions .....	1,000	1,500
(b) Cab apron, insufficient width .....	1,000	1,500
230.82 Fire doors:		
(a) Safe and suitable for service, general provisions .....	1,000	2,000
(b) Construction and maintenance of mechanically operated fire doors .....	1,000	2,000
(c) Construction and maintenance of hand-operated fire doors .....	1,000	2,000
230.83 Cylinder cocks:		
(1) Failure to properly equip with cylinder cocks .....	1,000	1,500
(2) Failure to properly maintain cylinder cocks .....	1,000	1,500
230.84 Sanders:		
(1) Inoperable sanders .....	1,000	1,500
(2) Failure to test sanders .....	1,000	1,500
230.85 Audible warning devices:		
(a) General provisions .....	1,000	1,500
(b) Sound level measurements, Failure to properly take .....	1,000	1,500
230.86 Required illumination:		
(a) General provisions .....	1,000	1,500
(b) Dimming device, Failure to properly equip with .....	1,000	1,500
(c) Multiple locomotives, Failure of lead locomotive to display headlight .....	1,000	1,500
230.87 Cab lights: Failure to properly equip with .....	1,000	2,000
230.88 Throttles: Failure to properly maintain, equip .....	1,000	2,000
230.89 Reverse gear:		
(a) General provisions .....	1,000	2,000
(b) Air-operated power reverse gear .....	1,000	2,000
(c) Power reverse gear reservoirs .....	1,000	2,000
230.90 Draw gear and draft systems:		
(a) Maintenance and testing .....	1,000	1,500
(b) Safety bars and chains, general .....	1,000	1,500
(c) Safety bars and chains, minimum length .....	1,000	1,500
(d) Lost motion between steam locomotive and tender .....	1,000	1,500
(e) Spring buffers: Improper application, compression .....	1,000	1,500
230.91 Chafing irons: Improper application, maintenance .....	1,000	1,500
230.92 Draw gear, draft systems: Improperly maintained, fastened .....	1,000	1,500
230.93 Pistons and piston rods:		
(a) Failure to properly inspect, maintain, renew .....	1,000	2,000
(b) Fasteners: Failure to keep tight, properly equip .....	1,000	2,000
230.94 Crossheads: Improperly maintained, excess clearance .....	1,000	2,000
230.95 Guides: Failure to securely fasten, properly maintain .....	1,000	2,000
230.96 Main, side, valve motion rods:		
(a) General .....	1,000	2,000
(b) Repairs.		
(1) Failure to make in accordance with accepted national standard .....	1,000	2,000
(2) Failure to submit written request for approval prior to welding .....	1,000	2,000
(c) Bearings and bushings .....	1,000	1,500
(d) Rod side motion: Excessive motion .....	1,000	1,500
(e) Oil, grease cups: Failure to securely fasten, properly equip .....	1,000	1,500
(f) Main rod bearings:		
(1) excessive bore .....	1,000	1,500
(2) excessive lost motion .....	1,000	1,500
(g) Side rod bearings, excessive bore .....	1,000	1,500
230.97 Crank pins:		

Section	Violation	Willful violation
(a) General provisions .....	1,000	2,000
(b) Maintenance: Failure to maintain in safe, suitable condition .....	1,000	2,000
230.98 Driving, trailing, engine truck axles:		
(a) Condemning defects .....	1,000	2,000
(b) Journal diameter: Failure to stamp on end of axle .....	750	1,000
230.99 Tender truck axle: Insufficient diameter .....	1,000	2,000
230.100 Defects in tender truck axles and journals:		
(a) Tender truck axle condemning defects .....	1,000	2,000
(b) Tender truck journal condemning defects .....	1,000	2,000
230.101 Steam locomotive driving journal boxes:		
(a) Driving journal boxes: Failure to properly maintain .....	1,000	2,000
(b) Broken bearings: Failure to renew .....	1,000	2,000
(c) Loose bearings: Failure to repair or renew .....	1,000	2,000
230.102 Tender plain bearing journal boxes: Failure to repair .....	1,000	1,500
230.103 Tender roller bearing journal boxes: Failure to properly maintain .....	1,000	1,500
230.104 Driving box shoes and wedges: Failure to properly maintain .....	1,000	1,500
230.105 Lateral motion:		
(a) Condemning limits: Total lateral motion in excess of .....	1,000	1,500
(b) Limits exceeded, failure to demonstrate conditions require additional lateral motion .....	1,000	1,500
(c) Interferes with other parts of steam locomotive .....	1,000	1,500
230.106 Steam locomotive frame:		
(a) Failure to properly inspect and/or maintain .....	1,000	2,000
(b) Broken frames, not properly patched or secured .....	2,500	5,000
230.107 Tender frame and body:		
(a) Failure to properly maintain .....	1,000	1,500
(b) Height difference between tender deck and steam locomotive cab floor or deck excessive .....	1,000	1,500
(c) Gangway minimum width excessive .....	1,000	1,500
(d) Tender frame condemning defects .....	1,500	3,000
230.108 Steam locomotive leading and trailing trucks:		
(a) Failure to properly maintain .....	1,000	1,500
(b) Safety chain, suitable safety chain not provided .....	1,000	1,500
(c) Insufficient truck clearance .....	1,000	2,000
230.109 Tender trucks:		
(a):		
(1) Tender truck frames .....	1,000	2,000
(2) Tender truck center plate .....	1,000	2,000
(b) Tender truck bolsters: Failure to properly maintain .....	1,500	3,000
(c) Condemning defects, springs and/or spring rigging .....	1,000	2,000
(d) Truck securing arrangement: Not properly maintained .....	1,000	1,500
(e) Side bearings, truck centering devices .....	1,000	2,000
(f) Friction side bearings: Run in contact .....	1,000	2,000
(g):		
(1) Side bearings, failure to equip rear trucks with .....	1,000	2,000
(2) Insufficient clearance of .....	1,000	2,000
230.110 Pilots:		
(a) General provisions .....	1,000	1,500
(b) Clearance, insufficient or excessive .....	1,000	1,500
230.111 Spring rigging:		
(a) Arrangement of springs and equalizers .....	1,000	2,000
(b) Spring or spring rigging condemning defects .....	1,000	2,000
230.112 Wheels and tires:		
(a) Improperly Mounted, excess variance in axle diameter .....	1,500	3,000
(b) Out of gage .....	1,000	2,000
(c) Flange distance variance, excessive .....	1,000	2,000
(d) Tire thickness, insufficient .....	1,000	2,000
(e) Tire width, insufficient .....	1,000	2,000
230.113 Wheels and tire defects:		
(1) Failure to repair .....	1,000	2,000
(2) Welding on, except as otherwise provided for .....	1,500	3,000
(a) Cracks or breaks in .....	1,000	2,000
(b) Flat spots .....	1,000	2,000
(c) Chipped flange .....	1,000	2,000
(d) Broken rim .....	1,000	2,000
(e) Shelled-out spots .....	1,000	2,000
(f) Seams .....	1,000	2,000
(g) Worn flanges, excessive wear .....	1,000	2,000
(h) Worn treads, excessive wear .....	1,000	2,000
(i) Flange height, insufficient or excessive .....	1,000	2,000
(j) Rim thickness, insufficient .....	1,000	2,000
(k) Wheel diameter, excessive variance .....	1,000	2,000
230.114 Wheel centers:		
(a) Filling blocks and shims .....	1,000	2,000
(b) Wheel center condemning limits, failure to repair .....	1,000	2,000

Section	Violation	Willful violation
(c) Wheel center repairs .....	1,000	2,000
(d) Counterbalance maintenance .....	1,000	2,000
230.115 Feed water tanks:		
(a) General provisions .....	1,000	2,000
(b) Inspection frequency, failure to inspect as required .....	1,000	1,500
(c) Top of tender: Improperly maintained and/or equipped .....	1,000	1,500
230.116 Oil tanks:		
(1) Failure to properly maintain .....	2,500	5,000
(2) Failure to equip with complying safety cut-off device .....	5,000	7,500

<sup>1</sup> Failure to observe any condition for movement set forth in § 230.12 will deprive the railroad of the benefit of the movement-for-repair provision and make the railroad and any responsible individuals liable for penalty under the particular regulatory section(s) concerning the substantive defect(s) present on the locomotive at the time of movement. Failure to comply with § 230.12 will result in the lapse of any affected waiver.

Issued in Washington, D.C. on September 30, 1999.

**Jolene M. Molitoris,**  
Administrator.

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