DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

49 CFR Parts 229 and 238

[Docket No. FRA–2004–17645, Notice No. 1]

RIN 2130–AB23

Locomotive Crashworthiness

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

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: FRA is proposing to establish comprehensive, minimum standards for locomotive crashworthiness. Locomotive crashworthiness protection is necessary because locomotive collisions can result in crew injuries and fatalities. These proposed performance standards are intended to help protect locomotive cab occupants in the event of a locomotive collision. Examples of locomotive collision scenarios considered include collisions with another locomotive, the rear of another train, a piece of on-track equipment, a shifted load on a freight car on an adjacent parallel track, or a highway vehicle at a rail-highway grade crossing. These proposed crashworthiness standards must be met by demonstrating compliance with either the proposed rule's performance standards or an FRA-approved design standard.

DATES: *Written Comments:* Comments on the proposed rule must be received on or before January 3, 2005. Comments received after that date will be considered to the extent possible without incurring additional expense or delay.

Public Hearing: Upon specific request, FRA will hold public hearings as appropriate to receive oral comments from any interested party. Written request for hearing must be received on or before January 3, 2005.

ADDRESSES: You may submit comments, identified by DOT DMS Docket Number FRA–2004–17645, by any of the following methods:

- *Federal eRulemaking Portal:* Go to *http://www.regulations.gov*. Follow the online instructions for submitting comments.
- *Web site: http://dms.dot.gov*. Follow instructions for submitting comments on the DOT electronic docket site.
- *Fax:* 1–202–493–2251.
- *Mail:* Docket Management Facility, U.S. Department of Transportation, 400 Seventh Street, SW., Nassif Building, Room PL–401, Washington, DC 20590–001.
- *Hand Delivery:* Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal Holidays.

Instructions: All submissions must include the agency name and docket number or Regulatory Identification Number (RIN) for this rulemaking. Note that all comments received will be posted without change to *http://dms.dot.gov*, including any personal information provided. Please see the Privacy Act heading under Regulatory Notices.

Docket: For access to the docket to read background documents or comments received, go to *http://dms.dot.gov* at any time or to Room PL–401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: John Punwani, Office of Research and Development, Federal Railroad Administration, 1120 Vermont Avenue, NW., Mail Stop 20, Washington, DC 20590 (telephone: 202–493–6369); Charles L. Bielitz, Mechanical Engineer, Office of Safety Assurance and Compliance, Federal Railroad Administration, 1120 Vermont Avenue, NW., Mail Stop 25, Washington, DC 20590 (telephone: 202–493–6314); or Darrell L. Tardiff, Trial Attorney, Office of Chief Counsel, Federal Railroad Administration, 1120 Vermont Avenue, NW., Mail Stop 10, Washington, DC 20590 (telephone: 202–493–6038).

SUPPLEMENTARY INFORMATION:

I. Statutory and Regulatory Background

A. FRA Regulatory Authority

FRA has broad statutory authority to regulate railroad safety. The Locomotive Inspection Act (LIA) (formerly 45 U.S.C. 22–34, now 49 U.S.C. 20701–20703) was enacted in 1911. It prohibits the use of unsafe locomotives and authorizes FRA to issue standards for locomotive maintenance and testing. In order to further FRA's ability to respond effectively to contemporary safety problems and hazards as they arise in the railroad industry, Congress enacted the Federal Railroad Safety Act of 1970 (Safety Act) (formerly 45 U.S.C. 421, 431 *et seq.*, now found primarily in chapter 201 of Title 49). The Safety Act grants the Secretary of Transportation rulemaking authority over all areas of railroad safety (49 U.S.C. 20103(a)) and confers all powers necessary to detect and penalize violations of any rail safety law. This authority was subsequently delegated to the FRA Administrator (49 CFR 1.49). (Until July 5, 1994, the Federal railroad safety statutes existed as separate acts found primarily in title 45 of the United States Code. On that date, all of the acts were repealed, and their provisions were recodified into title 49.)

The term ''railroad'' is defined in the Safety Act to include:

> All forms of non-highway ground transportation that runs on rails or electromagnetic guideways, * * * other than rapid transit operations within an urban area that are not connected to the general railroad system of transportation.

This definition makes clear that FRA has jurisdiction over (1) rapid transit operations within an urban area that are connected to the general railroad system of transportation, and (2) all freight, intercity, passenger, and commuter rail passenger operations regardless of their connection to the general railroad system of transportation or their status as a common carrier engaged in interstate commerce. FRA has issued a policy statement describing how it determines whether particular rail passenger operations are subject to FRA's jurisdiction (65 FR 42529 (July 2, 2000)); the policy statement can be found in Appendix A to parts 209 and 211.

Pursuant to its statutory authority, FRA promulgates and enforces a comprehensive regulatory program to address railroad track; signal systems; railroad communications; rolling stock; rear-end marking devices; safety glazing; railroad accident/incident reporting; locational requirements for dispatching of U.S. rail operations; safety integration plans governing railroad consolidations; merger and acquisitions of control; operating practices; passenger train emergency preparedness; alcohol and drug testing; locomotive engineer certification; and workplace safety.

In part 229 of title 49 of the Code of Federal Regulations (hereinafter, all references to CFR parts will refer to parts in title 49 of the Code of Federal Regulations), FRA established minimum federal safety standards for locomotives. These regulations prescribe inspection and testing requirements for locomotive components and systems, minimum locomotive cab safety requirements, and even basic crashworthiness design requirements for electric multiple-unit type locomotives. On May 12, 1999, FRA issued regulations addressing the safety of passenger rail equipment, including passenger-occupied

locomotives (*i.e.*, cab control cars, powered multiple-unit passenger cars). These are found in part 238. However, FRA's existing locomotive safety standards do not address crashworthiness of conventional locomotives, which comprise the majority of locomotives in use today.

B. Rail Safety Enforcement and Review Act

In 1992, Congress enacted The Rail Safety Enforcement and Review Act (RSERA). Pub. L. 102–365, September 3, 1992. In response to concerns raised by employee organizations, members of Congress, and recommendations of the National Transportation Safety Board (NTSB) concerning locomotive crew safety, Congress included mandates concerning locomotive crashworthiness and cab working conditions in the legislation. Section 10 of RSERA, entitled ''Locomotive Crashworthiness and Working Conditions,'' required FRA ''to complete a rulemaking proceeding to consider prescribing regulations to improve the safety and working conditions of locomotive cabs.'' In order to determine whether crashworthiness regulations would be necessary, Congress tasked FRA with assessing:

> The adequacy of Locomotive Crashworthiness Requirements Standard S–580, or any successor standard thereto, adopted by the Association of American Railroads in 1989, in improving the safety of locomotive cabs.

Furthermore, Congress specifically mandated that the Secretary, in support of the rulemaking proceeding, consider the costs and benefits associated with equipping locomotives with each of a number of specified design features.

FRA agrees that locomotive crashworthiness protection is necessary because train collisions and derailments cause crew fatalities and injuries. In the period from 1995 to 1997, 26 locomotive cab occupants were killed and 289 were injured in freight and passenger train accidents in the United States, a yearly average of 105 casualties.[1]

Adopted in 1989, Association of American Railroads (AAR) Specification S–580 (''S–580'') has served as the industry standard for crashworthiness design specifications of new road freight locomotives. At the time of its development, S–580 provided basic enhancements to the crashworthiness of road locomotives. Many of the units built to this specification are of wide-nose cab design, often referred to as the North American cab design. It is generally held throughout the industry that S–580 represented a significant step on the part of the railroad industry to improve the crashworthiness of locomotives.

II. FRA's Response to Section 10 of RSERA

In response to the mandate of Section 10 of RSERA, FRA conducted the necessary research and analysis. FRA undertook steps to determine the health and safety effects of locomotive cab working conditions and evaluated the effectiveness of S–580, along with the benefits and costs of the specified locomotive crashworthiness features. In an effort to fully address the broad range of issues presented in the RSERA, FRA (1) conducted an industry-wide public meeting to gather information regarding the areas of concern identified in the RSERA, (2) established a locomotive collision database based on detailed accident information gathered from actual collisions, (3) established a research contract to develop and verify a computer model capable of predicting how each of the crashworthiness features in S–580 and in the RSERA affect the collision dynamics and probability of crew injury, and (4) conducted a detailed survey of locomotive crews' cab working conditions and environment. FRA detailed the results of these actions in ''Locomotive Crashworthiness and Cab Working Conditions Report to Congress,'' dated September 18, 1996. A copy of this report has been placed in the docket of this rulemaking. Actions taken to gather information for that report are described below.

First, meetings with all segments of the railroad industry formed an essential part of FRA's plan to meet the requirements of the RSERA. FRA held an industry-wide public meeting on June 23, 1993, to gather information from the industry on each of the areas of concern identified in Section 10 of the RSERA and to inform the industry of FRA's approach. This meeting was well attended by all segments of the rail industry, including rail labor, freight railroads, locomotive builders, the National Railroad Passenger Corporation (Amtrak), and commuter railroads.

At this initial meeting, some of the railroads urged that improvements in crash avoidance technology should be pursued in lieu of improved crashworthiness features. FRA is currently pursuing crash avoidance technology and is in the process of completing a separate rule on performance standards for the use and development of processor-based signal and train control systems. The issue of collision avoidance is more fully discussed in section IV of the preamble to this proposed rule.

Several participants in the public meeting expressed an opinion that a series of smaller, informal meetings with the separate segments of the rail industry would provide more detailed information regarding locomotive crashworthiness. As a result, FRA held a number of such meetings which included the following organizations:

American Public Transportation Association (APTA);
American Short Line and Regional Railroad Association (ASLRRA);
Amtrak;
AAR;
Brotherhood of Locomotive Engineers (BLE);
Burlington Northern (now Burlington Northern Santa Fe Railway) (BNSF);
DuPont (glazing);
General Electric Transportation Systems (GE);
General Motors-Electro-Motive Division (GM/EMD);
Morrison Knudsen (MK);
NTSB;
Sierracin (glazing); and
United Transportation Union (UTU).

These meetings generated considerable discussion about the topics listed in section 10 of the RSERA. During the meetings, FRA requested specific cost or test data to support the positions taken by the various organizations. Some supply industry organizations were forthcoming with this data, while other organizations were apparently unable or unwilling to respond.

Second, FRA proceeded with the understanding that earlier locomotive collision accident reports did not contain the data necessary to support crash modeling. Thus, in 1992, FRA instructed field inspectors to investigate all accidents, regardless of monetary damage thresholds and locomotive design, involving either a collision of two trains or a collision of one train with an object weighing ten tons or more. This accident data provided information which FRA used to determine the possible benefits of a crashworthiness regulation.

Third, with the support of the Volpe National Transportation Systems Center (''Volpe Center''), FRA contracted with Arthur D. Little, Inc. (ADL) to predict the benefit, if any, of each of the locomotive crashworthiness features listed in section 10 of the RSERA. Using the collision data collected by FRA,

[1] Regulatory Impact Analysis, p. iii of Appendix B of the Analysis. These statistics were taken from the data set of injuries/fatalities that may have been prevented by the proposed crashworthiness standards. Thus, this set does not include the total number of all locomotive cab occupant fatalities/injuries that occurred during this time period.

ADL performed a series of analyses using computer models to evaluate the effectiveness of specific crashworthiness design features.[2]

Lastly, FRA's approach to the research and analysis tasks focused on the cost and benefits of design changes to conventional locomotives operating at speeds of less than 80 mph. The work done to meet the requirements of the RSERA was not intended to address safety concerns unique to high speed rail transportation. FRA addresses high speed rail safety concerns, including crashworthiness design, in part 238.

FRA's Report to Congress contained an implementation strategy to address each of the issues raised by the RSERA.[3] FRA determined that S–580, which provided for improvements in collision posts, anti-climbing arrangements and the short hood structure, represented a significant step on the part of the railroad industry to improve locomotive crashworthiness. The research and analysis conducted in response to the RSERA showed that S–580 can be further improved to reduce casualties without significantly impacting locomotive design. FRA also found that (1) modified front-end structural designs incorporating stronger collision posts, (2) full-height corner posts with increased strength, and (3) utilization of roof longitudinal strength to support structural members from crushing may provide opportunities for additional protection for locomotive cab occupants. FRA even evaluated the potential to create a designated crash refuge within the space that these measures would help to protect. Furthermore, based on accident/incident experience and recent advances in fuel tank design being undertaken by the industry, FRA concluded that fuel tank design could be significantly improved to minimize the risk and severity of future fuel spills. Finally, FRA identified locomotive cab emergency lighting and more reliable means of rapid egress during derailments and collisions as additional subject areas which appeared to warrant further exploration.

While the study findings clearly indicate that several crashworthiness features warranted further exploration, the findings also indicated that several features, including rollover protection, uniform sill heights, and deflection plates did not warrant further action. Rollover protection costs would be substantial, and no material need for such protection was demonstrated by the accident data. Design limitations of multi-use freight locomotives all but preclude practical design possibilities for deflection plates, and FRA found that a successful deflection device would cause collateral safety problems. Uniform sill heights were found not to significantly reduce life-threatening collision damage, would have a high cost, and any benefit would accrue only after an extended period over which older standard locomotives would be phased out of service. The perceived benefits of uniform sill height might be more reliably achieved by improved anti-climbing arrangements, and the report proposed that development and evaluation of a design concept be explored.

Many of the proposed measures were practical for application only to newly constructed locomotives. Further, additional information and research were required to determine the cost-effective basis of these concepts, and to assure the acceptance of these measures by locomotive crews. In order for protective features to be effective, crew members must have confidence that they will function as intended. Crew members who lack confidence in the safety measures employed may be inclined to jump from a locomotive prior to a collision, resulting in a high probability of serious injury or death.

FRA determined that it would use its Railroad Safety Advisory Committee to further develop these safety issues thereby tapping the knowledge and energies of a wide range of interested parties.

III. Railroad Safety Advisory Committee (RSAC) Recommendations

In March 1996, FRA established the RSAC, which provides a forum for consensual rulemaking and program development. The Committee includes representation from all of the agency's major customer groups, including railroads, labor organizations, suppliers and manufacturers, and other interested parties. A list of member groups follows:

AAR;
American Association of Private Railroad Car Owners (AARPCO);
American Association of State Highway & Transportation Officials (AASHTO);
American Train Dispatchers Department/BLE (ATDD/BLE);
Amtrak;
APTA;
ASLRRA;
Association of Railway Museums (ARM);
Association of State Rail Safety Managers (ASRSM);
BLE;
Brotherhood of Maintenance of Way Employes (BMWE);
Brotherhood of Railroad Signalmen (BRS);
Federal Transit Administration (FTA) (associate member);
High Speed Ground Transportation Association;
Hotel Employees & Restaurant Employees International Union;
International Association of Machinists and Aerospace Workers;
International Brotherhood of Boilermakers and Blacksmiths;
International Brotherhood of Electrical Workers (IBEW);
Labor Council for Latin American Advancement (LCLAA) (associate member);
League of Railway Industry Women (associate member);
National Association of Railroad Passengers (NARP);
National Association of Railway Business Women (non-voting);
National Conference of Firemen & Oilers;
National Railroad Construction and Maintenance Association;
NTSB (associate member);
Railway Progress Institute (RPI);
Safe Travel America;
Secretaria de Communicaciones y Transporte (associate member);
Sheet Metal Workers International Association (SMW);
Tourist Railway Association Inc.;
Transport Canada (associate member);
Transportation Communications International Union/BRC (TCIU/BRC);
Transport Workers Union of America (TWUA); and
UTU.

When appropriate, FRA assigns a task to RSAC, and after consideration and debate, RSAC may accept or reject the task. If the task is accepted, RSAC establishes a working group that possesses the appropriate expertise and representation of interests to develop recommendations to FRA for action on the task. The working group develops the recommendations by consensus. The working group may establish one or more task forces to develop the facts and options on a particular aspect of a given task. The task force reports to the working group. If a working group comes to unanimous consensus on recommendations for action, the working group presents the package to the RSAC for a vote. If a simple majority of the RSAC accepts the proposal, the

[2] Mayville, R.A., Stringfellow, R.G., Rancatore, R.J., Hosmer, T.P., 1995, ''Locomotive Crashworthiness Research, Volumes 1 through 5,'' DOT/FRA/ORD–95/8.1√8.5. a copy of each cited report has been placed in the docket of this rulemaking.

[3] ''Locomotive Crashworthiness and Cab Working Conditions Report to Congress'', Office of Safety Assurance and Compliance, Federal Railroad Administration, 1996.

RSAC formally recommends the proposal to FRA.

FRA then determines what action to take on the recommendation. Because FRA staff has played an active role at the working group level in discussing the issues and options and in drafting the language of the consensus proposal, and because the RSAC recommendation constitutes the consensus of some of the industry's leading experts on a given subject, FRA is often favorably inclined toward the RSAC recommendation. However, FRA is in no way bound to follow the recommendation, and the agency exercises its independent judgement on whether the recommended rule achieves the agency's regulatory goal, is soundly supported, and is in accordance with policy and legal requirements. Often, FRA varies in some respects from the RSAC recommendation in developing the actual regulatory proposal. If the working group or RSAC is unable to reach consensus on recommendations for action, FRA moves ahead to resolve the issue through traditional rulemaking proceedings.

On June 24, 1997, FRA tasked RSAC with the responsibility of making recommendations concerning standards for locomotive crashworthiness. Specifically, RSAC was charged with the investigation and development, if necessary, of crashworthiness standards to ensure the integrity of locomotive cabs in collisions, thereby minimizing fatalities and injuries to train crews. This task was to be performed in three phases. RSAC would first review relevant accident data and existing industry standards to determine which, if any, appropriate modifications to the cab structure are required to provide additional protection above that provided by S–580. In particular, RSAC was to specifically consider the following features: Full-height corner posts; improved glazing design and support structure; equipment to prevent the post-collision entry of flammable liquids; and improved fuel tank design. Second, RSAC would examine to what extent improved anticlimber designs and/or incorporation of shelf couplers, used to complement the existing S–580 standards, serve to mitigate the effects of the above-listed collision scenarios. Third, RSAC would examine past and present methods of cab egress, along with the benefits of emergency lighting in the event of a collision. Based on a review of relevant accident data, available technology, implementation costs, and other applicable factors, RSAC would then develop appropriate recommendations.

To accomplish the above goals, RSAC created the Locomotive Crashworthiness Working Group (''Working Group''). Created on June 24, 1997, this group of about 40 members consisted of FRA personnel and representatives from railroad labor and management, and two major manufacturers of locomotives. The following organizations provided representatives to serve on the Working Group:

AAR;
AASHTO;
APTA;
ASLRA;
BLE;
BMWE;
FRA;
IBEW;
RPI;
SMW;
UTU; and
NTSB.

The Working Group broke the task into three distinct phases. The first phase included review of accident data to formulate the most prevalent accident scenarios involving injuries and deaths. Second, the Volpe Center, along with contractor ADL, performed detailed analyses of how design improvements/additions to S–580 would affect the probable resulting injuries/deaths in each of five accident scenarios described later in this preamble.[4] Third, the Working Group analyzed and deliberated the proposed costs and benefits to determine the effectiveness of each of the proposed changes to S–580. The Working Group then presented its findings to the full RSAC Committee.

The Working Group conducted its meetings on the following dates at the following locations:

(1) September 8–9, 1997, Washington DC;
(2) February 2–3, 1998, Jacksonville, FL;
(3) April 9–10, 1998, Fort Pierce, FL;
(4) July 14–15, 1998, Las Vegas, NV;
(5) October 28–29, 1998, Kansas City, MO;
(6) February 25–26, 1999, Washington DC;
(7) June 15–16, 1999, Las Vegas, NV;
(8) October 19–20, 1999, Sterling, VA;
(9) December 13–14, 1999, Jacksonville, FL;
(10) October 9–10, 2001, Washington, DC; and
(11) January 17–18, 2002, Jacksonville, FL.

Minutes from the above-referenced meetings have been placed in the docket of this proceeding.

The Working Group had its inaugural meeting on September 8–9, 1997, in Washington DC. After reviewing its formal Task Statement to gain an understanding of the scope of its mission, the Working Group recognized that a smaller, more manageable group could more effectively consider the technical requirements and debate the advantages and disadvantages of the technical options available. Thus, the S–580/Engineering Review Task Force (''Engineering Task Force'') was created for this sole purpose. The Engineering Task Force was made up of Working Group members who either volunteered or named a fellow member as a representative. The Engineering Task Force met four times and conducted meetings by telephone conference on three occasions. These task force meetings served to progress the technical aspects of the issues and were open to all members of the Working Group. These meetings were somewhat less formal and were conducive to free exchange of technical information and ideas. A summary report on the Engineering Task Force's deliberations was made at each subsequent Working Group meeting.

The Working Group acknowledged the three distinct elements to the task. First, the group would need to identify, using recent accident data, the most prevalent locomotive collision scenarios which involve injuries and deaths. To this end, the Working Group requested that FRA review pertinent accidents for presentation at the February 2–3, 1998 Working Group meeting. The second element involved detailed engineering analysis of the effectiveness of specific crashworthiness features. To this end, FRA pledged the technical assistance of the Volpe Center, along with required support from outside contractors as needed. Third, the Working Group expressed interest in understanding the projected economic impact of any new requirements.

FRA commenced a review of locomotive accident data from 1995 to 1996 as a representative sampling of accidents. FRA then narrowed the pool

[4] Tyrell, D., Severson, K., Marquis, B., Martinez, E., Mayville, R., Rancatore, R., Stringfellow, R., Hammond, R., Perlman, A.B., 1999, ''Locomotive Crashworthiness Design Modifications Study,'' Proceedings of the 1999 IEEE/ASME Joint Railroad Conference, April 13–15, 1999, IEEE Catalog Number 99CH36340, ASME RTD Volume 16; Tyrell, D.C., Martinez, E.E., Wierzbicki, T., ''Crashworthiness Studies of Locomotive Wide Nose Short Hood Designs,'' Proceedings of the 8th ASME Symposium on Crashworthiness, Occupant Protection and Biomechanics in Transportation November 14–19, 1999; Nashivlle, Tennessee; Tyrell, D., Severson, K., Marquis, B., Perlman, A.B., ''Simulation of an Oblique Collision of a Locomotive and an Intermodal Container,'' Proceedings of the 8th ASME Symposium on Crashworthiness, Occupant Protection and Biomechanics in Transportation November 14–19, 1999; Nashville, Tennessee.

of accidents to 23 and presented summaries of them to the Engineering Task Force at its first meeting. Collective discussion of these accidents with railroad and labor members of the Engineering Task Force helped to flesh out all the details of the locomotive types and designs. The Engineering Task Force then classified all 23 collisions into five major categories and developed a sequence of events, or scenario, for each accident. These five scenarios are:

(1) Coupled locomotive override resulting from a head-on train-to-train collision;

(2) Colliding locomotive override resulting from a head-on train-to-train collision;

(3)[5] Rear end/overtaking collision between a locomotive and a freight car;

(4) Oblique/raking collision between a locomotive and a freight car or part thereof, at a switch or upon passing a train on the adjacent track; and

(5) Offset collision between locomotive and freight car.

Once these scenarios were identified, a representative accident for each scenario was chosen to be studied in detail. The Engineering Task Force next gathered as many details as possible concerning the accidents and determined the crashworthiness features which were involved or could have had an effect in each scenario. Table 1 shows the scenarios, collision mode, relevant crashworthiness features, and representative accidents.

TABLE 1.—COLLISION SCENARIO, COLLISION MODE, AND ACCIDENT REPRESENTATIVE OF SCENARIO

Collision scenario	Collision mode	Modified component	Accident location and date
1. Head-on collision between two freight trains	Coupled locomotive override.	Anti-climber Shelf-coupler	Smithfield, WV, August 20, 1996.
2. Head-on collision between two freight trains	Colliding locomotive override.	Collision post	West Eola, IL, January 20, 1993.
3a. Overtaking collision, locomotive to flat car	Loading of window frame structure.	Window frame structure	Phoenixville, PA August 23, 1996.
3b. Grade crossing collision with highway truck carrying logs.	Loading of window frame structure.	Window frame structure	Phoenixville, PA, August 23, 1996.
4. Object, such as a trailer, fouling right-of-way of locomotive.	Corner loading of locomotive short hood.	Short hood	Selma, NC, May 16, 1994.
5. Offset collision between a locomotive and a freight car.	Corner loading of locomotive underframe.	Front plate	Madrone, NM, October 13, 1995.

Each collision scenario presents a significant risk of injury or death to locomotive cab occupants, and the Working Group recognized that effective reduction of this risk is the primary goal when considering locomotive crashworthiness standards.

The Working Group next examined a list of crash survival concepts that FRA had previously assembled. The Engineering Task Force discussed each concept in light of the accidents reviewed. There was general agreement among Task Force members about the continued need for braced collision posts, corner posts, and the utilization of crash energy management principles to minimize secondary collisions within the locomotive cab. The Task Force also discussed the variance of underframe sill heights, the frequency of locomotive roll-over occurrences, and the concept of crash refuges, but ultimately agreed with FRA's Report to Congress that these features held little promise as effective locomotive crashworthiness features and that further use of resources in pursuit of these concepts was not warranted. The Task Force then discussed collision post strength, wide-nose locomotive cabs and cab corner strength as well as locomotive front end strength up to the window level. The Task Force felt that these concepts required further development in order to further mitigate the consequences from the reviewed accidents, which included side/oblique collisions, coupled locomotive override, and shifted load collisions.

Standard S–580 includes the use of collision posts, wide-nose cab configurations of greater strength, and anti-climbing means to prevent override. The Working Group found that the accident survey showed the effects of S–580 on the survivability of locomotive crews to be substantial. However, they also recognized that higher levels of protection could be achieved by enhancing the strength requirements for future locomotive designs and by fortifying the current design of locomotives where possible and economically practicable. Thus, for comparison purposes, the group decided to model each of the collision scenarios to gauge the performance of each of the crashworthiness features under consideration. Data from the accidents was used for comparison with the analytic models and, where possible, for information on the crashworthiness performance of the baseline S–580 locomotive design. For Scenarios 3a and 3b, the model was compared with the accident that occurred in Phoenixville, PA on August 23, 1996, but the grade crossing collision, also occurring on August 23, 1996 in Phoenixville, with logs impacting the window structure was used to evaluate the influences of changes in the window structure.

The Volpe Center, locomotive manufacturers and remanufacturers, and manufacturers of locomotive components made presentations to the Working Group on the current strength of the crash-related components and discussed the possibility of further strengthening of these components to improve overall crashworthiness. In addition, all members of the Working Group engaged in extensive discussion of these issues. Thus, only enhancements which were currently feasible were modeled.

In all, the Working Group considered the following locomotive crashworthiness features:

—*Shelf couplers:* A representative of the Mechanical Committee of Standard Coupler Manufacturers (MCSCM) reviewed the ''shelf coupler'' concept with the Working Group and traced its development from concept to the current status. Every freight car has a

[5] The report from the Accident/Data Analysis and Benefits Assessment Task Force describes 6 scenarios. It contains 2 scenarios in which the window structure is impacted. In one, an overriding freight car impacts the window structure during a rear-end collision; in the other logs impact the window structure in a grade crossing collision with a truck carrying logs. The Working Group initially considered the former, but the latter was used for the basis for crashworthiness evaluation of the window structure. See Table 1.

bottom-shelf E head coupler. Double shelf (top- and bottom-shelf) couplers are mandated by FRA on tank cars used to haul hazardous materials. These shelves limit vertical motion between two coupled couplers to approximately ±7¼ inches (184 mm). Passenger cars are typically equipped with tightlock couplers which keep the coupler faces at the same height. These couplers have demonstrated their effectiveness in preventing override for their respective equipment. During the discussion it was pointed out that a top shelf might assist in preventing override in a rear-end collision although it would require that a coupling actually occur for the shelf to be effective. However, type-F couplers commonly applied to locomotives already incorporate a top shelf feature. After deliberations, the Working Group decided not to pursue the concept of double shelf couplers as effective crashworthiness improvements. It was further noted that the coupling of MU cables and the air hoses between locomotives would be made more difficult if shelf couplers were required on locomotives. The potential for such coupler designs in preventing locomotive-to-locomotive override in a head-on collision was nonetheless evaluated.

—*Interlocking anti-climber:* The anti-climber design employed by the Canadian National Railway Company (CN) was evaluated. This design incorporates thicker webs and flanges than typical North American designs, and also includes exposed flanges running the width of the anti-climber.

—*Stronger collision posts:* Preliminary designs of collision posts with strengths up to the strength of the main underframe structure of the locomotive were developed and evaluated. Principal modifications were the addition of flanges and tapering the collision post.

—*Stronger window area structure:* Increased cab strength above the short hood was evaluated. Modification included the use of thicker sheet metal for the window frame members.

—*Stronger short hood:* The influence of short hood strength on locomotive crashworthiness in an oblique collision was evaluated. Modifications evaluated included thickness of the short hood and the material used to make the short hood.

—*Front plate:* Increased front plate strength was considered as a potential modification for increased locomotive crashworthiness in an oblique collision with a freight car. The modification considered consisted of increased front plate thickness.

The results of the study indicate that strengthened collision posts and short hoods resulted in increased crashworthiness for particular collision scenarios. Shelf couplers were found not to be effective in preventing coupled locomotive override. Due to the fracture that occurs as the CN anti-climber design longitudinally crushes, this design was found to be ineffective in supporting the vertical forces that occur during locomotive-to-locomotive override, consequently allowing such overrides to occur. For an oblique collision of a locomotive with an empty hopper car, in which the locomotive is principally engaged below the underframe, modifications to the locomotive are not likely to influence the outcome of the collision.

ADL and Volpe Center representatives, presented results from their detailed analyses of how design improvements/additions in S–580 would affect the probable resulting injuries/deaths in each of the five scenarios (a copy of the results has been placed in the docket of this proceeding). Then, the Working Group analyzed and considered the proposed costs and benefits to determine the effectiveness of each of the proposed changes to S–580. The group also considered a performance standard for locomotive crashworthiness design.

From this point forward, the Working Group, assisted by the Task Force, debated the format for specifying the crashworthiness requirements, many issues relating to feasibility of alternative structures, and the economic impact of the proposed new requirements. Throughout, the group remained convinced that significant safety benefits could be achieved. The AAR members volunteered to adopt a specification (which would become AAR S–580–2004) meeting the performance criteria under discussion. This would act as a model design standard which satisfies the crashworthiness performance requirements. The group then focused its attention on the details of AAR S–580–2004 in order to refine and optimize them. FRA notes that the designation of AAR S–580–2004 may be changed; however FRA is identifying the standard as AAR S–580–2004 for purposes of this NPRM.

On March 19, 2004, the Working Group presented its findings to the full RSAC, in the form of a draft notice of proposed rulemaking (NPRM). On April 14, 2004, RSAC voted to recommend the issuance of this proposed rule; and FRA, having full participation on the RSAC Committee, and finding that the recommendation will improve rail safety, has accepted it in finalizing this NPRM. RSAC's recommendation forms the basis for this proposed rule; however, FRA has included in this preamble reference to comments submitted with ballots on the rule (which may be viewed in full text in the docket). FRA has also made various editorial corrections necessary to present in a clear, concise, and technically correct manner the intended proposal.

FRA has worked closely with the RSAC in the development of its recommendations and believes that the RSAC effectively addressed locomotive crashworthiness standards. FRA has greatly benefitted from the open, informed exchange of information that has taken place during meetings. There is general consensus among labor, management, and manufacturers concerning the primary principles FRA sets forth in this NPRM. FRA believes that the expertise possessed by the RSAC representatives enhances the value of the recommendations, and FRA has made every effort to incorporate them in this proposal.

The Working Group will reassemble after the comment period for this NPRM closes and will consider all comments received. Based on any recommendations RSAC receives from the Working Group, RSAC will then be in position to make recommendations to FRA concerning the development of a final standard.

IV. Major Issues

A. Promulgation of Performance Standards Where Possible

FRA has endeavored to promulgate performance requirements in this NPRM rather than the more prescriptive design standards. FRA understands that this approach allows for greater flexibility in the design of locomotives and believes this approach has a better chance of encouraging innovation in locomotive design than stricter design standards. The following discussion includes a description of performance and design standards, the advantages and disadvantages of each, and the relationship between the proposed design and performance standards.

Performance standards describe the behavior, or performance, of systems under prescribed circumstances. The principal advantage of such standards is that how the performance is achieved is not specified; any design approach can be used. The principal drawback to such standards for crashworthiness is that

either destructive tests or detailed analyses (*i.e.*, computer simulation) are required in order to assure that the system can achieve the desired level of performance.

Design standards prescribe conditions which do not explicitly relate to the performance of the system. The principal advantage of such standards is that compliance can be verified with either non-destructive tests or closed-form analyses (*i.e.*, hand calculations). The principal disadvantages are that the desired level of performance is not guaranteed, assumptions about performance must be made when fashioning a particular design approach, and innovative approaches to achieving the regulatory objective may be precluded.

This NPRM includes performance requirements found to be feasible and certain requirements that use the more traditional design standards approach. In certain cases, design standards are identified as presumptively responsive to performance requirements. This approach permits builders to use accepted designs without conducting costly analyses that could still be challenged in later litigation.

While the Working Group endeavored in its recommendations to make both sets of requirements as equivalent as possible, because of the differences in their nature, it is impossible to make them completely equivalent. The equivalence of the design and performance standards is discussed in detail in: Martinez, E., Tyrell, D., ''Alternative Analyses of Locomotive Structural Designs for Crashworthiness,'' presented at the 2000 International Mechanical Engineering Congress and Exposition, November 6, 2000, Orlando, FL, and included in the docket of this proceeding. There are no guarantees that a locomotive built to the design specification will have the performance required by the performance specification. If some aspect of the design approach assumed in developing the design requirements is changed, it may be possible to meet the design requirements but not meet the level of desired performance. Nevertheless, FRA believes that the proposed rule will accomplish the intended risk reduction.

Since performance standards are not appropriate for every regulation, it must first be determined whether certain factors preclude their use. For example, performance standards are not effective for regulation in areas where it is difficult to determine compliance (*i.e.*, a regulation requiring safer piloting of aircraft) or where determination of a proper minimum level of performance cannot be made easily or cost-effectively (see ''Performance-Based Regulations Guide,'' Federal Aviation Administration, October 31, 1997, a copy of which has been placed in the docket of this proceeding).

The Working Group sought to recommend locomotive crashworthiness performance standards where possible and identified the locomotive front end structure design as the best candidate for regulation through performance requirements. There was some concern among the Working Group members that if FRA issued performance requirements in this area, computer models would be required to show compliance with performance requirements for each new locomotive design. Thus, the Working Group decided to recommend that S–580 be incorporated by reference in its entirety. This concept became further refined by maintaining the performance requirements, yet providing a model design standard which, if met, would likely satisfy the performance requirements.

The Working Group's approach encourages introduction of more innovative designs. As previously noted, AAR agreed to provide the model design standard in the form of an enhanced S–580. Thus, the Working Group focused its efforts on developing a model design standard for locomotives of conventional design, herein called AAR S–580–2004.

Rather than requiring every design to show satisfaction of the performance standards proposed here, FRA has offered AAR S–580–2004 as a conventional model design standard. FRA, in consultation with the RSAC Working Group, has performed the necessary analysis to show that AAR –580–2004 meets the proposed performance standards in most instances.

All of the subject areas covered by this NPRM, other than locomotive front end, are proposed in terms of design standards rather than performance requirements. This formulation required in-depth analysis of accident history, creation and validation of computer models, and comparison of various design improvements versus their baseline design. This was necessary to ensure that the minimum requirements being developed were in fact feasible and necessary. Also, S–580 provided a convenient and appropriate benchmark for testing of further improvements in this field, whereas FRA is not aware of any standards for subject areas such as locomotive cab interior configuration or locomotive cab emergency egress.

FRA proposes to regulate designs for anti-climbing devices and underframe strength through design standards, in accordance with AAR S–580–2004. The Working Group was not able to find any improvements to the industry standards for these two subject areas that would be both cost effective and have a significant impact on safety. However, the group did find evidence that anti-climbing devices do provide some secondary protection to cab occupants in the event of a collision with a highway vehicle. FRA plans additional research in this area in the future.

FRA understands that the proposed standards will not create absolutely crashworthy locomotives, but rather will tend to optimize crashworthiness design features in order to increase cab occupant safety under some of the most common collision conditions. Since its inception in the early 1990's, S–580 has had a positive effect on locomotive crashworthiness design. This proposed rule is intended to capture the benefits of the industry's initiative and improve upon it where possible. FRA believes the RSAC resources were the best forum for recognizing and generating such improvements.

Other efforts are being undertaken by the industry and by FRA to reduce the risk of locomotive collisions. For instance, FRA is finalizing a rule on performance standards for the use and development of processor-based signal and train control systems. The implementation of positive train control (PTC) technology could reduce the number of train-to-train collisions. Current federal and state programs encourage the safety improvement of highway-rail at-grade crossings (including initiatives targeted at drivers of heavy trucks) and help reduce the risk of locomotive collisions. The risks associated with locomotive collisions with offset intermodal containers on freight cars on parallel tracks are being addressed by joint industry/FRA programs to promote better securement of trailers and containers.

However, all of these collision avoidance strategies require time and resources to work, and there is significant uncertainty regarding their full implementation. Further, as rail operations and highway traffic grow, significant effort may be required to ensure that collision-related casualties do not grow as well. Accordingly, taking action to mitigate the effects of collisions remains a prudent element of public policy, and is likely to remain so for some years to come.

B. Application to New Locomotives (See Also Section-by-Section Analysis for § 229.203)

It should be emphasized that FRA does not seek to impose locomotive crashworthiness requirements on the current locomotive fleet. At this time, FRA feels safety benefits resulting from crashworthiness improvements would be best realized through future locomotive designs, rather than by retrofitting the current fleet. However, what ought to be considered a ''new locomotive'' for purposes of this proposed rule merits discussion.

FRA proposes using the locomotive build date of (a date three years after publication of the final rule) for determining whether the locomotive is subject to the requirements of this proposed rule. This should give railroads and locomotive manufacturers adequate time to take necessary steps to ensure that these new locomotives will be in compliance with these proposed requirements.

FRA is particularly interested in whether a locomotive rebuilt with new components atop a previously-used underframe, or ''decked'' locomotive, should qualify as a new locomotive. These ''remanufactured'' locomotives may have a future life span nearly equivalent to a locomotive constructed on a new underframe. FRA has defined ''new locomotive'' to include those locomotives rebuilt with a previously-used underframe and containing no more than 25% previously-used parts (weighted by cost). Commenters are invited to address this issue specifically, and also whether any other distinct class of locomotives should be considered a ''new locomotive'' for purposes of this rule.

FRA encourages, as discussed by the Working Group, the use of sound consist management principles to place improved, more crashworthy locomotives as lead locomotives in consists. As these new locomotives are phased in, they will only comprise a portion of the fleet, and railroads will be faced with making decisions regarding their placement in a consist. FRA believes the benefits of this rule are maximized when these newer locomotives are used in the lead position to provide additional protection to the operating crews, and not in trailing positions behind older, less crashworthy locomotives, but FRA has not mandated the placement of the newer locomotives. The Working Group did not believe a requirement to mandate placement of these newer locomotives in the lead position would be beneficial, and further believed that the issue is relevant only during the phase-in period. In any event, in the future the entire locomotive fleet will be built to these or future crashworthiness standards. Commenters are invited to address this issue.

V. Section-by-Section Analysis

Amendments to 49 CFR Part 229

In contrast to requirements for passenger-occupied cab control cars and multiple unit (MU) locomotives, there are no current federal regulations governing conventional locomotive crashworthiness design. The proposed revisions to part 229 would revise subpart D to address locomotive crashworthiness design for all locomotives covered by this rule while moving § 229.141 to part 238 as § 238.224.

Subpart A—General

Section 229.5 Definitions

The following terms have the same meaning as provided in part 238: ''corner post,'' ''lateral,'' ''locomotive cab,'' ''longitudinal,'' ''permanent deformation,'' ''power car,'' ''roof rail,'' ''semi-permanently coupled,'' ''Tier II,'' and ''ultimate strength.''

The term ''anti-climber'' is intended to have the same meaning as ''anti-climbing mechanism'' as it is used in part 238. The term ''anti-climber'' is used in place of ''anti-climbing mechanism'' to more accurately represent the name used in the rail industry.

The term ''collision post'' has essentially the same meaning as it is used in part 238; however, the definition is modified slightly in this proposed rule to narrow its application only to locomotives.

The term ''build date'' means the date on which the completed locomotive is actually shipped by the manufacturer or remanufacturer to the customer. FRA asks for comment as to whether this definition accurately represents the industry's definition of ''build date.''

The term ''designated service'' has the same meaning as provided in part 223.

The term ''design standard'' means a specification for the crashworthiness design of locomotives. This will usually contain a set of design requirements which do not specify ultimate performance, yet are not so specific in nature that they leave little flexibility to the designer. The overall design of the locomotive is allowed to vary, so long as the specified crashworthiness design requirements are met.

The term ''fuel tank, external'' revises the current part 238 definition by replacing the word ''volume'' with the word ''vessel.'' FRA believes that this is a more accurate and grammatically correct definition.

The term ''fuel tank, internal'' revises the current part 238 definition by replacing the word ''volume'' with the word ''vessel.'' FRA believes that this is a more accurate and grammatically correct definition.

The term ''manufacture'' means the practice of producing a locomotive from new materials.

The term ''monocoque design locomotive'' means a locomotive in which the external skin or shell of the locomotive combines with the support frame to jointly provide structural support and stress resistance.

The term ''MU locomotive'' revises the current part 229 definition to more clearly describe the types of equipment included in the definition of MU locomotives.

The term ''narrow-nose locomotive'' means a locomotive with a short hood which spans substantially less than the full width of the locomotive.

The term ''occupied service'' means any instance in which a locomotive is operated with a person present in the cab.

The term ''remanufacture'' means the practice of producing a ''remanufactured locomotive''.

The term ''remanufactured locomotive'' means a locomotive rebuilt or refurbished from a previously used or refurbished underframe (''deck''), containing fewer than 25% previously used components (weighted by dollar value of the components). It is intended to capture the practice of decking a locomotive, or rebuilding it on a previously used underframe. The proposed definition is intended to give better guidance to rebuilders of locomotives and railroads considering rebuilding a locomotive, and also to prevent avoidance of the proposed requirements by simply rebuilding a locomotive on a previously used underframe containing 25% or more previously used components without making safety improvements.

The term ''semi-monocoque design locomotive'' means a locomotive in which the external skin or shell of the locomotive partially combines with the support frame to provide structural support and stress resistance.

The term ''short hood'' means the part of the locomotive above the underframe located between the cab and the nearest end of the locomotive. Short hoods may vary in length and are usually, but not always, located toward the front-facing portion of the locomotive.

The term ''standards body'' means an industry and/or professional

organization or association which conducts research and develops and/or issues policies, criteria, principles, and standards related to the rail industry.

The term ''wide-nose locomotive'' means a locomotive used in revenue service which is not of narrow-nose or monocoque or semi-monocoque design.

Subpart D—Locomotive Crashworthiness Design Requirements

Section 229.201 Purpose and Scope

Paragraph (a) provides that the purpose of the proposed rule is to help protect locomotive cab occupants in the event of a collision with another locomotive, on-track equipment, or with any of several types of objects which may foul railroad trackage. Paragraph (b) provides that this subpart sets forth standards for the design of crashworthy locomotives. It is important to note that these requirements are not designed to protect all occupants in all collision situations; rather this rule calls for design improvements in areas which FRA believes will have the greatest effect on the reduction of cab crew injuries and fatalities associated with the most prevalent types of locomotive collisions.

Section 229.203 Applicability

Paragraph (a) proposes that the requirements of this subpart would apply to all locomotives manufactured or remanufactured on or after a date three years after publication of the final rule. The only locomotives exempt from these requirements are those specifically listed in paragraphs (b) and (c). FRA proposes using the locomotive build date to exempt the current locomotive fleet from requirements of this proposed rule. The entire current locomotive fleet would therefore not be subject to the requirements of this proposed rule, other than for the rebuilt and remanufactured requirements discussed below. FRA estimates that three years would be sufficient to allow manufacturers to re-engineer and re-tool in order to comply with these new standards.

This paragraph would further apply to remanufactured locomotives, as defined in § 229.5. FRA feels that the practice of ''decking'' a locomotive (stripping a locomotive to its underframe, or deck, and refurbishing it with new components) essentially creates a new locomotive. Since the useful life of a decked locomotive is practically the same as a newly built locomotive, FRA believes it should be subject to these new requirements. However, these new requirements are not intended to apply to locomotives undergoing periodic maintenance or a major overhaul not involving ''decking.'' Most large railroads perform a major overhaul after about 9–12 years, replacing or servicing many components, but not ''decking'' it. See also Major Issue (b) ''Application to new locomotives.''

Paragraph (b) would exclude from application of this rule passenger cab cars, or MU cars, and semi-permanently coupled power cars built for passenger service. These types of locomotives are subject to the requirements of part 238.

Paragraph (c) would exclude from application of most provisions of this rule locomotives used in designated service. This includes locomotives without occupant cabs and also locomotives referred to as ''slugs.'' On these locomotives the cab doors have been welded shut or otherwise secured to a similar extent so that crews cannot occupy the cab. The designated service classification is intended to mirror its application in FRA's Safety Glazing Standards at § 223.5. Locomotives used in designated service would still be subject to the fuel tank requirements proposed in § 229.217. FRA proposes this requirement because it has found that locomotive fuel tank ruptures place at risk the environment and all persons within the local area of the collision site. Since locomotives used in designated service may still be used as power in a consist, FRA feels that any fuel tank rupture on one of these locomotives would pose a safety risk at least equivalent to that from other road locomotives. Therefore, all new locomotives would be required to comply with this fuel tank requirement.

Section 229.205 General Requirements

Paragraph (a) of this section would require the design of all locomotives subject to this subpart, except monocoque or semi-monocoque design locomotives, to meet the performance criteria in Appendix D (hereafter referred to as ''wide-nose design locomotives''). All wide-nose design locomotives must comply with the requirements of Appendix D; however, the manufacturers or remanufacturers of these locomotives are given options as to how they demonstrate their compliance. Compliance with the performance criteria must be satisfied by complying with any one of the three options provided.

In paragraph (a) (1), FRA has provided a model design standard, AAR S–580–2004, which FRA has found to satisfy the proposed performance standard in Appendix D. This paragraph references that AAR standard's criteria for wide-nose locomotives, which has been analyzed in cooperation with the RSAC and found to satisfy the intent of the performance criteria. FRA does not require compliance with this standard; rather, it is being provided simply as an example of a design standard that FRA has already found to satisfy the performance requirements of Appendix D. Providing an available design standard aids the locomotive original equipment manufacturers (OEMs) by making it unnecessary for them to conduct elaborate analysis of new designs to establish compliance with the performance standards. Representatives of two OEMs that participated throughout development of this proposed rule in the RSAC embraced this approach and found it very cost effective. Paragraph (a)(2) allows compliance with FRA approved new crashworthiness design standards or changes to existing crashworthiness design standards. Finally, in paragraph (a)(3), FRA provides the option of meeting an FRA approved alternative crashworthiness design. The procedures for seeking such approval of new or revised standards or alternative designs are provided in §§ 229.207 and 229.209.

Paragraph (b) requires that monocoque and semi-monocoque design locomotives comply with the elements of the new AAR standard applicable to those types of locomotives. Typically used in passenger service, monocoque/semi-monocoque locomotives provide occupant protection in a different manner than wide-nose locomotives. Specifically, because much of the longitudinal strength of the locomotive is provided by the side panels of the unit (and potentially the roof) as well as the underframe, the front of a monocoque or semi-monocoque locomotive performs as an integral unit and resists collapse very effectively. By contrast, the wide-nose locomotive, which has relatively little strength above the underframe, is made safer by strengthening the short hood and allowing it absorb energy as it collapses when subjected to higher forces. Allowing a similar amount of crush in the case of the monocoque/semi-monocoque design would result in an almost complete loss of the cab volume. The RSAC Working Group reviewed the accident history of monocoque/semi-monocoque locomotives already in service that meet the new standard as built and found that they appear to be at least as safe as wide-nose locomotives enhanced to meet the new AAR standard and Appendix D of this proposed rule. Existing manufacturers of this type of locomotive have indicated that the new AAR standard is very reasonable and

should be effective in ensuring that locomotives of this type are built to protect cab occupants.

As the recommended text of this proposed rule was being circulated for final ballot within the RSAC Working Group, a supplier member of APTA, which builds locomotives for commuter railroads, noted the existence of the APTA standards, APTA SS–C & S–034, for monocoque/semi-monocoque passenger locomotives. This standard appears to be at least equivalent in every material respect to the new AAR standard. FRA solicits comments regarding whether the final rule should recognize this existing APTA standard as an additional option for compliance. A copy of this standard has been placed in the docket of this rulemaking.

Paragraph (c) requires that narrow-nose design locomotives be built to the requirements of the new AAR standard for that type of locomotive. The RSAC Working Group considered the need for a suitable standard to address locomotives used frequently to make up trains and pick up and set out cars. Presently, older narrow-nose locomotives are preferred for this type of work because they provide a better field of view for the engineer. FRA agreed that the safety of ground personnel, and avoidance of train accidents involving fouling equipment and misaligned switches, would be best served by allowing that narrow-nosed locomotives be built to a less stringent standard. Accordingly, protection of the cab under the new AAR standard will be significantly better than existing narrow-nose units (through strengthening of the short hood structure and the addition of corner post requirements for the cab itself), but not as robust as required for wide-nose locomotives.

It should be noted that the proposed rule (see §§ 229.207, 229.209) allows the qualification of monocoque/semi-monocoque and narrow-nose locomotives using alternative standards and approved designs. However, unlike the situation for all other locomotives, neither Appendix D nor any other portion of the rule spells out precisely how the case for safety equivalence would be made. This is in part because FRA research and RSAC Working Group attention focused on the principal opportunity for safety advances through the improvement of wide-nose design locomotives (by far the largest category of new locomotives built in the last decade and under order today). Further, as noted above, existing monocoque/semi-monocoque designs have performed admirably; and design choices for the narrow-nose are seriously limited due to functional requirements. However FRA welcomes suggestions for performance criteria that would provide guidance for establishing equivalence with the approved design standard.

It should be noted that the scope of AAR S–580–2004 varies slightly from that of this proposed rule. Specifically, in section ''1.0 Scope'' of AAR S–580–2004, ''road switcher/intermediate service locomotives'' are exempt from meeting the AAR design standard. However, ''road switcher/intermediate service locomotives'' are required to meet the performance standards of this proposed rule. Manufacturers and/or remanufacturers of ''road switcher/intermediate service locomotives'' may still utilize AAR S–580–2004 to satisfy the requirements of § 229.205.

Section 229.206 Design Requirements

This section would require all locomotives subject to this subpart to include anti-climbers, methods of emergency egress, and emergency interior lighting designed in compliance with the crashworthiness requirements contained in AAR S–580–2004, a copy of which has been placed in the docket of this proceeding.

AAR S–580–2004 requires that the cab end of a locomotive must incorporate an anticlimber of a specified width, depth, and design to resist an upward or downward vertical force of 100,000 pounds, applied over any 12 inches of the anticlimber, without exceeding the ultimate strength of the anticlimber or its connector. The Working Group understood, and FRA agrees, that the forces generated between two colliding locomotives are of sufficient magnitude that the anticlimber will most likely crush and absorb some energy. The most likely scenario where the anticlimber can prevent intrusion into the occupied cab area is in collisions at grade crossing where a highway vehicle struck by the locomotive may try to climb up but such motions and forces generated are resisted by the anticlimber.

AAR S–580–2004 requires that the locomotive cab allow for exit through at least one opening in any locomotive orientation. The Working Group faced the problem that research in this area is lacking. However, the problem is well-defined: when the locomotive lies on its side after a collision, the occupants may have trouble reaching a door that is not obstructed, especially if they are injured. The Working Group therefore made some general recommendations for the design of cabs to incorporate adequate means of emergency egress. FRA has adopted these recommendations. FRA envisions proposing more specific design requirements on this subject in future rulemakings once reliable research has been performed.

AAR S–580–2004 requires the placement of and specifies illumination levels for locomotive cab emergency lighting. These requirements are similar to those required for passenger equipment in § 238.115, except that the required duration for lighting levels in freight locomotive cabs is less to reflect the design distinction between the two types of equipment. Passenger equipment generally has use of an auxiliary power source, making it more convenient to provide ample power when needed. Most freight locomotives have only one power source and its reliability is important for powering the prime mover. Further, FRA sees locomotive crew members as being more familiar with the smaller layout of a freight locomotive cab and emergency lighting capabilities therein than the average passenger traveling in passenger equipment subject to part 238. FRA specifically invites comments on this issue.

AAR S–580–2004 provides general design requirements for the interior configuration of a locomotive cab. In order to minimize the chance of injury to occupants, protruding parts, sharp edges, and corners in the locomotive cab must be rounded, radiused, or padded. These requirements are similar to those covering passenger equipment in § 238.233(e)–(f).

AAR S–580–2004 provides design requirements for locomotive cab appurtenance (including cab seat) securement. The Working Group formulated these requirements based on manufacturer testing and their collective general experience with locomotive collisions. FRA expects that testing methods to determine compliance with this requirement be state of the art. Testing should demonstrate that the mountings, including cab seat mountings, meet the strength requirements without permanent deformation. Localized deformation may be acceptable for compliance purposes with this section.

The disparities in these cab seat securement requirements from those currently required by § 238.233(f)–(g) for passenger equipment are due solely to the difference in how compliance is measured. In § 238.233, seat mountings must withstand forces of 8.0 g longitudinal, 4.0 g lateral, and 4.0 g vertical without ultimate failure of the connection. This proposal requires that all appurtenances/mountings withstand forces of 3.0 g longitudinal, 1.5 g lateral,

and 2.0 g vertical without permanent deformation, as defined in § 229.5. The Working Group felt that, given current designs, all appurtenances and mountings which comply with § 238.233 requirements would most likely meet the proposed requirements and vice versa. FRA agrees.

Section 229.207 New Locomotive Crashworthiness Design Standards and Changes to Existing FRA-Approved Locomotive Crashworthiness Design Standards

This section proposes procedures to be followed when seeking FRA approval of new locomotive crashworthiness design standards. It also covers procedures for obtaining FRA approval of changes to existing standards which FRA has already approved. These procedures are similar to approval procedures currently used by FRA in other contexts. See, for example, § 238.21.

FRA envisions the possibility that other industry groups, such as passenger locomotive manufacturers, might desire a separate design standard from AAR S–580–2004. This section outlines the procedures to be used to obtain FRA approval for such a design standard. FRA recognizes that considerable expense could be required to validate a new design standard with respect to the performance criteria in Appendix D. Thus, FRA does not expect that submission of petitions for new locomotive crashworthiness design standards will be an ordinary occurrence.

However, FRA does foresee a need for flexibility with approved standards to enable industry standards bodies to suggest often highly technical changes to a previously-approved design standard without incurring delays inevitably invoked by the Federal administrative review process. This section would set two levels of FRA scrutiny, depending on the degree of change to the previously-approved standard. The lowest level of scrutiny is involved when non-substantive changes are involved. See paragraph (d) of this section. A higher level of scrutiny would be required when substantive changes are involved. However, since most of these changes are likely to be incremental in nature, FRA would only require evidence that the resulting standard still satisfies the performance criteria by showing an equivalent or better level of safety. See paragraph (c) of this section.

Paragraph (a) explains the purpose of this section. This section provides the procedures that must be followed by parties seeking approval of new crashworthiness design standards and changes to existing FRA-approved crashworthiness design standards. This paragraph also limits those who may seek approval of changes to existing FRA-approved crashworthiness design standards. Only a standards body which has adopted an FRA-approved design standard may request to change that standard. FRA has proposed this limitation in order to prevent parties who have no stake in a design standard from seeking to impose changes to it. A party seeking changes to a design standard that has not been approved by FRA should follow the procedures for approval of new design standards, paragraph (b), or the procedures for approval of alternative design standards provided in § 229.209.

Paragraph (b) specifies submission procedures for petitions for new design standards. Each petition must be submitted to the FRA Associate Administrator for Safety and be titled ''Petition for FRA Approval of a New Locomotive Crashworthiness Design Standard.'' Subparagraphs (b)(1) and (b)(2) require the petition to contain contact information for a representative of the petitioner and the proposed design standard in detail. Along with the proposed design standard, FRA needs to understand the intended type of use of the locomotive sought to be built by a petitioner. Subparagraph (b)(3) requires this information. Subparagraph (b)(4) requires the petition to contain data and analysis showing how the proposed design standard satisfies the performance requirements in Appendix D. Examples of the types of data and analysis required are provided in § 229.211(c)(1).

Paragraph (c) deals with substantive changes to an FRA-approved design standard. Each petition must be submitted to the FRA Associate Administrator for Safety and be titled ''Petition for FRA Approval of Changes to a Locomotive Crashworthiness Design Standard.'' Subparagraphs (c)(1) and (c)(2) require the petition to contain contact information for a representative of the petitioner and the proposed change in detail. Along with the proposed change, FRA needs to understand the intended type of use of the locomotive sought to be built by a petitioner. Subparagraph (c)(3) requires this information. These substantive changes, defined as all other changes not covered by paragraph (d) (non-substantive changes), would likely result in a change to the design standard which might call into question its compliance with the performance criteria of Appendix D or equivalence to the applicable technical standard. For these types of changes, FRA requires, in subparagraph (c)(4), validation that the resulting standard still satisfies the requirements stated in § 229.205. Types of validation which FRA will consider appropriate are described in § 229.211(c)(1).

Paragraph (d) specifies procedures for obtaining FRA approval of non-substantive changes to existing FRA-approved design standards. Each petition must be submitted to the FRA Associate Administrator for Safety and be titled ''Petition for FRA Approval of Non-substantive Changes to a Locomotive Crashworthiness Design Standard.'' Subparagraphs (d)(1) and (d)(2) require the petition to contain contact information for a representative of the petitioner and the proposed change in detail. FRA believes that these non-substantive changes will usually be editorial, procedural, or interpretive in nature, requiring a relatively low level of FRA scrutiny. FRA understands such changes could be necessary in order for standards bodies to effectively carry out their duties. Subparagraph (d)(3) requires a detailed explanation of how the proposed change is non-substantive. FRA will make an initial determination whether the proposed change is non-substantive. If FRA determines that the proposed change is in fact substantive, FRA will process the petition as a substantive proposed change in accordance with paragraph (c) of this section. If FRA determines that the proposed change is non-substantive, FRA will process the petition in accordance with § 229.211(c).

Section 229.209 Alternative Locomotive Crashworthiness Designs

This section proposes procedures to be followed when seeking FRA approval of an alternative locomotive crashworthiness design. These procedures are similar to approval procedures currently used by FRA in other contexts. See, for example, § 238.21.

FRA envisions the possibility that a railroad or locomotive manufacturer will desire to explore innovative locomotive designs which do not satisfy AAR S–580–2004 or any other current FRA-approved design standard. In such case, FRA has provided a procedure in this section whereby it would assess the design directly against the performance criteria of Appendix D. This section outlines the procedures to be used to obtain FRA approval for such a design. FRA recognizes that considerable expense could be required to validate an alternative design with respect to the performance criteria in Appendix D. However, the state of the art of

validation techniques is evolving, and FRA does not find it far-fetched that the expenses associated with validation processes today will decrease. Overall, FRA expects that submission of petitions for alternative locomotive crashworthiness designs will be a rare occurrence.

FRA also understands that the market for locomotives is very much customer-driven and that railroads of all sizes require a great degree of operational flexibility. Thus, FRA assumes that a locomotive capable of performing road-haul service will at some point be called upon to perform such service. Since the performance criteria are objectives designed for road-haul service locomotives, FRA contemplates approval of design standards and alternative designs not meeting the performance criteria or applicable technical standard only under a waiver proceeding (see part 211, subpart c). In such a proceeding, FRA would expect the petitioner to demonstrate that (1) service conditions will not approximate assumptions used for performance criteria (*i.e*, locomotive cannot possibly be used for road-haul service), and (2) adequate design restrictions on use will reinforce those assumptions. For example, appropriate restrictions on a locomotive's horsepower guarantee that it cannot effectively be used as a road-haul locomotive. However, FRA is willing to consider the option of building such an approval mechanism into this rule, and FRA welcomes comments regarding how that might be done.

Paragraph (a) explains the purpose of this section. This section contains procedures which govern locomotive designs which are truly innovative and unconventional. Manufacturers or railroads will most likely use the procedures in this section to gain FRA approval, rather than attempt to fit within an already-established design standard or alter an existing design standard. FRA feels that builders/railroads should not necessarily be forced to work with existing standards, should they be willing to have validated the safety features of their design against the performance criteria of Appendix D (or equivalence to the applicable technical standard).

Paragraph (b) specifies submission procedures for petitions for alternative locomotive crashworthiness designs. Each petition must be submitted to the FRA Associate Administrator for Safety and be titled ''Petition for FRA Approval of Alternative Locomotive Crashworthiness Design.'' Subparagraphs (b)(1) and (b)(2) require the petition to contain contact information for a representative of the petitioner and the proposed design in detail. Subparagraph (b)(3) requires that, along with the proposed alternative design, the petitioner also submit the type of service to which the locomotive will be put. FRA needs to understand the intended type of use to appreciate the probable collision risks to which it will be subjected. Subparagraph (b)(4) requires the petition to contain data and analysis showing how the proposed design standard satisfies the performance requirements in Appendix D or is equivalent in protection of cab occupants (in the case of narrow-nose or monocoque/semi-monocoque designs) to the applicable technical standard. Examples of the types of data and analysis required are provided in § 229.211(c)(1).

Section 229.211 Processing of Petitions

This section outlines the procedures that FRA will follow in reaching a decision on petitions submitted under § 229.207(b) (petitions for approval of new design standards); § 229.207(c) (petitions for approval of substantive changes to an approved design standard); and § 229.209(b) (petitions for approval of alternative design standards).

Paragraph (a) proposes that FRA publish a notice in the **Federal Register** for each petition received seeking approval of new or alternative crashworthiness designs or substantive changes to existing crashworthiness designs. This is to notify interested parties of the pending FRA action.

Paragraph (b) provides procedures for interested parties to comment on any petitions submitted to FRA pursuant to this section. FRA is aware that changes in design of conventional locomotives might impact the safety of locomotive crews and others railroad employees. Therefore, this paragraph provides such parties the opportunity to comment. Further, FRA welcomes comments in electronic form as well as in written form. If FRA determines that additional information is required to appropriately consider the petition, FRA will conduct a hearing on the petition. Notice of such hearing will provided in the **Federal Register**. Procedures for the conduct of such hearing will be in accord with § 211.25.

Paragraph (c) addresses FRA action on petitions submitted for FRA approval pursuant to §§ 229.207(b), 229.207(c), and 229.209.

Subparagraph (c)(1) describes the types of validation techniques required for FRA approval of design standards, changes to design standards, and alternative locomotive crashworthiness designs. FRA proposes several validation methods which it considers satisfactory. FRA is aware of the basic types of modeling and testing of locomotive design standards, as well as the relative costs associated with these processes. Any validation technique considered to be state-of-the-art, or generally acceptable within the scientific community, should suffice for purposes of this subparagraph, whether it be computer software modeling or full-scale crash testing of locomotives. FRA does realize that technological and market changes may make modeling and/or testing methods more or less cost-effective, and would thus require validation to such an extent as reasonably practicable. Finally, in order to facilitate and expedite the approval process, FRA would encourage effective peer review of submitted standards prior to submission. FRA is not aware how this requirement would affect small entities, but invites comments addressing this issue.

For locomotives subject to paragraph (a) of § 229.205, where solely incremental changes are being introduced to a previously approved design standard, FRA would not require proof of satisfaction of all Appendix D performance requirements. In this case, FRA would require submission of validation material for only those areas affected by the changes. FRA feels that to require full satisfaction of the Appendix D performance criteria would be too great a burden and would simply result in the requirement that subsequent petitioners ''reinvent the wheel'' in areas where it has already been invented.

In the event that a truly innovative alternative design is submitted for FRA approval (*i.e.*, not close to satisfying a previously-approved design standard), FRA would require full validation of its crashworthiness per Appendix D. However, if a proposed alternative design varies only slightly from a previously-approved design standard, FRA would require only validation of those features which are different, in lieu of proof of satisfaction of all Appendix D performance criteria. Designers ought to be able to take advantage of prior safety validation efforts on conventional designs (reflected in FRA-approved design standards). Thus, when an alternative locomotive design approaches that of a previously-approved design standard, FRA would prefer that validation efforts be focused on areas where the alternative design takes a different approach from the approved design standard. FRA envisions validation of such alternative designs to be

demonstrated through competent engineering analysis which compares the new alternative design to that of an approved design or design standard and demonstrates an equal or better performance. As detailed in Appendix D, the primary performance measure to be evaluated is crush distance. Crush distance restrictions are utilized in order to determine compliance with the goal of preventing intrusion into the occupied cab space.

In subparagraphs (c)(2) and (c)(3), FRA proposes a 90-day goal for disposition of a petition under this section, due to the technical review which may be required. It should be noted that 90 days is only a target goal. FRA will take more than 90 days to reach a decision if warranted. FRA will grant a petition only if it finds that the proposed design standard or change to an existing design standard satisfies the performance standards specified in Appendix D or provides a level of safety equivalent to the recognized technical standard (in the case of narrow-nose or monocoque/semi-monocoque designs). FRA will deny a petition if it determines that the proposed design standard or change to an existing design standard does not satisfy the performance standards specified in Appendix D or is not equivalent in safety (as applicable). FRA will also deny a petition if it determines that the petition does not meet the procedural requirements of §§ 229.207 and 229.209.

Subparagraph (c)(3) also contains a provision allowing petitions which have been denied to be re-opened for cause. For example, FRA might re-open consideration of a petition for an alternative locomotive crashworthiness design if a specific locomotive collision risk had been significantly affected by factors (*i.e.*, elimination of highway-rail at-grade crossings or adjacent parallel track) not present during the initial consideration of the petition.

Finally, subparagraph (c)(4) states that FRA will send copies of its written decision to all parties to the petition and will also place its decision in the docket for that proceeding. FRA may also post its decision on its Web site, *http://www.fra.dot.gov.*

Section 229.213 Locomotive Manufacturing Information

Paragraph (a) of this section requires each railroad operating a railroad subject to this subpart to retain the date upon which the locomotive was manufactured or remanufactured, the name of the manufacturer or remanufacturer, and the design specifications to which the locomotive was manufactured or remanufactured.

Paragraph (b) provides that the information required by paragraph (a) must be located permanently in the locomotive cab (*i.e.*, a plaque or plate affixed to the inside of the cab) or provided within two business days upon request of FRA or an FRA certified state inspector. This requirement would provide a means by which it can be rapidly determined whether a locomotive is subject to the requirements of this rule.

A related issue of locomotive identification of safety features is communication of these features to crews. The benefits of this rule may not be fully realized if the occupants of the locomotive are not made aware of the fact that the locomotive has crashworthiness design features and of the specific safety features incorporated in the locomotive design. Consequently, FRA feels it is imperative that this information be communicated to locomotive cab occupants. Commenters are asked to specifically address whether any particular method of identification ought be used so as to promote uniformity, or whether carriers should be required to simply identify the locomotive with the appropriate information by any reasonable means, such as training of crews.

Section 229.215 Retention and Inspection of Designs

Paragraph (a) proposes a requirement that locomotive manufacturers and remanufacturers maintain crashworthiness designs for those locomotives subject to subpart D. This requirement is designed to ensure that compliance with the requirements of this subpart can be readily determined in the event that a locomotive's compliance with its design or performance standard is called into question. It is also meant to ensure that the relevant designs are available in the event a locomotive subject to this subpart is modified or repaired. FRA believes these records should be available so that any repairs or modifications made to the locomotives do not compromise the crashworthiness features to such an extent that they are no longer in compliance with the proposed rule.

The requirement that these records be maintained for the life of the locomotive is limited to a twenty-year term, which approximates the normal period an initial owner would typically retain control of the unit. The twenty-year term runs from the date that a locomotive is manufactured. In the case of a remanufactured locomotive, the twenty-year term begins anew on its date of remanufacture. The manufacture and remanufacture date is determined by the date the locomotive is shipped by the manufacturer or remanufacturer to the customer.

Paragraph (b) requires all records of repairs or modifications to crashworthiness features of a locomotive subject to this subpart be kept by the owner or lessee of the locomotive. These records must also be maintained for the life cycle of the locomotive, up to a period of 20 years from the date these repairs/modifications are made. Under this paragraph, transfer of ownership of a locomotive does not relieve the transferor of responsibility to maintain the repair/modification records. The railroad would be relieved of its responsibility to maintain the repair/modification records after the earlier of a 20-year period or when the locomotive is permanently retired from service. FRA invites comments from small railroads regarding this issue, since FRA is aware that many smaller railroads obtain locomotives from larger railroads, rather than purchasing new from the manufacturer.

Paragraph (c) outlines the basic procedure FRA proposes for inspection of locomotive designs. FRA, or FRA-certified state inspectors, will request to view designs for specified locomotives, and the railroad will comply by making the designs available for inspection and photocopying by FRA, or FRA-certified state inspectors, within 7 days. FRA feels this provision is essential to its ability to ensure compliance with paragraphs (a) and (b) of this section.

FRA understands that railroads may not perform the actual repairs/modifications or possess the actual designs themselves, but rather would have them stored by a third party such as the AAR, the leasing company, or even the manufacturer. Paragraph (d) allows the records to be maintained by third parties; however, the manufacturers, remanufacturers, owners, and lessees of locomotives subject to this subpart will remain responsible for compliance with this section.

Section 229.217 Fuel Tank

Paragraph (a) proposes that locomotives equipped with external fuel tanks meet the October 1, 2001 version of AAR Standard S–5506 requirement for external fuel tanks, with the exception of Section 4.4 as noted below. That version of AAR S–5506 has been placed in the docket of this proceeding. These requirements were formerly classified as an AAR Recommended Practice, RP–506. RP–506 became effective on June 1, 1995. Only

preliminary observations of its effect have been made. Data from FRA accident records has shown that RP–506 has had a positive effect on the performance of fuel tanks in locomotive collisions and derailments. The NTSB in NTSB Report # PB92–917009 on fuel tank integrity has accepted RP–506 as a means to mitigate fuel tank breaches (a copy of the report has been placed in the docket of this proceeding). On October 1, 2001, AAR S–5506 was adopted as an AAR standard.

Section 238.223(a) requires that passenger locomotives with external fuel tanks comply with a similar version of S–5506. As FRA decided in the Passenger Equipment Safety Standards final rule (64 FR 25651–25652 (May 12, 1999)), to omit one of the provisions of RP–506 (now S–5506) since it does not appear to be a safety standard, but rather a fueling requirement; this provision is intentionally omitted here as well. This provision, Section 4.4 (''Fueling'') of S–5506, states ''[i]nternal structures of [the] tank must not impede the flow of fuel through the tank while fueling at a rate of 300 gpm [gallons per minute].'' FRA does not consider fueling rates to be a safety concern, but rather an operational consideration.

Paragraph (b) requires locomotives equipped with internal fuel tanks to meet the requirements of § 238.223, which governs design of fuel tanks on passenger locomotives. Although FRA contemplates most locomotives equipped with internal fuel tanks will be used in passenger service, FRA has classified locomotives by design rather than intended service, in order to allow maximum operational flexibility by the carriers.

Appendix D—Performance Criteria for Structural Design

This appendix proposes performance criteria for the structural design of locomotives (other than monocoque/semi-monocoque design or narrow-nose design), comprised basically of the front end structure inclusive of a short hood and collision posts with a cab structure. Demonstration that these criteria have been satisfied may be accomplished through any of the methods described in § 229.211. In conventional locomotive design, these two areas cover basically all of the major structural support separating cab occupants from the impacting objects in a locomotive collision. The criteria, which were recommended by RSAC and adopted by FRA, were developed by the Engineering Task Force with support from the Volpe Center. Each lettered paragraph of this appendix covers a different collision scenario, indicating the objective of the scenario, the proxy, or contemplated colliding object, the conditions of the impact, and the allowable results. The performance standard being adopted will allow for the maximum level of flexibility in future locomotive design.

The proposed performance criteria for the locomotive crashworthiness design features guarantee a minimum level of safety for locomotive cab occupants involved in a collision. The logic behind the performance criteria is that locomotives designed to meet the performance criteria specified in this proposed rule will be able to preserve survivable space in the locomotive cab in a collision under similar conditions as specified in this appendix, as well as those involving lower closing speeds. For instance, a locomotive traveling 30 miles per hour colliding with a heavy highway vehicle (weighing no more than 65,000 pounds, or 32½ tons) at a highway-rail grade crossing should maintain sufficient survivable space for its occupants if it is built to the standards required by this proposed rule, even if it effectively overrides the underframe of the locomotive. However, since actual collision conditions may vary greatly, these figures should only be used as guidelines and not relied upon as precise cutoff levels of locomotive crashworthiness. Whether there will be sufficient survivable space inside the locomotive cab depends on many unpredictable factors as well.

With these considerations, FRA desires to allow for maximum flexibility in locomotive design by proposing performance criteria to protect cab occupants where possible. The criteria for the front end structure of the locomotive are based on specified collision scenarios or performance requirements.

Paragraph (a) proposes performance criteria for design of the front end structure where, in conventional locomotive design, collision posts would normally be found. This collision scenario is intended to simulate a collision between a locomotive and a heavy highway vehicle at a highway-rail grade crossing. The proxy object in this scenario is designed to represent the heavy highway vehicle. The intended simulated impact conditions are specified for the closing speed, point of impact, and maximum allowable crush distance along the longitudinal axis of the locomotive. The improvements in crashworthiness required under this scenario will also have the effect of reducing intrusion into the cab during collisions between locomotives and other rail rolling stock.

Paragraph (b) proposes performance criteria for design of the front end structure, where, in conventional locomotive design, the short hood is normally found. The objective of this scenario is to simulate an oblique collision with an intermodal container offset from a freight car on an adjacent parallel track. This collision scenario is based on the collision conditions, other than speed, found in the May 16, 1994, Selma, NC, collision involving an overhanging intermodal trailer on the northbound CSXT 176 freight train and the lead locomotive on the southbound Amtrak passenger train 87. The closing speed between these two trains was estimated at about 110 mph. The proxy object in this scenario represents the intermodal trailer, and the intended simulated impact conditions are specified for the closing speed (30 mph), point of impact, and maximum allowable crush distance along the longitudinal axis of the locomotive.

In the course of the discussions held, the Working Group also performed research into strengthening the window frame structure of wide-nose locomotives. The window frame structure for typical wide-nose locomotives currently in use in North America is made up of two corner posts and a central post all of which are tied into the roof. After considerable discussion at the last meeting, the Working Group decided against recommending design load requirements as well as the performance requirements for the window frame structure. The key argument raised by members of the Working Group was that a majority of the cost, approximately one-half of the total cost for all modifications, would be incurred by the need for extensive engineering re-design and fabrication re-tooling. The benefits associated with the modifications to the window frame structure were small based upon the accident review. FRA agrees with the Working Group's analysis and has decided to postpone promulgation of requirements for the window frame structure for wide-nose locomotives pending further detailed study.

AAR S–580–2004, Locomotive Crashworthiness Requirements

FRA has approved AAR S–580–2004 as an acceptable design standard, for purposes of satisfying the performance criteria of Appendix D.

AAR S–580–2004 contains design requirements for locomotive front end structure design, as well as other miscellaneous design requirements, some of which are Federal requirements as well. Structural requirements listed

in AAR S–580–2004 are divided into three different subsections: one for locomotives of traditional wide-nose designs, one for locomotives of narrow-nose design, and one for those of semi-monocoque/monocoque design. There are separate requirements for these general classifications of designs in order to account for the different service conditions they typically operate under and the significantly different crush characteristics of the designs. For example, FRA proposes less stringent front end structure requirements for narrow-nose locomotives because they are used mainly in switching service. During switching operations, visibility to and from the cab is essential in preventing injuries and fatalities. FRA feels that requirements for a significantly enhanced front end structure on narrow-nose locomotives would be detrimental to visibility to and from the locomotive cab. Manufacturers have indicated that further strengthening would require major redesign, with structural members taking up more physical space in the cab. As a result, FRA has balanced these safety risks by increasing the strength requirements for the front end of narrow-nose locomotives, but only to the extent that the functionality of these locomotives would not be compromised.

Requirements in AAR S–580–2004 for wide-nose locomotive front end structure encompass three main components: anti-climbers, collision posts, and short hood structure.

Collision posts: the collision posts are the primary crash-energy absorbing features on a locomotive involved in an in-line train-to-train collision or impact with a large motor vehicle. S–580, as adopted in 1989, provided for a ''500,000/200,000 pound'' collision post. Through its efforts, the Working Group found that strengthened collision posts would provide additional collision protection to the cab occupants. Specifically, the group found that a collision post which can handle an application of 750,000 pounds at the point of attachment and 500,000 pounds of force applied at a point 30 inches above the top of the underframe could withstand the same damage in collisions occurring at a closing speed 2 mph higher than the baseline S–580 design. A collision post which can handle 800,000 pounds at the same point behaves similar in collisions occurring at closing speeds 8 mph faster than the baseline S–580 design. However, increasing the strength of the collision posts to a point beyond that of the strength of the underframe would serve no useful purpose, because the underframe would fail before the collision posts.[6] The Working Group found it more desirable to have the collision posts fail before the underframe does, thereby reducing the possibility of override due to either the formation of a ramp caused by underframe deformation or catapulting. The Working Group ultimately recommended the ''750,000/500,000 pound'' collision post as a minimum standard. FRA agrees and the proposed rule reflects this recommendation.

AAR S–580–2004 also requires collision posts to extend to a minimum of 24 inches above the finished floor and be located forward of the position of any seated crew member. The position of the collision posts and their required height were developed to provide the crew members a survivable area in the event of a frontal collision with an object above the underframe of the locomotive. The Working Group discussed the advantages of such a survivable volume in that it may help encourage crew members to remain in the cab rather than jumping, as they often do in the face of a collision. This would prevent unnecessary injuries, and even fatalities, resulting from jumping in these situations. FRA agrees with the Working Group's recommendation and the proposed rule reflects this recommendation.

Short Hood Structure: The short hood structure is constructed primarily from steel sheets, and spans the width of the locomotive from the finished floor up to the window frame. It provides additional protection to occupants. Since it extends the width of the locomotive (unlike collision posts), it is the primary means of protection in the event the locomotive collides with an object at an angle or a load is applied longitudinally outside of the collision posts, such as in a collision with an offset trailer on a flatbed car.

A short hood structure meeting the performance requirements in Appendix D should provide adequate protection to cab occupants in a 30-mile per hour collision with an offset trailer on a flatcar on an adjacent track. Such a structure should be able to withstand a load of 400,000 pounds. It is also intended to crush in a collision, absorbing some energy. Thus, the model design requirements of AAR S–580–2004 provide guidelines for design of a short hood structure having such strength characteristics.

AAR S–580–2004 also covers proposed front end structural requirements for semi-monocoque locomotives in section 8.0 ''Monocoque or Semi-monocoque Locomotive Designs.'' This design standard was adapted from the performance requirements of Appendix D and through variation of the design standard for wide-nose locomotives. Since locomotives of monocoque or semi-monocoque design are more efficient in managing crash energy due to the load-bearing capabilities of the wall and roof structures, they may be designed using a slightly weaker underframe than the conventional wide-nose locomotives. This type of design better distributes loads applied to its front end by effectively transferring them to the walls and roof, as well as the underframe. This design allows it to utilize a less-resistant underframe in order to provide the same degree of protection. Limited data from the performance of semi-monocoque locomotives involved in locomotive collisions has corroborated this theory.

Section 7.0 ''Narrow-Nose Locomotives'' covers design requirements for the front-end structure of narrow-nose locomotives. Strength requirements for the front end structure of narrow-nose locomotives are less stringent than those for wide-nose locomotives. The narrow nose on these locomotives simply does not allow for equivalent protection at the widest part of the locomotive in front of the cab. Although this makes the wide-nose locomotive more desirable for use in road freight service, narrow-nose locomotives have become useful in intermediate-haul and local switching operations because they offer cab occupants a much greater range of vision from the cab. During these types of movements, unobstructed vision is very important because railroad personnel are often standing on or near the right of way directing the movement. FRA believes that provision must be made for use of the narrow-nose locomotive design to maintain an appropriate level of safety during intermediate-haul and local switching operations. FRA proposes a design standard for narrow-nose locomotives which maximizes the strength of the front corners under existing technology and materials without sacrificing occupant visibility from the cab.

The most significant safety risk with respect to narrow-nose locomotives is their regular use in road-haul service. Since the Class I railroads have followed a trend of purchasing more and more wide-nose locomotives to be used in road freight service, the use of narrow-nose locomotives in a manner inconsistent with their intended service

[6] ADL presentation at July 14–15, 1998, Working Group meeting. This presentation has been placed in the docket of this rulemaking.

(*i.e.*, over-utilization in road freight service) is unlikely. Through the course of its deliberations, the Working Group had discussed possibilities of (1) Restricting service of narrow-nose locomotives to intermediate- and local-haul and transfer train service, (2) restricting them to a maximum speed limit, and (3) restricting design of these locomotives to a maximum horsepower limit. In its final recommendation, the Working Group decided not to recommend any service or design restrictions. FRA has no reason to believe that the trend of purchasing wide-nose locomotives will not continue, and thus does not propose any service or design restrictions on narrow-nose locomotives in this rule. FRA invites public comment on whether service or design restrictions should be imposed on narrow-nose locomotives; and, commenters supporting restrictions should specify the restrictions they support.

It should be noted that the Working Group abandoned discussions over a fourth design standard, that of the yard switcher locomotive. Such a locomotive would be designed for use solely in the assembling and disassembling of trains, and could be designed to the standard of S–580. FRA invites comments addressing whether such a design or performance standard ought to be included in this proposed rule rather than require designs for this type of locomotive to be submitted to FRA through the approval process outlined in § 229.209 (in which case it would have to be evaluated against the performance criteria in Appendix D). If so, what should such a standard contain; and how should compliance with the standard be established? Commenters supporting inclusion of a design standard in the rule are requested to specify the design standards they support.

AAR Standard S–5506, Performance Requirements for Diesel Electric Locomotive Fuel Tanks (October 1, 2001)

This standard contains the requirements recommended by the Working Group and adopted by FRA for the design of external fuel tanks, with the exception of Section 4.4 as noted above. The full text of AAR–S–5506 has been placed in the docket of this proceeding. This AAR standard was adopted from an earlier recommended practice, RP–506, which was first adopted in 1995.

Amendments to 49 CFR Part 238

In contrast to requirements for passenger-occupied cab control cars and multiple unit (MU) locomotives, there are no current Federal regulations governing conventional locomotive crashworthiness design. The proposed revisions to part 229 would revise subpart D to address locomotive crashworthiness design for all locomotives covered by this rule while moving § 229.141 to part 238 as § 238.224.

Subpart A—General

Section 238.5 Definitions

The term ''fuel tank, external'' revises the current part 238 definition by replacing the word ''volume'' with the word ''vessel.'' FRA believes that this is a more accurate and grammatically correct definition.

The term ''fuel tank, internal'' revises the current part 238 definition by replacing the word ''volume'' with the word ''vessel.'' FRA believes that this is a more accurate and grammatically correct definition.

Section 238.224 MU Locomotive Body Structure

This section is moved from part 229 to part 238 and is redesignated from § 229.141 to § 238.224. This section is being relocated to part 238 because MU locomotives are normally associated with passenger trains.

Regulatory Impact

Privacy Act

Anyone is able to search the electronic form of all comments received into any of FRA's dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (volume 65, number 70; pages 19477–78), or you may visit *http://dms.dot.gov.*

Executive Order 12866 and DOT Regulatory Policies and Procedures

OMB has determined that this proposed rule is ''significant—other'' under Executive Order 12866. FRA has prepared and placed in the docket a regulatory analysis addressing the economic impact of this proposed rule.

As part of the regulatory analysis FRA has assessed quantitative measurements of cost and benefit streams expected from the adoption of this proposed rule. For the twenty-year period the estimated quantified costs total $81.6 million, and have a Present Value (PV) of $43.9 million. For this period the estimated quantified benefits total $125.9 million, which have a PV of $52.4 million. Over a twenty-year period, the Net Present Value (NPV) of this proposal is a positive $8.5 million.

The major costs anticipated from adopting this proposed rule include: redesign costs for locomotive models; and the marginal cost increases for labor and supplies needed for the more crashworthy locomotives.

The major benefits anticipated from implementing this final rule include: a reduction of the damages on locomotives when they are involved in collisions; and a reduction in the severity of casualties incurred in locomotive collisions. In addition there should be a reduction in the number of lost work days by locomotive cab employees.

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 Small Entity Impact Assessment and Evaluation which assesses the necessary and pertinent small entity impacts.

Executive Order No. 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' requires federal agencies, among other things, to notify the Chief Counsel for Advocacy of the U.S. Small Business Administration (SBA) of any of its draft rules that will have a significant economic impact on a substantial number of small entities. The Executive Order also requires federal agencies to consider any comments provided by the SBA and to include in the preamble to the rule the agency's response to any written comments by the SBA, unless the agency head certifies that the inclusion of such material would not serve the public interest. 67 FR 53461 (Aug. 16, 2002).

The SBA stipulates in its ''Size Standards'' that the largest a railroad business firm that is ''for-profit'' may be, and still be classified as a ''small entity'' is 1,500 employees for ''Line-Haul Operating'' Railroads, and 500 employees for ''Switching and Terminal Establishments.'' ''Small entity,'' is defined in 5 U.S.C. 601 as a small business concern that is independently owned and operated, and is not dominant in its field of operation. SBA's ''size standards'' may be altered by Federal agencies on consultation with SBA and in conjunction with public comment. Pursuant to that authority, FRA has published a final policy which formally establishes ''small entities'' as being railroads which meet the line haulage revenue requirements of a Class III railroad. Currently, the revenue

requirements are $20 million or less in annual operating revenue. The $20 million limit is based on the Surface Transportation Board's (STB's) threshold of a Class III railroad carrier, which is adjusted by applying the railroad revenue deflator adjustment (49 CFR part 1201). The same dollar limit on revenues is established to determine whether a railroad shipper or contractor is a small entity.

For this proposed rulemaking there are over 410 railroads which could potentially be affected. However, only railroads which purchase new or original equipment will be impacted, and FRA is not aware of any small railroads that purchase new locomotives. Hence, FRA does not expect this proposed regulation to impact any small railroads.

The impacts from this proposed regulation are primarily a result of increased cost to produce more crashworthy locomotives. These costs include re-design and engineering costs for the new locomotive designs/models, and for the marginal costs of the incremental crashworthiness improvements. All of these impacts or costs are passed on to customers or purchasers of new locomotives. Again, since no small railroads purchase new locomotives these impacts are not anticipated to impact any small entities.

FRA's Small Entity Impact Assessment and Evaluation concludes that this proposed rule would not have an economic impact on any small entities. Thus, the FRA certifies that this proposed rule is not expected to have a ''significant'' economic impact on a ''substantial'' number of small entities. In order to determine the significance of the economic impact for the final rule's Regulatory Flexibility Act requirements, FRA invites comments from all interested parties concerning the potential economic impact on small entities caused by this proposed rule. The Agency will consider the comments and data it receives—or lack of comments and data—in making a decision on the small entity impact for the final rule.

Paperwork Reduction Act

The information collection requirements in this proposed 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—49 CFR	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
229.207A—Petitions For FRA Approval of New Locomotive Crashworthiness Design Standards.	685 Railroads/4 Locomotive Manufacturers.	2 petitions	1,000	2,000	$241,200
—Subsequent Years	685 Railroads/4 Locomotive Manufacturers.	1 petition	1,000	1,000	120,600
229.207B—Petitions For Substantive Changes to an FRA-Approved Locomotive Crashworthiness Design Standard.	685 Railroads/4 Locomotive Manufacturers.	1 petition	1,000	1,000	120,600
229.207C—Petitions For Non-Substantive Changes to an FRA-Approved Locomotive Crashworthiness Design Standard.	685 Railroads/4 Locomotive Manufacturers.	2 petitions	100	200	16,200
229.209—Petitions For FRA Approval of Alternative Locomotive Crashworthiness Designs.	685 Railroads/4 Locomotive Manufacturers.	1 petition	2,500	2,500	308,100
229.211A—Processing of Petitions—Comment.	4 Locomotive Manufacturers/ Railroad Association/Labor Organizations/Public.	10 comments	16	160	4,640
229.211B—Additional Information Concerning Petitions.	4 Locomotive Manufacturers/ Railroad Association/Labor Organizations/Public.	1 hearing	80	80	2,320
229.213—Locomotive Manufacturing Information.	685 Railroads	700 records	*6	70	2,590
229.215A—Retention of Records—Original Design.	4 Locomotive Manufact.	28 records	1	28	1,036
229.215B—Retention of Records—Repair and Modifications.	685 Railroads/Locomotive Lessees.	140 records	1	140	5,180

* Minutes

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), FRA solicits comments concerning: whether these information collection requirements are necessary for the proper performance of the functions 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 Mr. Robert Brogan, Information Clearance Officer, 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. Comments may also be submitted via e-mail to Mr. Brogan at the following address: *robert.brogan@fra.dot.gov.*

OMB is required to make a decision concerning the collection of information requirements contained in this proposed rule between 30 and 60 days after publication of this document in the **Federal Register**. Therefore, a comment to OMB is best assured of having its 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**.

Environmental Impact

FRA has evaluated this proposed rule in accordance with the agency's ''Procedures for Considering Environmental Impacts'' as required by the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), and related statutes and directives. The agency has determined that the proposed regulation would not have a significant impact on the human or natural environment and is categorically excluded from detailed environmental review pursuant to section 4(c)(20) of FRA's Procedures. Neither an environmental assessment or an environmental impact statement is required in this instance. The agency's review has confirmed the applicability of the categorical exclusion to this proposed regulation and the conclusion that the proposed rule would not, if implemented, have a significant environmental impact.

Federalism Implications

FRA has analyzed this proposed rule in accordance with the principles and criteria contained in Executive Order 13132, issued on August 4, 1999, which directs Federal agencies to exercise great care in establishing policies that have federalism implications. *See* 64 FR 43255. This proposed rule will not have a substantial effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among various levels of government. This proposed rule will not have federalism implications that impose any direct compliance costs on State and local governments.

FRA notes that the RSAC, which endorsed and recommended this proposed rule to FRA, has as permanent members two organizations representing State and local interests: The American Association of State Highway and Transportation Officials (AASHTO) and the Association of State Rail Safety Managers (ASRSM). Both of these State organizations concurred with the RSAC recommendation endorsing this proposed rule. The RSAC regularly provides recommendations to the FRA Administrator for solutions to regulatory issues that reflect significant input from its State members. To date, FRA has received no indication of concerns about the Federalism implications of this rulemaking from these representatives or of any other representatives of State government. Consequently, FRA concludes that this proposed rule has no federalism implications, other than the preemption of state laws covering the subject matter of this proposed rule, which occurs by operation of law under 49 U.S.C. 20106 whenever FRA issues a rule or order.

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).'' Sec. 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 $120,700,000 or more 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 proposed rules issued today do not include any mandates which will result in the expenditure, in the aggregate, of $120,700,000 or more in any one year, and thus preparation of a statement is not required.

Request for Public Comments

FRA proposes to amend part 229 of title 49, Code of Federal Regulations, as set forth below. FRA solicits comments on all aspects of the proposed rule whether through written submissions, participation in a public hearing if one is held, or both. FRA may make changes in the final rule based on comments received in response to this proposed rule.

List of Subjects

49 CFR Part 229

Transportation, Railroad safety, Locomotives.

49 CFR Part 238

Transportation, Railroad safety, Passenger equipment.

The Proposed Rule

In consideration of the foregoing, FRA proposes to amend parts 229 and 238 of chapter II, subtitle B of title 49, Code of Federal Regulations, as follows:

PART 229—[AMENDED]

1. The authority citation for part 229 continues to read as follows:

Authority: 49 U.S.C. 20102–20103, 20107, 20133, 20137–20138, 20143, 20701–20703, 21301–21302, 21304; 28 U.S.C. note; and 49 CFR 1.49(c), (m).

2. Amend § 229.5 by removing paragraph (l), removing the paragraph designations from the remaining paragraphs, placing the existing definiton of ''electronic air brake'' in alphabetical order, and adding in alphabetical order the following definitions to read as follows:

§ 229.5 Definitions.

As used in this part—

AAR means the Association of American Railroads.

Anti-climbers means the parts at the ends of adjoining rail vehicles in a train that are designed to engage when subjected to large buff loads to prevent the override of one vehicle by another.

Associate Administrator for Safety means the Associate Administrator for Safety, Federal Railroad Administration, or that person's delegate as designated in writing.

* * * * *

Build date means the date on which the completed locomotive is shipped by the manufacturer or remanufacturer to the customer.

* * * * *

Collision posts means structural members of the end structures of a rail vehicle that extend vertically from the underframe to which they are securely

attached and that provide protection to occupied compartments from an object penetrating the vehicle during a collision.

* * * * *

Corner posts means structural members located at the intersection of the front or rear surface with the side surface of a rail vehicle and which extends vertically from the underframe to the roof.

* * * * *

Designated service means exclusive operation of a locomotive under the following conditions:

(1) The locomotive is not used as an independent unit or the controlling unit in a consist of locomotives except when moving for the purposes of servicing or repair within a single yard area;

(2) The locomotive is not occupied by operating or deadhead crews outside a single yard area; and

(3) The locomotive is stenciled ''Designated Service—DO NOT OCCUPY.''

Design standard means a criterion adopted by an industry or voluntary consensus standards body, which addresses the design of a locomotive with respect to its crashworthiness and crashworthiness features.

* * * * *

FRA means the Federal Railroad Administration.

Fuel tank, external means a fuel containment vessel that extends outside the car body structure of a locomotive.

Fuel tank, internal means a fuel containment vessel that does not extend outside the car body structure of a locomotive.

* * * * *

Lateral means the horizontal direction perpendicular to the direction of travel.

* * * * *

Locomotive cab means the compartment or space on board a locomotive where the control stand is located and which is normally occupied by the engineer when the locomotive is operated.

Longitudinal means in a direction parallel to the normal direction of travel.

Manufacture means the act of constructing a locomotive.

* * * * *

Monocoque design locomotive means a locomotive design where the shell or skin acts as a single unit with the supporting frame to resist and transmit the loads acting on the locomotive.

MU locomotive means a multiple operated piece of on-track equipment other than hi-rail, specialized maintenance, or other similar equipment—

(1) With one or more propelling motors designed to carry freight or passenger traffic or both; or

(2) Without propelling motors but with one or more control stands.

Narrow-nose locomotive means a locomotive with a short hood that spans substantially less than the full width of the locomotive.

Occupied service means the operation of a locomotive when the cab is physically occupied by a person.

* * * * *

Permanent deformation means the undergoing of a permanent change in shape of a structural member of a rail vehicle.

* * * * *

Power car means a rail vehicle that propels a Tier II passenger train or is the lead vehicle in a Tier II passenger train, or both.

* * * * *

Remanufacture means the act of constructing a remanufactured locomotive.

Remanufactured locomotive means a locomotive rebuilt or refurbished from a previously used or refurbished underframe (''deck''), containing fewer than 25% previously used components (measured by dollar value of the components).

Roof rail means the longitudinal structural member at the intersection of the side wall and the roof sheathing.

* * * * *

Semi-monocoque design locomotive means a locomotive design where the skin or shell acts, to some extent, as a single unit with the supporting frame to resist and transmit the loads acting on the locomotive.

Semi-permanently coupled means coupled by means of a drawbar or other coupling mechanism that requires tools to perform the uncoupling operation.

* * * * *

Short hood means the part of the locomotive above the underframe located between the cab and the nearest end of the locomotive.

Standards body means an industry and/or professional organization or association which conducts research and develops and/or issues policies, criteria, principles, and standards related to the rail industry.

* * * * *

Tier II means operating at speeds exceeding 125 mph but not exceeding 150 mph.

* * * * *

Ultimate strength means the load at which a structural member fractures or ceases to resist any load.

* * * * *

Wide-nose locomotive means a locomotive with a short hood that spans the full width of the locomotive.

3. Revise the heading of subpart D of part 229 to read as follows:

Subpart D—Locomotive Crashworthiness Design Requirements

§ 229.141 [Redesignated]

4. Redesignate section 229.141 as section 238.224.

5. Add §229.201 to read as follows:

§ 229.201 Purpose and scope.

(a) *Purpose.* The purpose of this subpart is to help protect locomotive cab occupants in the event that the locomotive collides with another locomotive or piece of on-track equipment, a shifted load on a freight car on an adjacent parallel track, or a highway vehicle at a highway-rail grade crossing.

(b) This subpart prescribes minimum crashworthiness standards for locomotives. It also establishes the requirements for obtaining FRA approval of: New locomotive crashworthiness design standards; changes to FRA-approved locomotive crashworthiness design standards; and alternative locomotive crashworthiness designs.

6. Add §229.203 to read as follows:

§ 229.203 Applicability.

(a) Except as provided in paragraphs (b) and (c) of this section, this subpart applies to all locomotives manufactured or remanufactured on or after [DATE 3 YEARS AFTER DATE OF PUBLICATION OF FINAL RULE IN THE **FEDERAL REGISTER**].

(b) *Cab cars and power cars.* The requirements of this subpart do not apply to cab control cars, MU locomotives, and semi-permanently coupled power cars that are subject to the design requirements for such locomotives set forth in 49 CFR part 238.

(c) *Locomotives used in designated service.* Locomotives used in designated service are exempt from the requirements of this subpart, with the exception of § 229.233 (minimum requirements for fuel tank design), which remains applicable to such locomotives.

7. Add §§229.205, 229.206, and 229.207 to read as follows:

§ 229.205 General requirements.

(a) Each wide-nose locomotive used in occupied service must meet the minimum crashworthiness performance requirements set forth in Appendix D of this part. Compliance with those

performance criteria must be established by:

(1) Meeting an FRA-approved crashworthiness design standard (including AAR S–580–2004, Locomotive Crashworthiness Requirements);

(2) Meeting new design standards and changes to existing design standards approved by FRA pursuant to § 229.207; or

(3) Meeting an alternate crashworthiness design approved by FRA pursuant to § 229.209.

(b) A monocoque or semi-monocoque design locomotive must be designed in accordance with the provisions of AAR S–580–2004, Locomotive Crashworthiness Requirements, applicable to those types of locomotives or in accordance with a standard or design approved by FRA as providing equivalent safety.

(c) A narrow-nose locomotive must be designed in accordance with the provisions of AAR S–580–2004, Locomotive Crashworthiness Requirements, applicable to that type of locomotive (notwithstanding any limitation of scope contained in that standard) or in accordance with a standard or design approved by FRA as providing equivalent safety.

§ 229.206 Design requirements.

Each locomotive used in occupied service must meet the minimum anti-climber, emergency egress, emergency interior lighting, and interior configuration design requirements set forth in AAR S–580–2004, Locomotive Crashworthiness Requirements.

§ 229.207 New locomotive crashworthiness design standards and changes to existing FRA-approved locomotive crashworthiness design standards.

(a) *General.* The following procedures govern consideration and action upon requests for FRA approval of new locomotive crashworthiness design standards and changes to existing FRA-approved locomotive crashworthiness design standards, including AAR S–580–2004, Locomotive Crashworthiness Requirements. Only a standards body which has adopted an FRA-approved locomotive crashworthiness design standard may initiate these procedures for FRA approval of changes to the standard.

(b) *Petitions for FRA approval of new locomotive crashworthiness design standards.* Each petition for FRA approval of a locomotive crashworthiness design standard must be titled ''Petition for FRA Approval of a New Locomotive Crashworthiness Design Standard,'' must be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., NW., Mail Stop 25, Washington, DC 20590, and must contain the following:

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The proposed locomotive design standard, in detail;

(3) The intended type of service for locomotives designed under the proposed standard; and

(4) Appropriate data and analysis showing how the proposed design standard either satisfies the requirements of § 229.205 for the type of locomotive design or provides at least an equivalent level of safety. Types of data and analysis to be considered are described in § 229.211(c)(1).

(c) *Petitions for FRA approval of substantive changes to an FRA-approved locomotive crashworthiness design standard.* Each petition for approval of a substantive change to an FRA-approved locomotive crashworthiness design standard must be titled ''Petition for FRA Approval of Changes to a Locomotive Crashworthiness Design Standard,'' must be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., NW., Mail Stop 25, Washington, DC 20590, and must contain the following:

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The proposed change, in detail;

(3) The intended type of service for locomotives built with the proposed change; and

(4) Appropriate data and analysis showing how the resulting standard either satisfies the requirements for the type of locomotive set forth in § 229.205 or provides at least an equivalent level of safety. Types of data and analysis to be considered are described in § 229.211(c)(1).

(d) *Petitions for FRA approval of non-substantive changes to the existing FRA-approved crashworthiness design standards.* Each petition for approval of a non-substantive change to an FRA-approved locomotive crashworthiness design standard must be titled ''Petition for FRA Approval of Non-substantive Changes to a Locomotive Crashworthiness Design Standard,'' must be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., NW., Mail Stop 25, Washington, DC 20590, and must contain the following:

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The proposed change, in detail; and

(3) Detailed explanation of how the proposed change results in a non-substantive change to the existing FRA-approved crashworthiness design standard. If FRA determines that the proposed change is substantive, FRA will process the petition in accordance with paragraph (c) of this section.

8. Add §229.209 to read as follows:

§ 229.209 Alternative locomotive crashworthiness designs.

(a) *General.* The following procedures govern consideration and action upon requests for FRA approval of locomotive crashworthiness designs which are not consistent with any FRA-approved locomotive crashworthiness design standard.

(b) *Petitions for FRA approval of alternative locomotive crashworthiness designs.* Each petition for FRA approval of an alternative locomotive crashworthiness design must be titled ''Petition for FRA Approval of Alternative Locomotive Crashworthiness Design,'' must be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., NW., Mail Stop 25, Washington, DC 20590, and must contain the following:

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The proposed locomotive crashworthiness design, in detail;

(3) The intended type of service for locomotives built under the proposed design; and

(4) Appropriate data and analysis showing how the design either satisfies the requirements of § 229.205 for the type of locomotive or provides at least an equivalent level of safety. Types of data and analysis to be considered are described in § 229.211(c)(1).

9. Add §229.211 to read as follows:

§ 229.211 Processing of petitions.

(a) **Federal Register** notice. FRA will publish in the **Federal Register** notice of receipt of each petition submitted under §§ 229.207(b), 229.207(c), or 229.209.

(b) *Comment.* Not later than 60 days from the date of publication of the notice in the **Federal Register** concerning a petition submitted under §§ 229.207(b), 229.207(c), or 229.209(b),

any person may comment on the petition.

(1) Each comment must set forth specifically the basis upon which it is made, and contain a concise statement of the interest of the commenter in the proceeding.

(2) Each comment must be submitted to the U.S. Department of Transportation Central Docket Management System, Nassif Building, Room P1–401, 400 Seventh Street, SW., Washington, DC 20590, and must contain the assigned docket number which appeared in the **Federal Register** for that proceeding. The form of such submission may be in written or electronic form consistent with the standards and requirements established by the Central Docket Management System and posted on its Web site at *http://dms.dot.gov.*

(3) In the event FRA requires additional information to appropriately consider the petition, FRA will conduct a hearing on the petition in accordance with the procedures provided in § 211.25 of this chapter.

(c) *Disposition of petitions.* (1) In order to determine compliance with the performance criteria in Appendix D, FRA will consider proper documentation of competent engineering analysis, and/or practical demonstrations, which may include validated computer modeling, structural crush analysis, component testing, full scale crash testing in a controlled environment, or any combination of the foregoing, together with evidence of effective peer review. Compliance with the appropriate performance criteria must be demonstrated for any part of the locomotive which does not conform to an FRA-approved design standard.

(2) If FRA finds that the petition complies with the requirements of this subpart and that the proposed change or new design standard satisfies the requirements of § 229.205 for the type of locomotive, the petition will be granted, normally within 90 days of its receipt. If the petition is neither granted nor denied within 90 days, the petition remains pending for decision. FRA may attach special conditions to the granting of the petition. Following the granting of a petition, FRA may reopen consideration of the petition for cause stated. Petitions which FRA has granted will be placed in the public docket of this proceeding.

(3) If FRA finds that the petition does not comply with the requirements of this subpart, or that the proposed change or new design standard does not satisfy the performance criteria contained in Appendix D of this part (where applicable), the petition will be denied, normally within 90 days of its receipt. If the petition is neither granted nor denied within 90 days, the petition remains pending for decision. FRA may re-open a denial of a petition for cause stated.

(4) When FRA grants or denies a petition, or reopens consideration of the petition, written notice will be sent to the petitioner and other interested parties and a copy of the notice will be placed in the public docket of this proceeding.

10. Add §229.213 to read as follows:

§ 229.213 Locomotive manufacturing information.

(a) Each railroad operating a locomotive subject to the requirements of this subpart must retain the following information:

(1) The date upon which the locomotive was manufactured or remanufactured;

(2) The name of the manufacturer or remanufacturer of the locomotive; and

(3) The design specification to which the locomotive was manufactured or remanufactured.

(b) The information required in paragraph (a) of this section must be located permanently in the locomotive cab or be provided within two business days upon request of FRA or an FRA-certified state inspector.

11. Add § 229.215 to read as follows:

§ 229.215 Retention and inspection of designs.

(a) *Retention of records—original designs.* Each manufacturer or remanufacturer of a locomotive subject to this subpart shall retain all records of the original locomotive designs, including supporting calculations and drawings, pertaining to crashworthiness features required by this subpart. These records must be retained for the lesser period of:

(1) The life of such locomotive, or

(2) Twenty years after the date of manufacture or, if remanufactured, twenty years after the date of remanufacture.

(b) *Retention of records—repairs and modifications.* Each owner or lessee of a locomotive subject to this subpart shall retain all records of repair or modification to crashworthiness features required by this subpart. These records must be retained for the lesser period of:

(1) The life of such locomotive, or

(2) Twenty years after the date on which the repair/modification was performed.

(c) *Inspection of records.* Each custodian of records referred to in paragraphs (a) and (b) of this section shall, upon request by FRA or an FRA-certified state inspector, make available for inspection and duplication within 7 days, any records referred to in paragraphs (a) and (b) of this section.

(d) *Third party storage of records.* Each custodian of records referred to in paragraphs (a) and (b) of this section may delegate storage duties to a third party, however, the custodian retains all responsibility for compliance with this section.

12. Add § 229.217 to read as follows:

§ 229.217 Fuel tank.

(a) *External fuel tanks.* Locomotives equipped with external fuel tanks shall, at a minimum, comply with the requirements of AAR S–5506, Performance Requirements for Diesel Electric Locomotive Fuel Tanks (October 1, 2001), except for section 4.4.

(b) *Internal fuel tanks.* Locomotives equipped with internal fuel tanks shall, at a minimum, comply with the requirements of 49 CFR 238.223(b).

13. Add new Appendix D to part 229 to read as follows:

Appendix D to Part 229—Performance Criteria for Locomotive Crashworthiness

This appendix provides performance criteria for the crashworthiness evaluation of alternative locomotive designs and of design standards for wide-nosed locomotives and for any other locomotive, except monocoque/semi-monocoque design locomotives and narrow-nose design locomotives. Each of the following criteria describes a collision scenario and a given performance measure for protection provided to cab occupants, normally through structural design. Demonstration that these performance criteria have been satisfied may be accomplished through any of the methods described in § 229.205.

(a) *Front end structure (collision posts).*

(1) *Objective.* The front end structure of the locomotive must withstand a frontal impact with a proxy object which is intended to simulate lading carried by a heavy highway vehicle (see figure 1).

(2) *Proxy object characteristics and orientation.* The proxy object must have the following characteristics: Cylindrical shape; 48-inch diameter; 126 inches in length; 65,000 pounds in weight; and uniform density. The longitudinal axis of the proxy object must be oriented horizontally perpendicular to the longitudinal axis of the locomotive.

(3) *Impact and result.* The front end structure of the locomotive must

withstand a 30-mph impact resulting in no more than 24 inches of crush along the longitudinal axis of the locomotive, measured from the foremost point on the collision post. The center of impact must be 30 inches above the top of the locomotive underframe along the longitudinal centerline of the locomotive.

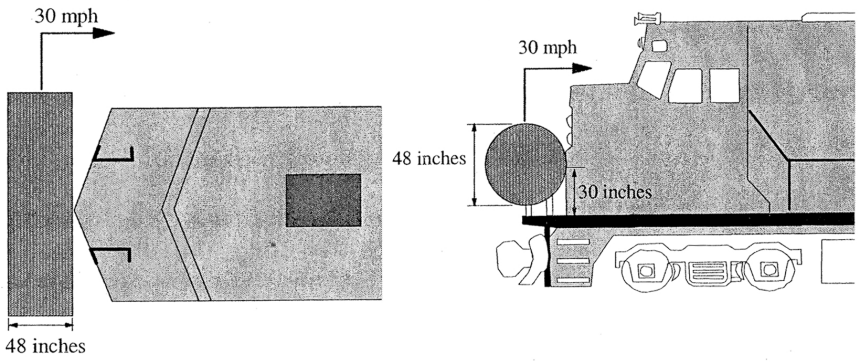

Figure 1. Schematic of Front End Structure (Collision Posts) Impact

(b) *Front end structure (short hood).*

(1) *Objective.* The front end structure of the locomotive must withstand an oblique impact with a proxy object intended to simulate an intermodal container offset from a freight car on an adjacent parallel track (see figure 2).

(2) *Proxy object characteristics and orientation.* The proxy object must have the following characteristics: Block shape; 36-inch width; 60-inch height; 108 inches in length; corners having 3-inch radii; 65,000 pounds in weight; and uniform density. The longitudinal axis of the proxy object must be oriented parallel to the longitudinal axis of the locomotive. At impact, the proxy object must be oriented such that there is 12 inches of lateral overlap and 30 inches from the bottom of the proxy object to the top of the locomotive underframe.

(3) *Impact and results.* The front end structure of the locomotive must withstand impact at 30 mph with no more than 60 inches of crush along the longitudinal axis of the locomotive, measured from the first point of contact on the short hood.

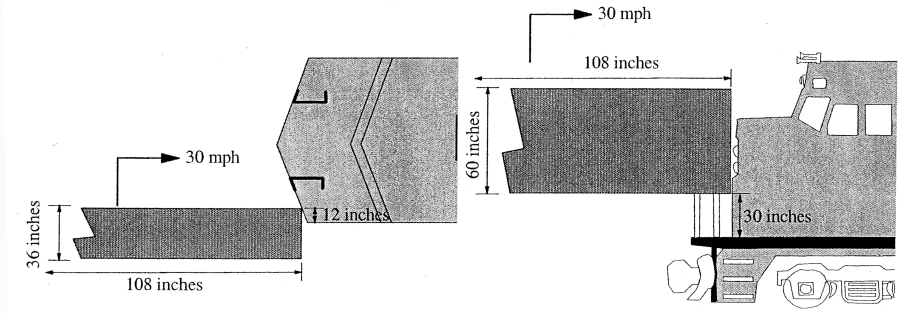

Figure 2. Schematic of Front End Structure (Short Hood) Offset Impact

PART 238—[AMENDED]

14. The authority citation for part 238 continues to read as follows:

Authority: 49 U.S.C. 20103, 20107, 20133, 20141, 20302–20303, 20306, 20701–20702, 21301–21302, 21304; 28 U.S.C. 2461, note; 49 CFR 1.49.

15. Amend section 238.5 by revising the definitions of ''fuel tank, external'' and ''fuel tank, internal'' to read as follows:

§ 238.5 Definitions

* * * * *

Fuel tank, external means a fuel containment vessel that extends outside the car body structure of a locomotive.

Fuel tank, internal means a fuel containment vessel that does not extend outside the car body structure of a locomotive.

* * * * *

Issued in Washington, DC on October 22, 2004.

Betty Monro,

Acting Federal Railroad Administrator.

[FR Doc. 04–24148 Filed 11–1–04; 8:45 am]

BILLING CODE 4910–06–P