4910-06-P

DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

49 CFR Part 229

[Docket No. FRA-2003-16357, Notice No. 3]

RIN 2130-AB34

Locomotive Event Recorders

AGENCY: Federal Railroad Administration (FRA), (DOT).

ACTION: Final rule.

SUMMARY: FRA is issuing revisions to the regulations governing locomotive event recorders to improve the crashworthiness of railroad locomotive event recorders and to enhance the quality of information available for post-accident investigations. FRA is amending its existing regulations in four major ways: (1) by requiring that a new locomotive have an event recorder with a "hardened" memory module, proven by a requirement that the memory module preserve stored data throughout a sequence of prescribed tests; (2) by requiring that this event recorder on a new locomotive collect certain additional types of information; (3) by simplifying standards for inspecting, testing, and maintaining all event recorders; and (4) by requiring the phasing out, over a four-year period, of event recorders on existing locomotives that use magnetic tape as a data storage medium and their replacement with event recorders with a certified survivable

version of its previous event recorder. FRA is also revising the definitions contained in the existing regulation to remove the letter designations so that the defined terms are simply presented in alphabetical order.

EFFECTIVE DATE: This final rule is effective [INSERT DATE 60 DAYS FROM DATE OF PUBLICATION].

ADDRESSES: Petitions: Any petitions for reconsideration related to Docket No. FRA-2003-16357, may be submitted by any of the following methods:

- Web Site: http://dms.dot.gov. Follow the 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, D.C. 20590-001.
- Hand Delivery: Room PL-401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, D.C. between 9 a.m. and 5 p.m. Monday through Friday, except Federal Holidays.
- Federal eRulemaking Portal: Go to http://www.regulations.gov. Follow the online instructions for submitting comments.

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. Please see the Privacy Act heading in the "Supplementary Information" section of this document for Privacy Act information related to any submitted comments or materials.

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

FOR FURTHER INFORMATION CONTACT: Edward W. Pritchard, Director, Office of Safety Assurance and Compliance, RRS-10, Mail Stop 25, Federal Railroad Administration, Department of Transportation, 1120 Vermont Avenue, NW., Washington, DC 20590 (telephone 202-493-6247), or Thomas J. Herrmann, Trial Attorney, Office of Chief Counsel, Mail Stop 10, Federal Railroad Administration, 1120 Vermont Avenue, NW., Washington, DC 20590 (telephone 202-493-6036).

SUPPLEMENTARY INFORMATION:

I. Statutory Background

Sections 10 and 21 of the Rail Safety Improvement Act of 1988 (RSIA), Public Law 100-342, 102 Stat. 624 (June 22, 1988), provide as follows:

> **SEC. 10. EVENT RECORDERS.**
>
> Section 202 of the Federal Railroad Safety Act of 1970 is amended by adding at the end the following new subsection:
>
> "(m)(1)(A) The Secretary shall, within 18 months after the date of the enactment of the Rail Safety Improvement Act of 1988, issue such rules, regulations, standards, and orders as may be necessary to enhance safety by requiring that trains be equipped with event recorders within 1 year after such rules, regulations, orders, and standards are issued.
>
> "(B) If the Secretary finds that it is impracticable to equip trains as required under subparagraph (A) within the time limit under such subparagraph, the Secretary may extend the deadline for compliance with such requirement, but in no event shall such deadline be extended past 18 months after such rules, regulations, orders, and standards are issued.

"(2) For the purpose of this subsection, the term 'event recorders' means devices that --

"(A) record train speed, hot box detection, throttle position, brake application, brake operations, and any other function the Secretary considers necessary to record to assist in monitoring the safety of train operation, such as time and signal indication; and

"(B) are designed to resist tampering."

* * *

SEC. 21. TAMPERING WITH SAFETY DEVICES.

Section 202 of the Federal Railroad Safety Act of 1970 is amended by adding at the end the following new subsection:

"(o)(1) The Secretary shall . . . issue such rules, regulations, orders, and standards as may be necessary to prohibit the willful tampering with, or disabling of, specified railroad safety or operational monitoring devices.

* * *

Codified at 49 U.S.C. 20137-20138, superseding 45 U.S.C. 431(m) and (o).

II. Proceedings to Date

On November 23, 1988, FRA published an ANPRM (Advance Notice of Proposed Rulemaking) in FRA Docket No. LI-7, soliciting comments on how to implement these statutory mandates concerning event recorders. See 53 FR 47557. On June 18, 1991, FRA published an NPRM in that docket, setting forth proposed regulations on event recorders, the elements they were to record, and the preservation of data from the event recorder in the event of an accident. See 56 FR 27931. Two public hearings were held in order to facilitate public participation; the written comments submitted in response to the NPRM were extensive, detailed, and helpful.

FRA prescribed final event recorder rules, effective May 5, 1995 (58 FR 36605, July 8, 1993) and issued a response to petitions for reconsideration (60 FR 27900, May 26, 1995); they were codified principally at 49 CFR 229.135. In issuing the final rules, FRA noted the

need to provide more refined technical standards. The National Transportation Safety Board (NTSB) had previously remarked on the loss of data from event recorders in several accidents due to fire, water, and mechanical damage. NTSB proposed performance standards and agreed to serve as co-chair for a joint industry/government working group that would refine technical standards for next-generation event recorders. FRA conducted a meeting of an informal working group comprised of railroad labor and management representatives and co-chaired by NTSB on December 7, 1995, to consider development of technical standards. At the July 24-25, 1996 meeting of FRA's Railroad Safety Advisory Committee (RSAC), the Association of American Railroads (AAR) agreed to continue the inquiry and on November 1, 1996, reported the status of work on proposed industry standards to the RSAC.

On March 5, 1997, the NTSB issued several recommendations regarding testing and maintenance of event recorders as a result of its findings in the investigation of an accident on February 1, 1996, at Cajon Pass, CA. As the Board noted in its recommendation to FRA, the train that derailed in Cajon Pass "had an event recorder that was not fully operational. The self-diagnostic light on the unit was insufficient to fully examine the unit and ensure that it was recording the data." The Board recommended that inspection and testing of event recorders "include, at a minimum, a review of the data recorded during actual operations of the locomotive to verify parameter functionality

. . . ." See NTSB Recommendation R-96-70.

III. RSAC Overview

In March 1996, FRA established the RSAC, which provides a forum for developing consensus recommendations on rulemakings and other safety program issues. 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:

American Association of Private Railroad Car Owners (AARPCO)

American Association of State Highway & Transportation Officials (AASHTO)

American Public Transportation Association (APTA)

American Short Line and Regional Railroad Association (ASLRRA)

American Train Dispatchers Department/Brotherhood of Locomotive Engineers (ATDD/BLE)

National Passenger Railroad Corporation (Amtrak)

Association of American Railroads (AAR)

Association of Railway Museums (ARM)

Association of State Rail Safety Managers (ASRSM)

Brotherhood of Locomotive Engineers and Trainmen (BLET)

Brotherhood of Maintenance of Way Employees (BMWE)

Brotherhood of Railroad Signalmen (BRS)

Federal Transit Administration (FTA)*

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)*

League of Railway Industry Women*

National Association of Railroad Passengers (NARP)

National Association of Railway Business Women*

National Conference of Firemen & Oilers

National Railroad Construction and Maintenance Association

National Transportation Safety Board (NTSB)*

Railway Progress Institute (RPI)

Safe Travel America

Secretaria de Communicaciones y Transporte*

Sheet Metal Workers International Association

Tourist Railway Association Inc.

Transport Canada*

Transport Workers Union of America (TWUA)

Transportation Communications International Union/BRC (TCIU/BRC)

United Transportation Union (UTU)

*Indicates associate membership.

When appropriate, FRA assigns a task to RSAC, and after consideration and debate, RSAC may accept or reject the task. If 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. These recommendations are developed by consensus. A working group may establish one or more task forces to develop facts options on a particular aspect of a given task. The task force then provides that information to the working group for consideration. If a working group comes to unanimous consensus on recommendations for action, the package is presented to the RSAC for a vote. If the proposal is accepted by a simple majority of the

RSAC, the proposal is formally recommended 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, 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 March 24, 1997, the RSAC indicated its desire to receive a task to consider the NTSB recommendations with regard to crash survivability, testing, and maintenance. A task was presented to, and accepted by, the RSAC on June 24, 1997. The Working Group on Event Recorders was formed, and a Task Force established. Members of the Working Group, in addition to FRA, included the following:

AAR, including members from

The Burlington Northern and Santa Fe Railway Company (BNSF),

Canadian National Railway Company (CN),

Canadian Pacific Railway Company (CP),

Consolidated Rail Corporation (CR)

CSX Transportation, Incorporated (CSX),

Florida East Coast Railway Company (FEC),

Illinois Central Railroad Company (IC),

Norfolk Southern Corporation (NS),

Union Pacific Railroad Company (UP),

APTA, including members from

Southeastern Pennsylvania Transportation Authority (SEPTA)

Amtrak,

Bach-Simpson,

BLET,

EDI,

General Motors Corporation/Electro-Motive Division (EMD)

IBEW,

Pulse/Wabco,

Q-Tron,

TCIU/BRC, and

UTU.

The NTSB met with the Working Group and provided staff advisors. In addition, GE-Harris, STV Incorporated, and Peerless Institute attended many of the meetings and contributed to the technical discussions.

The Working Group and related Task Force conducted a number of meetings and discussed each of the matters proposed in the NPRM issued in this matter. Minutes of these meetings have been made part of the docket in this proceeding. The Working Group reached full consensus on a recommended proposal on October 20, 2003, and transmitted the document as its recommendation to the full RSAC for its concurrence via mail ballot on October 23, 2003. By November 12, 2003, the deadline set for casting a ballot in this matter,

thirty-five of the forty-eight voting members of the full RSAC had returned their ballots on the regulatory recommendation submitted by the Working Group. All thirty-five of the voting members concurred with and accepted the Working Group's recommendation. Thus, the Working Group's recommendation became the full RSAC's recommendation to FRA. After reviewing the full RSAC's recommendation, FRA adopted the recommendation with minor changes for purposes of clarity, and responsiveness to certain comments made by Working Group and RSAC members when submitting their concurrences.

On June 30, 2004, FRA published an NPRM containing the recommendations of the Working Group and the full RSAC. See 69 FR 39774. The NPRM provided for a 60-day comment period and provided interested parties the opportunity to request a public hearing. Based on the comments received, FRA issued a notice on September 2, 2004, scheduling a public hearing for September 30, 2004 and extending the comment period an additional 41 days to October 11, 2004. See 69 FR 54255 (September 8, 2004). FRA received comments from 22 interested parties, most of these were private citizens or private law firms.

Subsequent to the close of the comment period, the Working Group conducted a meeting to review and discuss the comments received in response to the NPRM. The Working Group discussed all of the issues raised in the comments and considered various methods by which to address the comments. Minutes of these meetings have been made part of the docket in this proceeding. Based on information and discussions held at these meetings, the Working Group developed a potential recommendation for a final rule. The Working Group reached full consensus on a recommended proposal for a final rule on May 3, 2005, and transmitted the document as its recommendation to the full RSAC for its concurrence via mail ballot on May 13, 2005. On **XXXX,** 2005, the voting members of the full RSAC concurred with and

accepted the regulatory recommendation submitted by the Working Group. Thus, the Working Group's recommendation related to this final rule became the full RSAC's recommendation to FRA. FRA further reviewed the recommendation and adopted it with minor changes for purposes of clarity.

Throughout the preamble discussion of this final rule, FRA refers to comments, views, suggestions, or recommendations made by members of the Working Group. When using this terminology, FRA is referring to views, statements, discussions, or positions identified or contained in either the minutes of the Working Group and Task Force meetings or the specific written submissions discussed above. These documents have been made part of the docket in this proceeding and are available for public inspection as discussed in the preceding ADDRESSES portion of this document. These points are discussed to show the origin of certain issues and the course of discussions on those issues at the working group level. We believe this helps illuminate factors FRA has weighed in making its regulatory decisions, and the logic behind those decisions. The reader should keep in mind, of course, that only the full RSAC makes recommendations to FRA, and it is the consensus recommendation of the full RSAC on which FRA is acting.

IV. Section-by-Section Analysis

The AAR Universal Machine Language Equipment Register (UMLER) file had approximately 28,000 locomotives registered as of January 1, 2000, including locomotives operated by shortline and regional railroads, Canadian and Mexican railroads, and Amtrak. Portions of the Canadian and Mexican fleet operate in the United States. Every major railroad uses event recorders, and no railroads report a difficulty in complying with the 1995 regulations requiring event recorders on the lead locomotive of any train operated faster than 30 miles per

hour. As noted above, this proceeding builds on the current regulations in Part 229 and adds requirements for crash survivability and enhanced data collection by event recorders. In addition, this final rule requires the installation of these current "state-of-the-art" event recorders in new locomotives and would require that, if a locomotive with an event recorder is remanufactured, it be equipped with a certified survivable version of its previous event recorder.

As noted previously, FRA received comments from 22 interested parties in response to the NPRM. The specific comments are addressed and discussed in the section-by-section analysis related to the provision that was the subject of the submitted comment.

§ 229.5. This section contains an extensive set of definitions. FRA intends these definitions to clarify the meaning of terms as they are used in the text of the final rule. The final rule retains all of the definitions proposed in the NPRM with the only changes being a slight modification of the definition of the term "distributed power system" for clarity and the addition of a definition for the term "DMU Locomotive," which will be explained in detail below. One commenter suggested the addition of a definition for the term "positive train control (PTC)" because event recorders are an integral part of any PTC system. FRA agrees with the RSAC's recommendation not to include a definition for PTC in this final rule because the term is not used in the rule text contained in this part and the term is adequately defined in the new regulations related to train control systems recently added to 49 CFR part 236. See 70 FR 11051 (March 7, 2005).

The final rule entirely rewrites the "definitions" section as it currently exists in part 229 in order to remove the letter designations from the subparagraphs so that the terms are simply presented in alphabetical order. Several of the definitions introduce new concepts or new

terminologies that require further discussion. The following discussion is arranged in the order in which the added or revised definitions appear in the rule text.

Controlling remote distributed power locomotive is a new definition added to this final rule in response to concerns discussed in comments received in response to the NPRM. The definition is being added in order to clearly identify what constitutes a controlling remote distributed power locomotive addressed by the requirements of this final rule. A controlling remote distributed power locomotive means the locomotive in a distributed power consist that receives the coded signal from the lead locomotive consist of the train whether commanded automatically by the distributed power system or independently by the locomotive engineer. A distributed power system means a system that provides control of a number of locomotives dispersed throughout a train from a controlling locomotive located in the lead position. The system provides control of the rearward locomotives by command signals originating at the lead locomotive and transmitted to the remote (rearward) locomotives.

Cruise control, an added definition, describes the device that controls locomotive power output to maintain a targeted speed. Primarily used on through-route passenger equipment, this device allows the engineer a choice between automated controls or the traditional throttle handle. Devices that only function at or below 30 miles per hour, such as those used in the loading/unloading of unit trains of bulk commodities, or those used to move equipment through car or locomotive washers, are not considered cruise controls for purposes of this part.

Data element, an added definition, clarifies that the data recorded may be directly passed through or they may be derived from other data. As an example, speed may be calculated from time and distance; the event recorder may capture “speed” by calculating that

value using the common formula of dividing distance by time. An alternative term "data parameter" is not used in this final rule because a "parameter" connotes one value standing for all others of a class and an "element" is a discrete value. Data may be derived from both recorded and unrecorded "facts" in the memory module. For instance, the distance element in the calculation of speed may be derived from a count of the wheel revolutions (data from the memory module) and the wheel diameter or wheel circumference (data measured directly from a physical component and, thus, not stored in the memory module).

Distributed power system,an added definition, describes a system to allow the engineer in the lead unit to control locomotive power units placed within the train consist. Typically, a radio link is established between the lead unit and the remote power consist so that a single engineer can control several locomotives not directly coupled to the lead unit. FRA notes that this definition has been modified slightly from that proposed in the NPRM. FRA agrees with the RSAC's recommendation that the word "automatic" used in the proposed definition did not accurately reflect the way distributed power systems operate. Distributed power systems allow for either synchronous or non-synchronous operation, only the former of which results in the distributed units responding "automatically" to the controls of the lead locomotive. Thus, the definition has been modified from that contained in the NPRM by removing the word "automatic" to avoid any misunderstanding regarding how these systems function.

DMU locomotive, a new definition, is being added to this final rule in order to specifically identify diesel-powered multiple unit locomotives. Diesel-powered MUs are just starting to be used by a small number of passenger railroads. However, FRA and the industry believes that the use of DMU locomotives will expand significantly in the future. For purposes

of event recorders, DMU locomotives will be treated the same as MU locomotives. For other portions of part 229 the two types of locomotives may be treated differently.

Event recorder is a revised definition. The definition that is currently in the regulations is modified so that the list of data elements to be recorded will now appear in rewritten § 229.135(b). This change is necessary because the final rule requires the event recorders on new locomotives to record more data elements than the recorders required by the regulation as it existed prior to this final rule.

FRA received a comment from one party questioning whether the 48-hour monitoring and recording requirement for event recorders is sufficient, without further elaborating on the need for such an extension. FRA has not found the need to require the monitoring and recording of train information beyond the 48 hours required under the existing regulation. The RSAC, through the Working Group, discussed this issue and determined that the 48-hour provision adequately captures the necessary data and recommended no increase to the time frame. As FRA has not found the need to require the monitoring and recording of train information beyond the 48 hours required under the existing regulation, FRA has adopted the RSAC's recommendation. Furthermore, any increase to the amount of data that must be stored could significantly increase the cost of producing and acquiring the event recorder, and FRA is not willing to impose additional costs without an established need.

In the NPRM, FRA noted that the issues of accuracy, resolution, and sampling rate remained unresolved, provided a brief discussion related to sampling rates, and requested comment from interested parties on this subject. See 69 FR 39779-80. FRA received comments from the BLET supporting the adoption of the IEEE sampling rate standard detailed in the preamble to the NPRM. FRA also received comments from the AAR objecting to the

use of the IEEE sampling rate standard based on its belief that the standard is too high and not applicable to railroad operations. AAR asserts that a sampling rate of 50 samples per second is unnecessary as events do not happen that fast on railroads and the most modern locomotive event recorders only record data once per second. Furthermore, increasing the sampling rate above what is currently being manufactured would significantly increase the costs of the recorders. AAR also noted that Transport Canada's regulations do not mandate a specific sampling rate.

The issue was discussed by the Working Group, and one manufacturer explained that current microprocessor based event recorders sample at least 20 times per second and record one time per second. Thus, event recorders do not record at anywhere near the rate at which they sample. The Working Group recommended that no sampling rate be mandated in the regulation for the above-noted reasons. FRA believes that the currently manufactured event recorders have an acceptable sampling rate, and FRA is not aware of any instance where a higher sampling rate was necessary. Moreover, FRA and the Working Group concentrated on the crashworthiness aspects of the event recorder memory module, together with enhancing the kind of data to be collected for post-accident analysis. FRA believes that this focus is both an ordering of priorities and a recognition that the industry has an economic and operational incentive to make the data as accurate as possible. What the event recorder stores are data that are, first and foremost, indispensable to the operation of the locomotive. Because the railroads have operational needs for the same data elements that are also vital to accident analysis, the "numbers" tend to be accurate and, with microprocessor-based event recorders, the data thus generated during the ordinary course of business are not diminished in accuracy just because they are stored. In addition, microprocessor-based event recorders run so fast

that the sampling intervals are naturally short, and they may be adjusted differently for different elements. Thus, FRA agrees with the recommendation of the Working Group and RSAC and will not mandate a specific sampling rate in this final rule but will continue to monitor the operation of event recorders to determine if further regulatory action is necessary on this issue.

Event recorder memory module, a new definition, describes the portion of the event recorder that will be required to meet the crashworthiness standard contained in Appendix D to Part 229.

Lead locomotive is a definition moved from current § 229.135(a) and revised to reflect current industry practice and to make it clear that "lead locomotive" describes a set position in the train rather than the locomotive from which the crew is operating the train. This change was necessary, among other reasons, to accurately record the signal indications displayed to the crew of the train.

Mandatory directive is a definition also contained in § 220.5 of this chapter and is being included in this part to aid in understanding the type of data that is to be captured by the event recorder when a railroad utilizes a train control system pursuant to Part 236 of this chapter.

Remanufactured locomotive is a new definition added to clarify when an existing event recorder-equipped locomotive must be equipped with a crashworthy event recorder.

Self-monitoring event recorder is a new definition added to state clearly the conditions under which an event recorder does not require periodic maintenance. One member of the Working Group, in a written submission to FRA, suggested that this definition be slightly altered to state that a self-monitoring event recorder is one that has the ability to monitor its own operation and to display an indication to the locomotive operator either when any data required to be stored are not stored or when the input signal or stored signal is detected as out-of-range.

This commenter stated that there is no way to verify whether the stored data matches the data received from the sensor or data collection point as described in the definition. Examples of this are when a sensor fails open and the locomotive computer does not pass that information to the event recorder, or when a speed sensor is not producing any output due to certain failure modes. However, certain data elements can be programmed with a minimum or maximum range and if the sensor input is outside that range then an appropriate indication can be provided to the operator. Although FRA sought comments from interested parties on this suggested change to the definition no comments or suggestions were received and no support for such a change was indicated. Consequently, FRA is retaining the definition proposed in the NPRM in this final rule.

Throttle position is a new definition added to capture the industry understanding about this parameter of locomotive operation. The NPRM contains a detailed discussion regarding the use of the term "throttle position," which provides additional information and background regarding the nature and meaning of the term as used in this final rule. See 69 FR 39777. While typical diesel-electric freight locomotives have positions, or "notches" for eight power positions and "Idle," many other locomotives, especially those in passenger and heavy electric passenger service, do not. The final rule definition calls for measuring the power requested by the engineer/operator at any and all of the discrete output positions of the throttle. If the throttle quadrant on a locomotive has continuously variable segments, the recorder would be required to capture the exact level of speed/tractive effort requested, on a scale of zero (0) to 100 percent (100%) of the output variable or a value converted from a percentage to a comparable 0- to 8-bit digital system. In the NPRM, FRA sought comment on the need to specify specific parameters by which throttle position is recorded. See 69 FR 39777 and 39781. NTSB was

the only party responding, expressing its support and need for the definition. Therefore, the final rule retains the definition as proposed in the NPRM.

§ 229.25. The final rule retains the proposed amendment to paragraph (e) of this section by moving the language dealing with microprocessor-based event recorders from subparagraph (e)(2) to the lead paragraph and providing that microprocessor-based event recorders with a self-monitoring feature are exempt from the 92-day periodic inspection and are to be inspected annually as required under proposed § 229.27(d). Other types of event recorders would require inspection and maintenance at 92-day intervals, as before.

Older styled event recorders used magnetic tape cartridges as their recording medium; while this final rule will "sunset" such equipment, it needs to be maintained in order to perform satisfactorily. The final rule provides for this, at 49 CFR 229.25(e). Microprocessor-based event recorders, typified by virtually all of the recorders now being installed in locomotives, are similar to many consumer solid state electronic devices; either they work or they do not. Maintenance consists of checking for satisfactory operation and, if there is a failure, replacing either the failed component or the entire unit.

What further complicates the newest installations is that there is no "black box," as such. Rather, the entire locomotive is wired with sensors and, as an illustration, those elements necessary for routine maintenance of the locomotive are routed to one collection point, and those required for accident analysis are routed to another. There are also ways to retrieve any particular subset of data out of a single data port by using what is popularly called a "smart card" to query the computer for a predetermined set of data. Accident investigators would get the data elements specified in § 229.135(b), locomotive electrical maintainers would get the set of data applicable to their work, and a person evaluating the engineer's performance over the

last run would download a data set preprogramed for that purpose. Data necessary for accident analysis, as required in this final rule, would be routed to a crash-hardened memory module.

In comments, the NTSB recommended provisions for testing the full range of all parameters periodically and for testing the sensors, transducers, or wiring for data elements not cycled during the normal operation more often than annually. However, NTSB provided no data or significant number of instances relating to the failure of sensors, transducers, or wiring that are not detected during the course of the currently required periodic maintenance of either the locomotive itself or the locomotive event recorder. A requirement to independently test the sensors, transducers, and wiring involved with capturing the data elements required by this final rule would add a significant cost to the conduct of periodic inspections. Without some proven established need for these additional inspections, FRA is not willing to impose that additional cost at this time. FRA continues to recognize that railroads cannot test event recorders over the full range of all recorded parameters. Such testing might require operating locomotives at speeds far higher than safe over a particular railroad's track, and some events, such as EOT valve failure, are extremely rare. The final rule requires "cycling, as practicable, all required recording elements . . ." in recognition of this fact.

The NTSB also sought clarification as to whether the proposed rule would require event recorder maintenance to be recorded on the locomotive "blue card" (form FRA F6180-49A) maintained in the cab of the locomotive. While the "blue card" does not contain a specific line-item related to event recorders, the regulation does require that the date, place, and signature of the person performing the required periodic inspections under §§ 229.25 and 229.27 be entered on the form. Thus, in order to properly sign and date the "blue card," the

required inspection, testing, and maintenance must have been performed on the event recorder and any dates on the form would be equally applicable to the event reorder as to any other component required to be addressed during a periodic inspection.

The final rule also retains the proposed provisions for maintaining records related to periodic inspections and maintenance instructions. Although the final rule does not specify how records of successful tests are to be maintained, FRA has no objection to keeping the records electronically, provided the electronic "record" is the full and complete "data verification result" required by this section, the record is secure, the record is accessible to FRA for review and monitoring, and the record is made available upon request to FRA or any other governmental agent with the authority to request them.

Although the Electronic Signatures in Global and National Commerce Act (Pub. L. 106-229, 114 Stat. 464, June 30, 2000) requires that regulated entities be allowed to keep records electronically, in appropriate circumstances, FRA believes that the tenor and language of this final rule make it unnecessary to discuss the specifics of whether or not the Electronic Signatures Act applies to the subject matter of this regulation because nothing in this rule is intended to circumvent the requirements of that act. With the exception of the "maintenance instructions of the manufacturer, supplier, or owner" of the event recorder (see proposed § 229.25(e)), and any notations this final rule requires on the "blue card" (Form FRA F6180-49A), all other records required by this final rule may be kept electronically. Paragraph (e)(1) of this section requires that the maintenance instructions for the event recorder may be kept electronically, but must be available at the maintenance/repair point so they can be used by workers on the shop floor, at the point of testing and repair. Maintenance instructions printed from an electronically maintained master copy would satisfy this requirement. In addition, the

applicable "blue card" provisions are existing regulatory requirements that are not being amended by this rulemaking and are intended to establish whether the locomotive is "equipped" or not, in the field, without requiring reference or access to a data base at some other location.

§ 229.27. The final rule retains the proposed amendment to the introductory text of this section and retains paragraph (d) of this section as proposed in the NPRM without change. Paragraph (d) addresses the annual maintenance requirements for microprocessor-based event recorders with a self-monitoring features. (Non-self-monitoring recorders require maintenance at quarterly intervals, under the requirements of § 229.25). Paragraph (d) contains two potential triggers for requiring maintenance on such event recorders. A self-monitoring microprocessor-based event recorder will require "maintenance" in the sense of opening the box and making adjustments only if either or both of the following occur: (1) the event recorder displays an indication of a failure, or (2) the railroad downloads and reviews the data for the past 48 hours of the locomotive's use and finds that any required channels are not recording data representative of the actual operations of the locomotive during this time period.

Essentially all modern event recorder systems are equipped with self-test circuitry that constantly compares data flowing in with the data being stored and that signals (typically with a red light) when there is a fault. In a sense, maintenance is simple: If the red light is off (and the unit is still receiving power), the unit is in good working order. The users and vendors of self-monitoring event recorders have discovered that, in common with many electronic devices, either the unit works or it does not. If it is working — if it is recording all the data it is required to record and if it is accurately storing the data sent by the sensors or other data collection points — no tweaking, lubricating, adjusting, or other traditional maintenance practice will make it work better or more accurately. If a self-monitoring event recorder is not working, that fact

will be displayed, and the experience of the users and builders is that a circuit board, or other electronic component, will have to be exchanged.

By the same token, the NTSB has recommended in its comments that the maintenance of locomotive event recorders should verify that the entire event recorder system—including the recorder, the memory module, the cabling, the transducers, and the sensors—is accurately recording what the locomotive has actually done. As noted above, the NTSB provided no data relating to the failure of sensors, transducers, or wiring that are not detected during the course of the currently required periodic maintenance of either the locomotive itself or the locomotive event recorder or during the self-test of more modern event recorders. Rather than impose a significant periodic inspection cost by specifically requiring the inspection of such components, FRA believes that the provisions related to the annual inspection will ensure the accuracy of the devices. To ensure that the recorder is indeed capturing data representative of the locomotive's actual operations, the final rule retains the proposed requirement that, sometime within 30 days of each annual periodic inspection, the railroad download and review the data required by § 229.135(b), as captured by the event recorder's crashworthy memory module. This download might be part of any other download a railroad might choose to perform, whether as a part of locomotive maintenance, employee monitoring, service planning, or whatever. The downloaded data must then be compared to the known operations of the locomotive over the past 48 hours and, if all required channels are recording and the required elements are representative of actual operations, the recorder—assuming always that the fault light is not on—will require no further maintenance or checking.

FRA recognizes that certain data elements do not regularly recur and may not, in fact, have been seen for a long time. Such elements might include EOT emergency applications,

EOT communications loss, EOT valve failure, and specific channels devoted to distributed power operations when such operations have not occurred to the locomotive within the past 48 hours. FRA has also eased the burden of specific "annual test dates" by acknowledging that any time an event recorder is downloaded, reviewed for the relevant elements as required in § 229.135(b), and successfully passes that review, a new 368-day interval begins. The added flexibility provided by this section could mean that locomotives equipped with microprocessor-based event recorders need never visit a shop just to check the event recorder.

The final rule also retains the proposed provisions for maintaining records related to annual inspections. Although the final rule does not specify how records of successful tests are to be maintained, FRA has no objection to keeping the records electronically, provided the electronic "record" is full and complete and contains all the information required by this section, the record is secure, the record is accessible to FRA for review and monitoring, and the record is made available upon request to FRA or any other governmental agent with the authority to request them. In addition, whatever medium is used to maintain the record, the record is to be kept at the location where the locomotive is maintained until a record of a subsequent successful test is filed.

One commenter on the NPRM expressed concern as to whether railroads maintain maintenance and repair instructions at each shop for each type of event recorder on which they perform periodic maintenance. A commenter also questioned whether there was a need to include qualification standards for individuals downloading and analyzing event recorder data. FRA is not aware of any instances where railroads do not have appropriate maintenance and repair manuals available for the event recorders they service. Members of the RSAC Working Group indicated that they have adequate access to maintenance and repair manuals for all types

of event recorders. Furthermore, a person should not be signing the blue card indicating performance of event recorder maintenance if that individual is not able and qualified to perform the required tasks. Neither FRA nor the NTSB has found unqualified or improperly trained individuals performing event recorder downloads or analysis. Moreover, on December 12, 2004, AAR implemented a mandatory locomotive event recorder download standard applicable to all member railroads to minimize operational and maintenance incompatibilities. See AAR Manual of Standards and Recommended Practices, Section M, AAR Standard S-5512, "Locomotive Event Recorder Download Standard" (November 2004). The standard defines the physical and logical download interfaces, various download methods, and the required protocol to support serial download of event recorders. Consequently, FRA does not see a need, at this time, to impose strict Federal qualification standards on those individuals responsible for the maintenance and downloading of event recorders. FRA will continue to monitor this issue should the need for additional regulation become necessary.

§ 229.135. Paragraph (a) retains the changes to this paragraph proposed in the NPRM. This paragraph modifies the existing provision by requiring the make and model of the event recorder to be entered on Form FRA F6180-49A (blue card). Some members of the Working Group, in written responses to the NPRM, continue to question the need to record this information on the blue card as there is no known instance where a problem was encountered downloading data or locating appropriate analysis software. These commenters assert that railroads and event recorder manufacturers are well aware of the type of event recorder installed on a locomotive and which software to employ for downloads. However, these commenters agree that the cost of this requirement is *de minimus*. This item was requested by the NTSB, and based on the NTSB's stated need for the information, FRA has

decided to retain the provision in this final rule. FRA continues to believe that there is very little burden placed on the railroads by requiring the information to be recorded because the presence of any such recorder is already required under the existing regulation and the benefit to an accident investigator may be considerable.

Several commenters suggested the need to expand the applicability of the event recorder requirements. These commenters recommended that any locomotive operating over a public or private grade crossing be equipped with an event recorder regardless of its operating speed. One commenter believed the requirements for event recorders should be applied to any remote controlled locomotive. The primary purpose of this rulemaking proceeding is to increase the survivability of locomotive event recorders and to ensure that necessary information is being captured by the devices for use in accident investigations. FRA did not intend to expand, nor has it seen a need to expand, the scope of what locomotives were covered by the regulations. To expand the applicability of these regulations as suggested would add a significant and unjustified cost to the industry. FRA previously determined that lower speed operations (i.e., those under 30 mph) do not result in complex accidents requiring the analysis of event recorder data. FRA is not aware of any data or information that contradicts this view. In addition, there are currently no remote controlled locomotives being operated at speeds exceeding 30 mph nor is such operation being considered in the immediate future by the industry. FRA will continue to monitor these types of operations and will take appropriate action should they change to include higher speed operation. Moreover, the on-board equipment on most remote controlled locomotives capture and retain inputs from the remote unit. Consequently, FRA does not see a need at this time to expand the scope of the event

recorder requirements to either locomotives operating under 30 mph or to remote controlled locomotives.

In its comments to the NPRM, NTSB sought clarification regarding the regulation's applicability to manned helper locomotives operating faster than 30 mph. The rule's application to these types of locomotives was not specifically considered when the NPRM was originally issued. After discussing the matter with the Working Group, the members of the Working Group agreed that to include these types of locomotives would not be a significant, if any, cost to the industry because most helper locomotives are operated by Class I railroads and are already equipped with event recorders. The Working Group indicated its acceptance of requiring event recorders on such locomotives provided that it was limited to the lead manned helper locomotive because in most instances the leading manned locomotive in a helper locomotive consist is the locomotive that is equipped with an event recorder. FRA agrees with the recommendation of the Working Group and the RSAC on this issue and believes that the information retained on these units could prove valuable in accident investigations where helper locomotives are present. Consequently, the final rule slightly amends the proposed applicability provisions contained in paragraphs (b)(1) and (b)(3) to include a specific reference to lead manned helper locomotives.

In its comments on the NPRM, BLET asserted that any controlling locomotive operated in positive train control (PTC) territory should be required to be equipped with a crashworthy event recorder capable of capturing all of the data elements proposed in this regulation. Although FRA understands BLET's position, FRA does not believe that such a requirement is necessary at this time. FRA believes that such a requirements might inhibit the current and future testing or implementation of PTC type systems. In addition, such a provision

would likely have a disparate impact on smaller railroads that share trackage with larger operations. Furthermore, virtually all of the PTC systems being developed already include data capturing devices and hardware. Consequently, FRA believes, and the RSAC recommendation concurs, that the issues related to the type of data to be recorded and the method by which the data is captured on PTC systems is an issue better addressed in the product safety plans required in subpart H of the recently issued final rule related to Standards for Development and Use of Processor-Based Signal and Train Control Systems (PTC final rule). See 70 FR 11051 (March 7, 2005).

Paragraph (b) essentially retains the proposed requirements for when a new or remanufactured locomotive must be equipped with a certified crashworthy memory modules and retains the proposed information that must be captured and stored by both new and existing event recorders. The provisions contained in this paragraph have been slightly modified to include certain clarifications related to identifying covered locomotives and to include specific outside dates when certain requirements become applicable. These modifications are discussed in detail below.

In order to avoid confusion when locomotives are re-sold after the original purchase from the manufacturer (i.e., sold from one user to another), the final rule specifies that the equipment required on a specific locomotive is determined by the date it was originally manufactured. The introductory language in this paragraph makes clear that the recorded data be at least as accurate as the data required to be displayed to the engineer. Further, the final rule retains the proposed language requiring the crashworthy event recorder memory module to be mounted for its maximum protection, stating that a module mounted behind the collision posts and above the platform is deemed to be appropriately mounted.

Several members of the Working Group continued to emphasize that the language contained in the proposed provision and retained in this final rule regarding the placement of the crashworthy event recorder memory module may be interpreted to limit the placement of the module. These parties assert that the placement of the module in an electrical cabinet may not necessarily be below the top of the collision posts and yet such placement would provide adequate protection and would actually provide superior crush resistance, be more fire resistant, and be a longer distance from the point of impact. Similarly, a module located in the nose of the locomotive may not be above the platform level and yet it would be sufficiently protected. The illustration retained in this final rule is intended to provide one example of a module properly mounted for its maximum protection. FRA continues to agree that there may be other mounting options that provide at least equal protection, and has retained the proposed language in the final rule text making this point very clear.

One commenter to the NPRM recommended that FRA should require railroads to utilize global positioning satellite (GPS) receivers to calculate and provide the time, location, speed, and direction elements to the event recorders. This commenter states that such technology would provide an absolute time standard. This commenter provided no indication as to how this would be accomplished and did not provide any cost estimates regarding the implementation of the suggestion. Neither the Working Group or the full RSAC believed there was a need to specify a method by which the required data is derived or obtained. FRA agrees with the recommendation of these parties. FRA believes that any such requirement would add a significant cost to the final rule while adding an unknown benefit, if any.

Certain provisions in paragraph (b) have been slightly modified to include a placed-in-service date after which the equipment must be properly equipped. In the NPRM, the

requirements relating to when a new locomotive is required to be equipped with a crashworthy event recorder memory module was based solely on the date that the locomotive was originally ordered. See 69 FR 39792. In the preamble to the NPRM, FRA voiced its concern that no outside parameter has been included in the proposal for newly manufactured locomotives. See 69 FR 39782. Thus, as proposed the regulation would have allowed any locomotive ordered prior to the one-year period not to be required to be equipped with a crashworthy event recorder even if not delivered and placed in-service until years later. FRA stated that it believed there should be a placed in-service date included in the final rule after which any new locomotive must be properly equipped. FRA sought comments and suggestions from interested parties as to an appropriate date to include in the final rule for ensuring that any applicable locomotive placed in service after that date is properly equipped with a crashworthy memory module.

Members of the Working Group, including AAR, APTA, and its member railroads, discussed this issued at length. These parties noted the need to ensure that any date inserted into the final rule must allow for existing contracts and contracts that are put into place within one year after the effective date of the final rule to be completed in order to prevent additional cost burdens on these contracts. These parties suggested that a period of four years after the effective date of the final rule would provide the necessary assurances. Therefore, the Working Group recommended a four-year period to the full RSAC in response to FRA's request. In turn, the RSAC included the four year period in its recommendation to FRA. FRA believes that the recommended four-year placed in-service date is reasonable and consistent with other federal regulations. Consequently, FRA has accepted the recommendation and has modified subparagraphs (b)(3) and (b)(4) to require that any identified locomotive ordered one year

after the effective date of the final rule or placed in-service four years after the effective date of the rule must be equipped with a crashworthy event recorder memory module.

Subparagraph (b)(1) contains the equipment requirements for current event recorders that use a recording medium other than magnetic tape. This section retains the proposed language to permit the continued use of these current event recorders on any locomotive manufactured until one year after the effective date of the final rule. At the initial meetings with the RSAC Working Group, FRA made clear that this rule was not intended to involve the retrofitting of existing locomotives with event recorders containing crashworthy memory modules. FRA continues to believe that, except for the need to replace event recorders using magnetic tape to record information, any significant retrofit requirement of existing locomotive event recorders cannot be justified from a cost/benefit perspective. In addition to the cost of the crashworthy event recorder, it would be cost prohibitive to retrofit many existing locomotives with the ability to monitor many of the data elements described in this paragraph.

Notwithstanding the above discussion, FRA believes that the industry and the marketplace will dictate that as older style event recorders fail they will be replaced with event recorders containing crashworthy memory modules. In addition, the operational benefits derived from the newer crashworthy event recorders will likely drive the railroads' decisions when acquiring replacement event recorders for existing locomotives. Moreover, as the newer crashworthy event recorders become more prevalent and are manufactured in greater numbers, the costs of the recorders will likely be more comparable to currently produced event recorders and thus, many railroads may find it economically advantageous to purchase the new crashworthy event recorders as replacements for the older model event recorders on existing locomotives. With these thoughts in mind, FRA sought comments or information from

interested parties as to whether there is some future date, that would impose little or no cost burden to the industry, after which any event recorder that is replaced on an existing locomotive should be replaced with an event recorder containing a crashworthy memory module described in Appendix D of this rule. See 69 FR 39783.

FRA received a limited number of comments in response to this request. AAR asserted that there is no need to establish an outside date on replacement event recorders as the marketplace and economics will drive the railroad's decisions. BLE suggested that any replacement event recorder eighteen months after the effective date of the final rule should be outfitted with a crashworthy memory module. Several members of the Working Group noted that any date considered must allow railroads to use up their existing stock of event recorders that are not equipped with crashworthy memory modules. AAR, APTA and their member railroads suggested a date of January 1, 2010 as the date after which any replacement event recorder acquired must be equipped with a crashworthy memory module pursuant to Appendix D of this final rule. These parties claim that a provision drafted in such a manner would allow railroads to continue to acquire solid state event recorders for the immediate future and would allow railroads to deplete their in-stock event recorders without imposing any significant financial burden on the industry. The full RSAC included this date in its recommendation to FRA. After reviewing the recommendation, FRA agrees that a cut-off date of January 1, 2010 for the purchase of newly manufactured event recorders without crashworthy memory modules is reasonable. FRA notes that this time frame is consistent with the elimination and replacement of event recorders utilizing magnetic tape as their recording medium discussed in subparagraph (b)(2) below. Consequently, FRA has incorporated the recommendation in a new paragraph (b)(6) by requiring that any event recorder originally manufactured after January 1, 2010, that is

installed on a locomotive identified in this paragraph shall be an event recorder with a crashworthy memory module meeting the requirements of Appendix D of this final rule.

FRA wishes to make clear that the event recorder currently installed on or any replacement event recorder subsequently installed on a locomotive identified in this paragraph (b)(1) need only be capable of recording the data elements specifically enumerated in this subparagraph. FRA continues to believe that it would be cost prohibitive, and in some cases impossible, to reconfigure existing locomotives with the ability to monitor and record many of the data elements required for newly manufactured locomotives. Consequently, FRA is retaining the proposed provision in this final rule that requires any covered locomotive ordered prior to one year after and placed in service prior to four years after the effective date of the final rule to be equipped with an event recorder capable of recording at least the nine data elements specifically identified in this subparagraph.

Subparagraph (b)(2) contains a "sunset" date for current event recorders using magnetic tape as their recording medium. In the NPRM, FRA proposed elimination of these types of event recorders within six years from the effective date of the final rule. See 69 FR 39783 and 39792. Due to significant industry efforts, AAR, APTA and their member railroads informed FRA that the proposed timetable for eliminating magnetic tape-based event recorders could be shortened to four years. These parties note that their replacement efforts are progressing faster than they originally estimated. Therefore, FRA is pleased to note that the date by which event recorders utilizing magnetic tape as its recording medium must be replaced has been reduced to just four years from the effective date of the final rule. Consequently, subparagraph (b)(2) has been slightly modified to reflect this modification to the timetable for replacement of event recorders with magnetic tape as their recording medium.

FRA believes eliminating the use of magnetic tape-based event recorders is necessary because it is essentially impossible to make a crashworthy event recorder memory module that uses magnetic tape. The final rule requires that, four years after the effective date of a final rule, all such recorders must be replaced with event recorders using "hardened" memory modules, but recording the same elements as they do now. The replacement recorders would not have to meet the crashworthy performance criteria contained in Appendix D to this final rule but would need to be solid state technology. As discussed in the preamble to the NPRM, the principal supplier of magnetic tape event recorders has ceased manufacturing them and has recently discontinued supplying replacement recording media. In addition, representatives of the railroads have indicated that the industry will voluntarily complete its replacement of such event recorders within the four years provided in this final rule. Accordingly, FRA continues to believe that this provision will not constitute a significant burden to the industry.

Subparagraph (b)(3) retains the proposed standards for new event recorders and make new event recorders that meet these standards mandatory equipment for freight (diesel) locomotives (other than DMU and MU locomotives) manufactured one year after the effective date of a final rule in this proceeding. The new recorder is required to have a certified crashworthy event recorder memory module meeting the performance criteria contained in Appendix D of the final rule. This final rule retains all of the proposed data elements without change. Thus, in addition to the data elements recorded by current event recorders detailed in subparagraph (b)(1), new event recorders will be required to record the following data elements:

- emergency brake applications initiated by the engineer or by an on-board computer;
- a loss of communications from the EOT (End of train) device;

- messages related to the ECP (electronic controlled pneumatic) braking system;
- EOT messages relating to "ready status," an emergency brake command, and an emergency brake application, valve failure indication, end-of-train brake pipe pressure, the "in motion" signal, the marker light status, and low battery status;
- the position of the switches for headlights and for the auxiliary lights on the lead locomotive;
- activation of the horn control;
- the locomotive number;
- the automatic brake valve cut in;
- the locomotive position (lead or trail);
- tractive effort;
- the activation of the cruise control; and
- safety-critical train control display elements with which the engineer is required to comply.

FRA is well aware of the pace at which technology is changing. Locomotives, once controlled by mechanical levers and wheels, now read the "input" of a moved lever and adjust multiple aspects of their operating systems to produce the desired result; they can accept a cruise control setting and adjust power to maintain a constant speed as the grade increases. New methods for monitoring and controlling train operations, some of them using global-positioning satellites as the basis for position determination, are now being deployed. Where these technologies affect the operation and safety of trains, the event recorder needs to be able to capture data elements that will enable analysis of the locomotive's operations. As just one example, if a positive train control system (PTC) "took away" control of a locomotive to

enforce train separation protocols, the recorder needs to capture the information that an input from outside the cab caused the train to speed up or slow down.

With PTC, the recorder needs to identify both the fact of an incoming signal and the response to it, whether automated or an engineer override. Just as the recording of cab signals is relatively easy because the signal system's aspect is already on board, so too it should be easy to capture a PTC signal and record any display elements on which the engineer is expected to rely and any commands sent to initiate braking and knock down power. The existing regulation requires that the cab signal display be recorded, but this technology may be superseded in the future. In the Working Group meetings, the Brotherhood of Locomotive Engineers (BLET) has consistently raised a concern with respect to determining the source of penalty brake applications initiated by innovative train control systems (i.e., not only what was the source of the brake application, but what indication was displayed to the engineer and on what basis this was determined). BLET provided the Working Group with a "white paper" further detailing its concerns in this area. This document has been made part of the docket in this proceeding. After reviewing BLET's concerns, RSAC's recommendation as well as the discussions of them within the Working Group, FRA has determined that it will accept the full RSAC's recommendation not to amend the data elements proposed in the NPRM in this final rule. Although it may not be possible to specify clearly all of the information that would be required to determine the basis for every penalty application, given the wide variety of possible system architectures, the final rule will retain the proposed data elements that require that the following be recorded:

- Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake

application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer; and

- Safety-critical train control data routed to the locomotive engineer's display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.

FRA believes that these two data elements, contained in both subparagraph (b)(3) and (b)(4), deserve additional explanation. The data element contained in subparagraphs (b)(3)(vi) and (b)(4)(vi) of the final rule requires that the system record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system must record, or provide a means of determining, the involvement of any such computer.

These additional requirements concerning the operation of the automatic braking system are necessary in order to take into account the proliferation of processor-based technology that is now extensively used to control the functions of locomotives, including on-board computers constituting subsystems of train control systems. When the original event recorder rule was being prepared, the automatic brake on most locomotives functioned by mechanical and pneumatic means, responding directly to manipulations of the controls by the locomotive engineer; and train control (where provided) addressed braking and power "knock down" functions very directly as well. Since that time, braking functions are becoming increasingly controlled electronically based on requests from the control stand, and the electronic commands themselves may pass through a second locomotive computer before being executed. Major manufacturers of locomotives have plans to run braking software on their own host processors. Further, some developing train control projects contemplate routing commands through other on-board computers.

In general, new electronic systems have functioned well, but there have been notable failures. It is obviously a dangerous situation when service braking is not available (requiring the engineer to employ the emergency braking feature). The unintended application of train brakes can also constitute a safety hazard, particularly in freight operations where management of in-train forces is a significant challenge. In the event of an accident, it is critical that data be logged in the event recorder memory module that is sufficient to determine the source of brake applications and releases. It should be known whether or not they were requested, and whether or not they occurred as requested, from the control stand. In the event no action was taken at the control stand that can explain the brake application, it is important to know (insofar as is feasible) the source of the application. While not every source of an unintended brake

application can be determined in real time and monitored electronically, on-board computers capable of issuing a command for application or release of the brakes or executing such commands should be monitored to determine their role.

The data element contained in subparagraphs (b)(3)(xxv) and (b)(4)(xxii) requires that safety-critical train control data routed to the locomotive engineer's display, with which the engineer is required to comply, be recorded. The data to be recorded would in every case include text messages conveying mandatory directives and maximum authorized speed. It may be necessary to record other data elements depending on the design of the train control system and the type of information displayed to the engineer (e.g., distance to a "target" at which a particular action must be taken). The format, content, and proposed duration for retention of such data would be specified by the railroad in the product safety plan (PSP) required to be submitted for the train control system under the new PTC final rule detailed in subpart H of 49 CFR Part 236, subject to FRA approval under this paragraph. See 70 FR 11051 (March 7, 2005). FRA would expect to approve this element of the PSP if it was clear that data sufficient to determine the proper functioning of the train control system is routed to the memory module and retained for a sufficient period to support accident investigation. FRA anticipates that railroads will elect to record additional train control data elements in a crashworthy memory module (e.g., train consist data entered by the crew that is critical to the correctness of the braking curve), and FRA will welcome inclusion of this additional data.

Train control systems are still evolving, and it is therefore difficult to anticipate what should be selected for recording; consequently, it may be difficult to plan for such eventualities. FRA believes that this final rule provides flexibility to address these future needs by determining data recording needs appropriate to various systems, including a shorter duration for data

retention if appropriate to the subject matter. Contemporary solid state recorders are programmable and should be capable of receiving and retaining the necessary data. If, for some reason not presently foreseen, data retention requirements for a train control system exceed the capacity of the primary memory modules, secondary modules associated with the on-board train control computer could be used to meet the need.

The final rule retains the proposal's use of the term "safety-critical" which is intended to have a meaning consistent with the meaning assigned in 49 CFR § 236.903. That section provides that "safety-critical," as applied to a function, a system, or any portion thereof, means the correct performance of which is essential to safety of personnel and/or equipment, or the incorrect performance of which could cause a hazardous condition, or allow a hazardous condition which was intended to be prevented by the function or system to exist. In the present context, then, safety-critical data would be data displayed to the locomotive engineer that is integral to a safety-critical train control function (such as avoiding over-speed operation, preventing a collision, or preventing an incursion into a work zone). The safety-critical functions of a new train control system are defined by the railroad in the requirements section of the PSP (consistent with the assumptions specified in the accompanying risk assessment). In addition, the term "mandatory directive," as used in this provision, has the meaning assigned to the term in 49 CFR § 220.5 ("any movement authority or speed restriction that affects a railroad operation") and that definition has been duplicated in § 229.5

BLET again raised various concerns related to the data elements that should be captured by the event recorder on PTC systems and by distributed power locomotives. These included such things as braking algorithms, train consist data, track profile data, and software being used for track profile data used in PTC systems. Based on the discussion provided

above, FRA continues to believe that data elements related to PTC systems are better addressed by the PSP required to be submitted and approved by FRA under subpart H of part 236. Consequently, FRA believes that speculation as to what needs to be recorded on these systems or how the information is to be captured should not be attempted in this regulation but would be better addressed when the specific systems are being developed and implemented.

With regard to distributed power locomotives, BLET seeks to have some method by which the event recorder would capture miscompare messages between the lead locomotive and the distributed power locomotives. A distributed power system places locomotives within the train consist to add their tractive and braking effort to the movement of, typically, long and heavy trains. The locomotives "distributed" back in the train are controlled by signals from the lead locomotive. At the NPRM stage of this proceeding, the Working Group agreed not to include a proposed requirement that new event recorders capture "miscompare" messages between the lead locomotive and the remotely distributed locomotive due to the extremely high costs associated with monitoring and capturing such data. BLET continues to disagree with the absence of this data element. This member again voiced concern that locomotive engineers should be given an opportunity to show that they were not responsible for the failure of a remote control locomotive to respond properly to a control input because of a problem with the communication link or other failure originating from software or hardware faults on a locomotive. A detailed discussion of the basis for this concern was included in the preamble to the NPRM. See 69 FR 39780.

Based on information and discussions of the Working Group as well as comments submitted to the docket, FRA is not convinced of the need to specifically capture the information requested by BLET. FRA continues to believe that it would be very costly to

record the large amount of data regarding communications between a lead locomotive and a distributed power locomotive. Furthermore, the event recorders on the lead locomotive and the lead distributed power locomotive can be compared to determine if a mis-communication between the units occurred in the limited number instances where such communication failure is suspected. Moreover, the safety benefits of recording this information are unclear because if a miscompare does occur, the systems are designed so that the remotely-controlled distributed power unit will shut down or be placed in idle. Consequently, FRA is not willing at this time to impose a significant cost to the industry by requiring the recording of information that could potentially be derived from other sources and the benefits of which are not clearly defined.

One data element proposed in the NPRM for new locomotives with new event recorders generated a significant amount of attention — the recording of the horn control handle activation. This data element was not the result of a recommendation from either the Working Group or the full RSAC. FRA received comments from several parties recommending that the actual sounding of the train horn be recorded as well as the horn's activation. Some commenters further suggested that any locomotive with an event recorder capable of capturing train horn activation or actual sounding should be required to do so. These parties assert that such requirements would reduce the disputes involving when and if the horn actually sounded during an accident investigation.

Although FRA is cognizant of the potential benefits of such a requirement, FRA believes the benefits are somewhat overstated. The reasons for carefully using data relating to horn activation are equally applicable to data related to the actual sounding of the train horn. Users of event recorder data for purposes other than accident investigation (such as supporting

claims in accident-related litigation) should bear in mind that the event recorder samples what is going on in the locomotive and there are gaps between the time the recorder first "looks" for the data from the horn switch activation sensor or the horn sound sensor and the time it next takes that "look." Even a gap of a second, at main line track speeds, can yield an inaccurate, false record of when, exactly, or where, exactly, the horn was blown. The Working Group was provided an excellent presentation of these recording limitations at its meeting in Atlanta, Georgia, in May of 1998 by Rail Sciences, Incorporated. Further, emergency responders complain that automobile drivers with their windows up, radios on, and air conditioning on often do not react to the sirens or air horns on fire trucks. The same situation exists when a railroad engineer blows his horn at an automobile starting across a crossing with too little time to clear. In addition, the locomotive horn is external to the cab of the locomotive, the effective operation of which may be diminished by snow, sleet, and other weather conditions.

With these limited benefits in mind, it is important to note that no commenter, other than AAR, provided any information or insight relating to the costs that any such requirement might entail. AAR indicated that the cost to monitor and record the actual sounding of the locomotive horn on either new or existing locomotives would be significant. AAR asserts, and FRA agrees, that the most significant cost would result from developing and maintaining the sensors required to monitor the actual sounding of the horn. As noted above, the locomotive horn is external to the cab of the locomotive thus, any sensor would also have to be mounted externally and would be subject to various external conditions. FRA believes that the costs related to the monitoring and recording of the actual sounding of the locomotive horn are not justified based on the limited benefits provided by such a requirement as discussed above. Thus, this final rule will retain the proposed requirement that the event recorder capture activation of the

locomotive horn control handle but will not include an additional data element related to the actual sounding of the horn. FRA continues to believe that horn activation data will provide one tool, among many, in the investigation of railroad accidents and in the monitoring of equipment and the people who operate it. FRA again cautions that the use of the data for other purposes should be made only after fully considering the limited usefulness of such data as briefly discussed above. This provision reflects FRA's responsibility to implement 49 U.S.C. § 20153. FRA notes that if railroads monitor and record the sounding of the locomotive horn voluntarily, then the data would need to be preserved pursuant to the provisions contained paragraph (e) of this final rule.

In its comments to the NPRM, the NTSB sought clarification of FRA's rationale for not including a requirement to record the wheel slip/slide alarm on freight locomotives similar to that contained in subparagraph (b)(4) for MU and DMU locomotives. FRA is requiring the recording of tractive effort. Moreover, there is no uniformity as to when wheel a slip/slide alarm is activated in the freight industry. This is due to the fact that there is no consistency in how wheel slip/slide is measured and recorded. Thus, the data would not provide any useable, readily applicable information. In addition, the monitoring and recording of this data would impose an additional cost to the industry based on the uncontested information provided by AAR. Both the Working Group and the full RSAC recommended that a provision to record the wheel slip/slide alarm on freight locomotives was not necessary for the reasons noted above. FRA agrees with this recommendation and is not willing to impose an additional cost in order to capture data of limited value. FRA notes that if railroads monitor and record this information of their own volition, then the data would need to be preserved pursuant to the provisions contained paragraph (e) of this final rule.

Several commenters to the NPRM also suggested the need to require that video cameras of some type be mounted on the front of all locomotives and that the event recorder capture such recordings. While FRA acknowledges that there may be some benefit to requiring video cameras, FRA believes that consideration of such a requirement is outside the scope of this rulemaking proceeding. There are a variety of issues that would need to be explored, discussed, and researched related to the placement, content, use, retention, and cost of requiring such devices and retaining the recorded materials. FRA believes that the final rule stage of this proceeding is not the appropriate time or place to begin such considerations. FRA believes that a separate rulemaking proceeding would be required if the need and/or desire for such regulations were established. At the Working Group meeting and in their written comments, AAR and several of its member railroads stated their support of a separate rulemaking proceeding to consider the issues related to requiring video and locomotive cab recordings. AAR noted that it has established a video standards working group to address the development of industry environmental and technical standards. BLET stated that it would consider discussing these types of issues if the purpose of video standards is safety and not discipline of employees. NTSB also expressed its belief that video and cab recording issues need to be addressed by FRA and the industry. However, all of these parties agreed with FRA's position that the issues related to video and cab recordings should not and cannot be addressed in this rulemaking proceeding without the issuance of a new NPRM.

Subparagraph (b)(4) contains the requirements for equipping new MU and DMU locomotives with event recorders having crashworthy memory modules and capable of recording various data elements similar to those required in subparagraph (b)(3). Thus, the discussions relating to the data elements contained in that subparagraph are equally applicable

in this context. This subparagraph applies to any MU or DMU locomotive ordered one year from the effective date of this final rule or placed in service four years after the effective date of this final rule. Differences between subparagraphs (b)(3) and (b)(4) reflect the differences between freight locomotives and heavy electric commuter equipment, primarily in the particular brake application data required to be monitored and recorded.

Subparagraph (b)(5) retains the requirements proposed in the NPRM without change. FRA received no comments on this provision. This subparagraph requires that when a locomotive equipped with an event recorder is remanufactured, it must be equipped with a certified crashworthy event recorder memory module capable of capturing the same data as the recorder on the pre-remanufactured locomotive.

Subparagraph (b)(6) contains a new requirement not specifically proposed in the NPRM. A detailed discussion of the provision is included in the section-by-section analysis related to subparagraph (b)(1). In the NPRM, FRA sought comments or information from interested parties as to whether there was some future date, that would impose little or no cost burden to the industry, after which any event recorder that is replaced on an existing locomotive should be replaced with an event recorder containing a crashworthy memory module described in Appendix D of this rule. See 69 FR 39783.

At the Working Group meeting to discuss the comments to the NPRM, AAR, APTA and their member railroads suggested a date of January 1, 2010 as the date after which any replacement event recorder acquired must be equipped with a crashworthy memory module pursuant to Appendix D of this final rule. These parties claim that a provision drafted in such a manner would allow railroads to continue to acquire solid state event recorders for the immediate future and would allow railroads to deplete their in-stock event recorders without

imposing any significant financial burden on the industry. The full RSAC included this date in its recommendation to FRA. After reviewing the recommendation, FRA agrees that a cut-off date of January 1, 2010 for the purchase of newly manufactured event recorders without crashworthy memory modules is reasonable. FRA notes that this time frame is consistent with the elimination and replacement of event recorders utilizing magnetic tape as their recording medium discussed in subparagraph (b)(2) above. Consequently, the final rule requires that any event recorder originally manufactured after January 1, 2010 and installed on a locomotive identified in this paragraph shall be an event recorder with a crashworthy memory module meeting the requirements of Appendix D of this final rule.

Paragraph (c) is retained as proposed in the NPRM. FRA received no comments on this provision in response to the NPRM. This paragraph contains the requirements relating to removing an event recorder from service. This paragraph is essentially the same as paragraph (c) of the existing regulation, modified for clarity and to reflect the specific equipment requirements in paragraph (b).

Paragraph (d) is retained as proposed in the NPRM. Essentially, this paragraph is the same as paragraph (b) of the existing regulation with slight modification for clarity. This paragraph makes clear that a locomotive on which the event recorder is removed from service may only remain as the lead locomotive until the next calendar day inspection is performed on the locomotive. FRA received comments from three parties related to this provision. These commenters suggested that no locomotive should be permitted to operate as a lead locomotive with a disabled or non-functioning event recorder. One commenter also recommended that if any required data element is not being recorded at the time of an incident, the railroad should be required to file a report with FRA addressing the condition and how it was corrected.

These comments were considered and discussed by the Working Group and the Working Group and the full RSAC recommended that no change in the proposed provision was necessary. FRA agrees with this recommendation. FRA believes that the provisions relating to the continued use of a locomotive with a defective event recorder for a short period of time recognize the realities of railroad operations. In many cases, changing locomotive power cannot be done instantaneously upon finding a defective condition. In addition, locomotive power is in limited supply and conservative utilization of that resources is necessary to ensure effective railroad operations. Moreover, the handling of defective equipment provision retained in this paragraph has served FRA, NTSB, and the industry well for over a decade. FRA is not aware of any instance where use of this provision has resulted in the loss of any necessary data. Consequently, the final rule is retaining this paragraph as proposed in the NPRM.

One commenter suggested that FRA adopt a procedure into the regulation that would allow parties to file complaints with FRA regarding a railroad's non-compliance with the event recorder requirements and that each complaint should be required to be addressed within 30-days with written findings to the complainant. FRA believes such a provision is unnecessary. Any person or party with information regarding non-compliance with any of the federal regulations handled by FRA are free to contact any of FRA's regional offices or headquarters by letter, e-mail, telephone, or verbally to report such information. FRA investigates all credible complaints and provides specific feedback to the complainant when such feedback is requested. FRA sees no reason to place specific procedures into the event recorder regulations nor did the commenter provide any rationale for doing so.

Paragraph (e) contains the requirements relating to a railroad's duty to preserve locomotive event recorder data, or any other locomotive mounted recording devices that records information concerning the functioning of a locomotive or train when involved in an accident or incident required to be reported to FRA under 49 CFR part 225. Except for the period of time that such data must be preserved, discussed in detail below, the final rule retains the language proposed in the NPRM. This section combines and simplifies paragraphs (d) and (d)(1) of the existing event recorder regulation.

The current regulation allows a railroad after an accident, to "extract and analyze" data from the event recorder, if the railroad preserves "the original or a first-order accurate copy" of the data. Experience since the present event recorder rule became effective shows that the phrase "first-order accurate copy" is not easily understood by those first on scene at a derailment. First responders must primarily deal with wrecked equipment, the potential need for life-saving actions, and the ever-present danger— especially if hazardous materials are present—of fire, smoke, and explosion. FRA believes it has clarified the requirement. The final rule retains the proposed language to permit a railroad to extract and analyze such data, provided the original downloaded data file, or an unanalyzed exact copy of it, is retained subject to the direction and control of FRA or the NTSB. In the case of microprocessor-based machines, the "original" copy of the data will not show any immediately prior downloads, while the "copies" may show that previous downloads have occurred. Certainly this is not a requirement to put a "marker," or some indication in the downloaded data to show the "order" in which multiple downloads were made; the final rule mandates that the original download be preserved for analysis by FRA or the NTSB.

The final rule also retains the current rule and proposed language that require efforts, "to the extent possible," and "to the extent consistent with safety," to preserve all the data stored in any locomotive-mounted recording device designed to record information concerning the functioning of the locomotive or train. FRA is well aware of the difficulty of performing field downloads of data retention devices not so designed; FRA is also aware that such downloads may be more dangerous, especially in an accident situation, than extracting the data from a crash-hardened event recorder memory module designed for easy field downloads. FRA's experience is that those who serve as the railroad's incident commanders are well schooled in safety and the preservation of life and property, and this agency is comfortable with the decisions they will make about the safety of entering a hostile atmosphere to gather knowledge about the dynamics immediately preceding an accident.

FRA received a number of comments relating to the provisions contained in this paragraph. These comments included recommendations for the following: preserving such data for periods up to three years; providing exact copies of any downloaded data to local police to be made part of the accident report; permitting data to be downloaded only in the presence of a law enforcement officer; making software for analyzing data available to any individual or public entity; requiring local law enforcement personnel to record various information on the locomotive and person downloading the data; and notification of involved motorists and families by the railroad that event recorder data exists. The Working Group considered and discussed the concerns identified above. The Working Group recommended that because most event recorder data downloads are stored on compact discs or hard drives there was not a significant burden in requiring retention of the data for a period of longer than 30 days. The Working Group believed that a period of one year was reasonable as this would ensure data was

available for subsequent review if an accident or incident was not immediately investigated by FRA or NTSB. Therefore, the Working Group and the full RSAC recommended extending the time period for retaining the required data from the 30-days contained in the existing regulation to one year. FRA has accepted this recommendation and does not see a need to extend the preservation period beyond that time frame. Neither NTSB or FRA could articulate an instance where recorded data was determined to be needed or not needed more than one year of an accident reportable to FRA under part 225.

With regard to the other issues raised related to the preservation of recorded data, FRA agrees with the Working Group and RSAC recommendation to not alter the language proposed in the NPRM. The primary purpose of this provision is to ensure that data from event recorders and other locomotive mounted recording devices are retained for a sufficient amount of time to ensure that FRA and NTSB can accurately and effective conduct accident investigations. The provision was never intend to serve as a platform for private litigants to obtain access to evidentiary materials. Although FRA recognizes the relevance and need for private parties to obtain this information, FRA believes there are sufficient legal processes by which private litigants can obtain access and ensure the veracity of the data required to be preserved in this provision. In Working Group discussions, NTSB noted that it does not permit observers in its facilities when data is being downloaded and that it does not have law enforcement personnel witness such downloading. NTSB does brief interested law enforcement personnel after the data is downloaded and analyzed. In addition, neither FRA nor NTSB could identify a circumstance where they experienced a problem in getting appropriate software from the involved railroad to conduct their analyses of event recorder data. Based on the intent of this provision and based upon FRA's and NTSB's experience in

investigating accidents, FRA believes that it would be inappropriate to include the recommendations submitted by various commenters noted above.

Paragraph (f) retains the language proposed in the NPRM without change. This paragraph explains the regulations relationship to other laws including sate laws, NTSB authority, and the authority of the Secretary of Transportation. FRA received no comments on this provision in response to the NPRM. Identical language is contained in paragraph (d)(2) of the existing regulation and was merely separated in the NPRM and this final rule for purposes of clarity and ease of citation.

Paragraph (g) retains the language proposed in the NPRM without change. This paragraph explains the potential ramifications related to willfully disabling an event recorder or tampering with or altering the data recorded by such devices. BLET sought clarification as to whether the altering of brake algorithms, train consist data, or track profile data is covered by the tampering and disabling provisions contained in 49 CFR part 218. While part 218 only addresses the disabling of the actual device, if such an action alters or tampers with the data produced by the event recorder such action could be addressed by civil penalties under this paragraph directly or by an independent disqualification action under the procedures contained in 49 CFR part 209. Similar language is contained in paragraph (e) of the existing regulation.

Appendix B contains the schedule of civil penalties to be used in connection with part 229. Conforming changes are being made to the entries related to § 229.135 to reflect the changes made to that section by this final rule as discussed above.

Appendix D retains the proposed criteria for certification of an event recorder memory module (ERMM) as crashworthy. The elements contained in this appendix are the result of the collaborative efforts of a task group of the RSAC Event Recorder Working Group and were

adopted by the full RSAC in its recommendation to FRA. FRA continues to agree with the recommendation of the full RSAC. This appendix establishes the general requirements, the testing sequence, and the required marking for memory modules certified by their manufacturers as crashworthy. This appendix also contains the performance criteria for survivability from fire, impact shock, crush, fluid immersion, and hydrostatic pressure.

The performance criteria contained in Section C of Appendix D are presented in two tables which represent alternative performance criteria under which an ERMM could be tested for crashworthiness. During the development of the NPRM the Working Group discussed and reviewed various performance criteria which some manufacturers of event recorders began using in an effort to pre-qualify their ERMMs. Rather than penalizing these manufacturers by including only the performance criteria contained in Table 1, FRA also provides the performance criteria contained in Table 2 as an acceptable alternative. FRA expects that ERMMs built to Table 2 criteria would survive more extreme conditions than those built under Table 1. FRA is also advised by manufacturers that have already designed and tested Table 2 ERMMs that the incremental cost of event recorders built to those more rigorous criteria will be less than the incremental cost of Table 1 ERMMs (for which the differential associated with increased fire protection over the IEEE criteria is said to be the cost driver).

The performance criteria contained in Table 1 of this appendix are adapted from the Institute of Electrical and Electronics Engineers, Inc., IEEE Std 1482.1-1999, IEEE Standard for Rail Transit Vehicle Event Recorders. Virtually all of the criteria contained in this table are included in Section 4.5 of the above noted IEEE standard. FRA has slightly modified the fire criteria to make it consistent with the conditions an event recorder would encounter in actual operation. FRA increased the IEEE high temperature fire standard from 650 degrees Celsius

to 750 degrees Celsius because the higher temperature is consistent with the temperature at which locomotive diesel fuel burns. FRA also did not include IEEE's penetration standard as FRA finds it unnecessary for purposes of an event recorder mounted inside a locomotive. Although FRA and the Working Group explored other performance criteria, FRA believes that the criteria contained in Table 1 are acceptable to the vast majority of the parties participating in and affected by this regulation, are a significant improvement over any existing crashworthiness standard, and will ensure the protection and retention of the necessary event recorder data when investigating virtually all railroad accidents involving locomotives equipped with event recorders. Several manufacturer's of event recorders noted that they currently manufacture or are capable of manufacturing a crashworthy ERMM consist with IEEE's standard. Furthermore, the NTSB indicated its potential acceptance of the criteria contained in Table 1 at the NPRM stage of this proceeding.

It should be noted that in its comments to the NPRM, the NTSB urged FRA to adopt the criteria contained in Table 2 of the proposal and phase-out the criteria contained in Table 1 over a period of time. Table 2 of this appendix contains alternative performance criteria to those adapted from IEEE's standard. As discussed above, the performance criteria contained in Table 2 was included in the NPRM, and is being retained in this final rule, based on information received from a small number of manufacturers indicating that they were currently producing some crashworthy ERMMs based on the criteria contained in Table 2. Rather than penalize those manufacturer's that took the lead in developing crashworthy ERMMs, FRA believed and continues to believe that it is appropriate to include the criteria used by those manufacturer's in developing their ERMMs instead of requiring recertification of the modules under the criteria contained in Table 1. Although NTSB espoused its desire for the Table 2

criteria, it did not provide any cost estimates related to adopting those standards. Moreover, NTSB did not provide any examples or known incidents, other than fires fueled by a source other than diesel fuel, where the performance criteria contained in Table 1 would not be effective in preventing the destruction of necessary event recorder data. Furthermore, it was generally not the Working Group's, RSAC's, or FRA's intent to have the performance criteria contained in Table 2 serve as the regulatory standard. They were included primarily for the purpose of accommodating a small number of manufacturers currently producing ERMMs. Both Tables have benefits and FRA continues to believe that the performance criteria contained in Table 1 are the most cost effective standards available to the industry at this time.

Table 2 contains two options for meeting the Impact Shock performance criteria. When using Table 2 criteria, crashworthy ERMMs may utilize either the IEEE impact shock performance criteria or the impact shock criteria discussed by the Working Group. FRA continues to believe that either impact shock criteria is acceptable. FRA recognizes that the duration of the impact pulse contained Table 2 may be far more expensive to produce than that contained in the IEEE standard and that there are only a few testing laboratories capable of performing a test for that duration. FRA realizes that there is a trade-off between a higher impact value for a short duration as opposed to a lower impact pulse for a longer duration. FRA sees merit in both criteria and is not willing to espouse the benefits of either criterion over the other, and will permit the use of either criterion when testing the ERMM.

One commenter suggested that FRA consider whether standards related to electromagnetic interference (EMI) should be included in the performance criteria. This commenter did not provide any information related to instances of such interference and did not suggest any criteria to address the issue. FRA and the Working Group did consider EMI

effects on event recorders when developing the NPRM. Several parties made presentations to the Working Group on EMI at the January 27, 1999, meeting held in Washington, D.C. The Working Group eventually decided against including any specific EMI related criteria in the regulation based on its determination that the issue was not a major concern in the area of locomotive event recorders if adequate shielding, cabling, gasketing, and grounding of the devices. The Working Group did not find any problems related to data corruption due to EMI issues. The Working Group reiterated this position when considering the comment to the NPRM. FRA is not aware and has not been provided any indication that EMI is a significant problem in the area of locomotive event recorders. FRA will continue to monitor this issue and take appropriate regulatory action should it become necessary. Consequently, FRA accepts the recommendation of the RSAC Working Group and is not including EMI-specific performance criteria in this final rule.

It should be noted that each set of criteria is a performance standard and FRA has not included any specific test procedures to achieve the required level of performance. Although FRA and the Working Group considered specific testing criteria, FRA continues to believe that it is not necessary to include specific testing criteria in this regulation. FRA did not receive any comments in response to the NPRM suggesting a need to include specific testing criteria. FRA also believes that the industry and the involved manufacturers are in the best position to determine the exact methods by which they will test for the specified performance parameters. It should be noted that the Working Group did consider the testing criteria contained in the following international standards: (1) The European Organization for Civil Aviation Equipment (EUROCAE), ED-55, Minimum Operational Performance Specification for Flight Data Recorder System (May 1990); (2) EUROCAE ED-56A, Minimum Operational Requirement

for Cockpit Voice Recorder System (December 1993); and (3) The Fluid Immersion Test Procedures contained in the National Fire Protection Association's Fire Protection Handbook, 18th Edition. Although FRA endorses the use of any of the above standards, FRA is not mandating their use at this time. Appendix D makes clear that any testing procedures employed by a manufacturer must be documented, recognized, and acceptable.

FRA wishes to inform all interested parties that they may obtain a copy of the standards noted in the above discussion through the following: (1) the EUROCAE standards may be obtained from The European Organization for Civil Aviation Equipment, 17, rue Hamelin, 75783 PARIS CEDEX 16, France; (2) the Fire Protection Handbook, 18th Edition, may be obtained from the National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101; and (3) the IEEE Standard for Rail Transit Event Recorders, IEEE Std 1482.1-1999, may be obtained from The Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017-2394. Interested parties may also inspect a copy of any of these materials during normal business hours at the Federal Railroad Administration, Docket Clerk, Suite 7000, 1120 Vermont Avenue, NW., Washington D.C. 20590.

Section E of appendix D retains the proposed testing exception for new model crashworthy ERMMs that represent an evolution or upgrade of an older model ERMM meeting the performance criteria contained in this appendix. FRA has included this exception based on its determination that there is no reason to subject a new model ERMM to the proposed testing where no material change has been made to the unit that would impact any of the performance criteria. For example, if a memory chip is modified but the remainder of the box is left unchanged, there would likely be no reason to subject the unit to all or any of the required tests.

In this example, the only performance criteria, if any, potentially affected might be the fire standard. This section makes clear that the new model ERMM need only be tested for compliance with those performance criteria contained in Section C of appendix D that are potentially affected by the upgrade or modification. FRA will consider a performance criteria to not be potentially affected if a preliminary engineering analysis or other pertinent data establishes that the modification or upgrade will not affect the crashworthy performance criteria established by the older model ERMM. The provision requires the manufacturer to retain and make available to FRA upon request any analysis or data relied upon to make a determination relating to the crashworthiness impacts of any upgrade or modification to an older model ERMM.

V. Regulatory Impact and Notices

Executive Order 12866 and DOT Regulatory Policies and Procedures

This final rule has been evaluated in accordance with existing policies and procedures, and determined to be **non-significant(?)** under both Executive Order 12866 and DOT policies and procedures (44 FR 11034; Feb. 26, 1979). FRA has prepared and placed in the docket a regulatory evaluation addressing the economic impact of this rule. Document inspection and copying facilities are available at the Department of Transportation Central Docket Management Facility located in Room PL-401 on the Plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, D.C. 20590. Access to the docket may also be obtained electronically through the Web site for the DOT Docket Management System at http://dms.dot.gov. Photocopies may also be obtained by submitting a written request to the FRA Docket Clerk at Office of Chief Counsel, Stop 10, Federal Railroad Administration,

1120 Vermont Avenue, NW., Washington, D.C. 20590; please refer to Docket No. FRA-2003-16357. FRA invites comments on this regulatory evaluation.

Event recorders have successfully improved the safety of rail operations by monitoring railroad operations and by capturing the pre-accident inputs to the train control. This impartial collection of data has improved the ability of the railroads and the railroad operating employees, the ability of the railroads and governmental agencies to investigate accidents, and the ability of FRA and the States to regulate railroad operations. These contributions have, in turn, tended to reduce the number and severity of incidents, accidents, and resulting damage and casualties. The higher standards contained in this final rule can be expected to produce even greater safety progress. Therefore, dilution of the existing standards or rejection of the higher standards contained in this final rule would create the potential for an increase in property damage, injuries, and fatalities resulting from rail accidents.

The Regulatory Impact Analysis (RIA) developed in connection with this final rule uses a break-even analysis approach to assessing the monetary impacts and safety benefits of this proposal. This approach is appropriate for this particular rule because event recorders do not directly prevent accidents. Event recorders may indirectly prevent future accidents by allowing for in-depth accident causation analysis to take place using complete information, thereby allowing accurate causation determinations, and the development of appropriate and effective countermeasures. Because event recorders also allow the railroad to monitor train handling performance and rules compliance in a widespread and economical way, FRA believes that event recorders might have the potential of increasing skillful train handling and encouraging rules compliance. The extent of the event recorders' contribution to accident analyses, train handling, and rules compliance is somewhat open to interpretation and argument. FRA is not in

a position to claim a particular degree of improvement in these areas from event recorders. Therefore, the RIA simply states the level of effectiveness (avoided accidents, etc.) that event recorders would have to reach such that the cost of the final rule would be "paid for" by the benefits expected to be achieved. It should be noted that the accident figures used in FRA's analysis do not include the costs of environmental cleanup or evacuations related to human factor caused accidents.

FRA expects that overall the rule will not impose a significant additional cost on the rail industry over the next twenty years. FRA believes it is reasonable to expect that several accidents, injuries, and fatalities will be avoided as a result of implementing this proposed rule. FRA believes that this safety benefit alone justifies the measures contained in this final rule. FRA also believes that the safety of rail operations will be compromised if this rule is not implemented. The RIA indicates that an accident reduction of approximately 2 percent (2%) annually during the first twenty years "breaks-even" with the expected costs of the final rule. In FRA's judgement this level of Human Factor Accident reduction is clearly achievable, and is likely to be exceeded. This is all the more likely if one or more of the accidents prevented is a passenger train accident. Passenger train accidents usually have more casualties than other types of train accidents, just based on the fact that more people are exposed to the dangers and damages of the accident. Also, those types of accidents tend to be much more disastrous than a typical freight train accident, such as a derailment or an accident that does not involve hazardous materials, thus costing much more than the assigned average value of a human factor accident.

Although FRA believes this final rule is justified by safety benefits alone, the addition of clear and substantial business benefits makes the final rule obviously justified. For example, the

estimated savings resulting from just the proposed requirement of the floating year approach to the inspection period is a total 20-year benefit of approximately $ 1.2 million. In addition to this quantified business benefit there are other benefits which may result from this final rule that are not quantified in the RIA. For example, the quality and quantity of information gained by recorded data resulting in increased knowledge of train handling and pre-accident inputs (events occurring just prior to impact which may have contributed to the cause) and the public perception that the railroads offer higher levels of safety and efficiency are not easily quantified benefits.

The following table presents estimated twenty-year monetary impacts associated with the new requirement for crashworthy event recorders. The table contains the estimated costs and benefits associated with this final rule and provides the total 20-year value as well as the 20-year net present value (NPV) for each indicated item. The dollar amounts presented in this table have been rounded to the nearest thousand. For exact estimates, interested parties should consult the RIA that has been made part of the docket in this proceeding.

Description	20-Year Total	20-Year NPV
Costs:		
Replacement of Magnetic Tape Recorders:	$ 6,310,000	$ 5,272,000
Crashworthy ERMM no new parameters:	$ 558,000	$ 296,000
Crashworthy ERMM new parameters:	$ 16,494,000	$ 8,706,000
Maintenance/Inspections:	$ 16,107,000	$ 8,281,000
Preservation of Data:	$ 124,000	$ 66,000

Total Costs:	**$ 39,593,000**	**$ 22,611,000**
Benefits:		
Safety: Reduction of Human Factor accidents and injuries (2% effectiveness):	$ 42,808,000	$ 22,675,000
Business: Magnetic tape inspection savings:	$ 1,751,000	$ 1,201,000
Total Benefits:	**$ 44,559,000**	**$ 23,876,000**

Regulatory Flexibility Act and Executive Order 13272

The Regulatory Flexibility Act (5 U.S.C. 601 et seq.) and Executive Order 13272 require a review of proposed and final rules to assess their impact on small entities. FRA has prepared and placed in the docket an Analysis of Impact on Small Entities (AISE) that assesses the small entity impact of this final rule. Document inspection and copying facilities are available at the Department of Transportation Central Docket Management Facility located in Room PL-401 on the Plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, D.C. 20590. Docket material is also available for inspection on the Internet at http://dms.dot.gov. Photocopies may also be obtained by submitting a written request to the FRA Docket Clerk at Office of Chief Counsel, Stop 10, Federal Railroad Administration, 1120 Vermont Avenue, NW., Washington, D.C. 20590; please refer to Docket No. FRA-2003-16357.

"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. The U.S.

Small Business Administration (SBA) has authority to regulate issues related to small businesses, and stipulates in its size standards that a "small entity" in the railroad industry is a railroad business "line-haul operation" that has fewer than 1,500 employees and a "switching and terminal" establishment with fewer than 500 employees. SBA's "size standards" may be altered by Federal agencies, in consultation with SBA and in conjunction with public comment.

Pursuant to that authority FRA has published a final statement of agency policy that formally establishes "small entities" as being railroads that meet the line-haulage revenue requirements of a Class III railroad. See 68 FR 24891 (May 9, 2003). 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. FRA uses this alternative definition of "small entity" for this rulemaking.

The AISE developed in connection with this final rule concludes that this rule would not have a significant economic impact on a substantial number of small entities. Thus, FRA certifies that this final rule is not expected to have a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act or Executive Order 13272.

While about 645 of the approximately 700 railroads operating in the United States are considered small businesses by FRA, this final rule would only apply to railroads that operate passenger or freight trains at speeds greater than 30 mph. Very few of these smaller railroads

conduct operations on track that is suitable for top speeds of greater than 30 mph, i.e., track maintained above Class 2 standards, thus, FRA believes that the vast majority of small railroads would not be impacted by the final rule. Further, most small railroads own older locomotives and, thus, would not be affected by the new equipment requirements of this rule. FRA estimates that approximately only 350 locomotives operated by these smaller railroads would be affected by the provisions contained in this final rule. The AISE associated with this rule estimates that the economic impact on these operations will have a NPV of less than $ 400,000 over a 20-year period. Representatives of small railroads participated in the RSAC discussion that provided the basis for this final rule.

Paperwork Reduction Act

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

CFR Section	Respondent Universe	Total Annual Responses	Average Time per Response	Total Annual Burden Hours	Total Annual Burden Cost
229.9 - Movement of Non-Complying Locomotives	685 Railroads	21,000 tags	1 minute	350 hours	$12,250
229.17 - Accident Reports	685 Railroads	1 report	15 minutes	.25 hour	$10
229.21 - Daily Inspection	685 Railroads	5,655,000 rcds.	1 or 3 min.	263,383 hours	$10,798,703
Form FRA F 6180.49A Locomotive Insp/Repair Rcd	685 Railroads	14,750 forms	2 minutes	492 hours	$17,220
210.31 - Locomotive Noise Emission Test	685 Railroads	100 tests/remarks	15 minutes	25 hours	$850
229.23/229.27/229.29/229.31 - Periodic Inspection/Annual Biennial Tests/Main Res. Tests	685 Railroads	87,000 tests	8 hours	696,000 hours	$24,360,000
229.33 - Out-of Use Credit	685 Railroads	1,000 notations	5 minutes	83 hours	$2,822
229.25(1) - Test: Every Periodic Insp. - Written Copies of Instruction	685 Railroads	200 amendments	15 minutes	50 hours	$1,700
229.25(2) - Duty Verification Readout Record	685 Railroads	4,025 records	30 minutes	2,013 hours	$58,377
229.25(3) - Pre-Maintenance Test - Failures	685 Railroads	700 notations	30 minutes	350 hours	$10,150
229.135(A.) - Removal From Service	685 Railroads	1,000 tags	1 minute	17 hours	$578
229.135(B.) - Preserving Accident Data	685 Railroads	100 reports	15 minutes	25 hours	$850
NEW REQUIREMENTS					
229.27 - Annual Tests	685 Railroads	700 Test Records	90 minutes	1,050 hours	$30,450
229.135(b)(1) & (2)- Equipment Rqmnts - Mag Tape Replacements	685 Railroads	850 Cert. Mem Modules	2 hours + 200 hours	1,900 hours	Included in RIA
229.135(b)(3) - Equipment Rqmnts - Lead Locomotives	685 Railroads	600 Cert. Mem Modules	2 hours	1,200 hours	Included in RIA
229.135(b)(4) - Equipment Rqmnts - MU Locomotives	685 Railroads	255 Cert. Mem Modules	2 hours	510 hours	Included in RIA
229.135(b)(5) - Equipment Rqmnts. - Other Locomotives	685 Railroads	1,040 Cert. Mem Modules	2 hours	2,080 hours	Included in RIA

All estimates include the time for reviewing instructions; searching existing data sources; gathering or maintaining the needed data; and reviewing the information. For information or a copy of the paperwork package submitted to OMB contact Robert Brogan at 202-493-6292.

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.

FRA cannot 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.

Federalism Implications

FRA has analyzed this final 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 final 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 final 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 final 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 final 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 final rule has no federalism implications, other than the preemption of state laws covering the subject matter of this final rule, which occurs by operation of law under 49 U.S.C. § 20106 whenever FRA issues a rule or order.

Environmental Impact

FRA has evaluated this regulation in accordance with its "Procedures for Considering Environmental Impacts" (FRA's Procedures) (64 FR 28545, May 26, 1999) as required by the National Environmental Policy Act (42 U.S.C. 4321 et seq.), other environmental statutes, Executive Orders, and related regulatory requirements. FRA has determined that this regulation is not a major FRA action (requiring the preparation of an environmental impact statement or environmental assessment) because it is categorically excluded from detailed environmental review pursuant to section 4(c)(20) of FRA's Procedures. 64 FR 28547, May 26, 1999. Section 4(c)(20) reads as follows:

> (c) Actions categorically excluded. Certain classes of FRA actions have been determined to be categorically excluded from the requirements of these Procedures as they do not individually or cumulatively have a significant effect

> on the human environment. *** The following classes of FRA actions are categorically excluded:
> * * *
> (20) Promulgation of railroad safety rules and policy statements that do not result in significantly increased emissions or air or water pollutants or noise or increased traffic congestion in any mode of transportation.

In accordance with section 4(c) and (e) of FRA's Procedures, the agency has further concluded that no extraordinary circumstances exist with respect to this regulation that might trigger the need for a more detailed environmental review. As a result, FRA finds that this final rule is not a major Federal action significantly affecting the quality of the human environment.

Unfunded Mandates Reform Act of 1995

Pursuant to Section 201 of the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4, 2 U.S.C. 1531), each Federal agency "shall, unless otherwise prohibited by law, assess the effects of Federal regulatory actions on State, local, and tribal governments, and the private sector (other than to the extent that such regulations incorporate requirements specifically set forth in law)." Section 202 of the Act (2 U.S.C. 1532) further requires that "before promulgating any general notice of proposed rulemaking that is likely to result in the promulgation of any rule that includes any Federal mandate that may result in expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100,000,000 or more (adjusted annually for inflation) in any 1 year, and before promulgating any final rule for which a general notice of proposed rulemaking was published, the agency shall prepare a written statement" detailing the effect on State, local, and tribal governments and the private

sector. The final rule will not result in the expenditure, in the aggregate, of $100,000,000 or more in any one year, and thus preparation of such a statement is not required.

Energy Impact

Executive Order 13211 requires Federal agencies to prepare a Statement of Energy Effects for any "significant energy action." 66 FR 28355 (May 22, 2001). Under the Executive Order, a "significant energy action" is defined as any action by an agency (normally published in the Federal Register) that promulgates or is expected to lead to the promulgation of a final rule or regulation, including notices of inquiry, advance notices of proposed rulemaking, and notices of proposed rulemaking: (1)(i) that is a significant regulatory action under Executive Order 12866 or any successor order, and (ii) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action. FRA has evaluated this final rule in accordance with Executive Order 13211. FRA has determined that this final rule is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Consequently, FRA has determined that this regulatory action is not a "significant energy action" within the meaning of Executive Order 13211.

Privacy Act

FRA wishes to inform all potential commenters that anyone is able to search the electronic form of all comments received into any agency docket 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.

List of Subjects

49 CFR Part 229

Accident investigation, Data preservation, Event recorders, Locomotives, National Transportation Safety Board, Penalties, Railroad safety, Railroads, Reporting and record keeping requirements.

The Rule

For the reasons discussed in the preamble, the Federal Railroad Administration amends part 229 of chapter II, subtitle B of Title 49, Code of Federal Regulations, as follows:

PART 229 [AMENDED]

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

Authority: 49 U.S.C. 20103, 20107, 20133, 20137-38, 20143, 20701-03, 21301-02, 21304; 28 U.S.C. 2401, note; and 49 CFR 1.49(c),(m).

2. Section 229.5 is revised to read as follows:

§ 229.5 Definitions**.**

As used in this part—

Break means a fracture resulting in complete separation into parts.

Cab means that portion of the superstructure designed to be occupied by the crew operating the locomotive.

Carrier means *railroad*, as that term is in this section.

Commuter service means the type of railroad service described under the heading "Commuter Operations" in 49 CFR part 209, Appendix A.

Commuter work train is a non-revenue service train used in the administration and upkeep service of a commuter railroad.

Control cab locomotive means a locomotive without propelling motors but with one or more control stands.

Controlling remote distributed power locomotive means the locomotive in a distributed power consist that receives the coded signal from the lead locomotive consist of the train whether commanded automatically by the distributed power system or manually by the locomotive engineer.

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

Cruise control means a device that controls locomotive power output to obtain a targeted speed. A device that functions only at or below 30 miles per hour is NOT considered a "cruise control" for purposes of this part.

Data element means one or more data point or value reflecting on-board train operations at a particular time. Data may be actual or "passed through" values or may be derived from a combination of values from other sources.

Dead locomotive means—

(1) A locomotive, other than a control cab locomotive, that does not have any traction device supplying tractive power; or

(2) A control cab locomotive that has a locked and unoccupied cab.

Distributed power system means a system that provides control of a number of locomotives dispersed throughout a train from a controlling locomotive located in the lead position. The system provides control of the rearward locomotives by command signals originating at the lead locomotive and transmitted to the remote (rearward) locomotives.

DMU locomotive means a diesel-powered multiple unit operated locomotive with one or more propelling motors designed to carry passenger traffic.

Electronic air brake means a brake system controlled by a computer which provides the means for control of the locomotive brakes or train brakes or both.

Event recorder means a device, designed to resist tampering, that monitors and records data, as detailed in § 229.135(b), over the most recent 48 hours of operation of the electrical system of the locomotive on which the device is installed. However, a device, designed to resist tampering, that monitors and records the specified data only when the locomotive is in motion meets this definition if the device was installed prior to November 5, 1993 and if it records the specified data for the last eight hours the locomotive was in motion.

Event recorder memory module means that portion of the event recorder used to retain the recorded data as detailed in § 229.135(b).

High voltage means an electrical potential of more than 150 volts.

In-service event recorder means an event recorder that was successfully tested as prescribed in § 229.27(d) and whose subsequent failure to operate as intended, if any, is not actually known by the railroad operating the locomotive on which it is installed.

Lead locomotive means the first locomotive proceeding in the direction of movement.

Lite locomotive means a locomotive or a consist of locomotives not attached to any piece of equipment or attached only to a caboose.

Locomotive means a piece of on-track equipment other than hi-rail, specialized maintenance, or other similar equipment—

(1) With one or more propelling motors designed for moving other equipment;

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

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

Mandatory directive means any movement authority or speed restriction that affects a railroad operation.

Modesty lock means a latch that can be operated in the normal manner only from within the sanitary compartment, that is designed to prevent entry of another person when the sanitary compartment is in use. A modesty lock may be designed to allow deliberate forced entry in the event of an emergency.

MU locomotive means a multiple unit operated electric locomotive–

(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.

Other short-haul passenger service means the type of railroad service described under the heading "Other short-haul passenger service" in 49 CFR part 209, Appendix A.

Potable water means water that meets the requirements of 40 CFR part 141, the Environmental Protection Agency's Primary Drinking Water Regulations, or water that has been approved for drinking and washing purposes by the pertinent state or local authority having jurisdiction. For purposes of this part, commercially available, bottled drinking water is deemed potable water.

Powered axle is an axle equipped with a traction device.

Railroad means all forms of non-highway ground transportation that run on rails or electromagnetic guideways, including (1) commuter or other short-haul rail passenger service in a metropolitan or suburban area, and (2) high speed ground transportation systems that connect metropolitan areas, without regard to whether they use new technologies not associated with traditional railroads. Such term does not include rapid transit operations within an urban area that are not connected to the general railroad system of transportation.

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

Sanitary means lacking any condition in which any significant amount of filth, trash, or human waste is present in such a manner that a reasonable person would believe that the condition might constitute a health hazard; or of strong, persistent, chemical or human waste odors sufficient to deter use of the facility, or give rise to a reasonable concern with respect to exposure to hazardous fumes. Such conditions include, but are not limited to, a toilet bowl filled with human waste, soiled toilet paper, or other products used in the toilet compartment, that are present due to a defective toilet facility that will not flush or otherwise remove waste; visible human waste residue on the floor or toilet seat that is present due to a toilet that overflowed; an accumulation of soiled paper towels or soiled toilet paper on the floor, toilet facility, or sink; an accumulation of visible dirt or human waste on the floor, toilet facility, or sink; and strong, persistent chemical or human waste odors in the compartment.

Sanitation compartment means an enclosed compartment on a railroad locomotive that contains a toilet facility for employee use.

Self-monitoring event recorder means an event recorder that has the ability to monitor its own operation and to display an indication to the locomotive operator when any data required to be stored are not stored or when the stored data do not match the data received from sensors or data collection points.

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

Switching service means the classification of railroad freight and passenger cars according to commodity or destination; assembling cars for train movements; changing the position of cars for purposes of loading, unloading, or weighing; placing locomotives and cars for repair or storage; or moving rail equipment in connection with work service that does not constitute a train movement.

Throttle position means any and all of the discrete output positions indicating the speed/tractive effort characteristic requested by the operator of the locomotive on which the throttle is installed. Together, the discrete output positions shall cover the entire range of possible speed/tractive effort characteristics. If the throttle has continuously variable segments, the event recorder shall capture either: (1) the exact level of speed/tractive effort characteristic requested, on a scale of zero (0) to one hundred percent (100%) of the output variable or (2) a value converted from a percentage to a comparable 0 to 8 digital signal.

Time means either "time-of-day" or "elapsed time" (from an arbitrarily determined event) as determined by the manufacturer. In either case, the recorder must be able to convert to an accurate time-of-day with the time zone stated unless it is Greenwich mean time (UTC).

Toilet facility means a system that automatically or on command of the user removes human waste to a place where it is treated, eliminated, or retained such that no solid or non-treated liquid waste is thereafter permitted to be released into the bowl, urinal, or room and that prevents harmful discharges of gases or persistent offensive odors.

Transfer service means a freight train that travels between a point of origin and a point of final destination not exceeding 20 miles and that is not performing switching service.

Unsanitary means having any condition in which any significant amount of filth, trash, or human waste is present in such a manner that a reasonable person would believe that the condition might constitute a health hazard; or strong, persistent, chemical or human waste odors sufficient to deter use of the facility, or give rise to a reasonable concern with respect to exposure to hazardous fumes. Such conditions include, but are not limited to, a toilet bowl filled with human waste, soiled toilet paper, or other products used in the toilet compartment, that are present due to a defective toilet facility that will not flush or otherwise remove waste; visible human waste residue on the floor or toilet seat that is present due to a toilet that overflowed; an accumulation of soiled paper towels or soiled toilet paper on the floor, toilet facility, or sink; an accumulation of visible dirt or human waste on the floor, toilet facility, or sink; and strong, persistent chemical or human waste odors in the compartment.

Washing system means a system for use by railroad employees to maintain personal cleanliness that includes a secured sink or basin, water, antibacterial soap, and paper towels; or antibacterial waterless soap and paper towels; or antibacterial moist towelettes and paper towels; or any other combination of suitable antibacterial cleansing agents.

3. Section 229.25 is amended by revising paragraph (e) to read as follows:

§ 229.25 Tests: Every periodic inspection.

* * * * *

(e) Event Recorder. A microprocessor-based self-monitoring event recorder, if installed, is exempt from periodic inspection under paragraphs (e)(1) through (e)(5) of this section and shall be inspected annually as required by § 229.27(d). Other types of event recorders, if installed, shall be inspected, maintained, and tested in accordance with instructions of the manufacturer, supplier, or owner thereof and in accordance with the following criteria:

(1) A written or electronic copy of the instructions in use shall be kept at the point where the work is performed and a hard-copy version, written in the English language, shall be made available upon request of a governmental agent empowered to request it.

(2) The event recorder shall be tested before any maintenance work is performed on it. At a minimum, the event recorder test shall include cycling, as practicable, all required recording elements and determining the full range of each element by reading out recorded data.

(3) If the pre-maintenance test does not reveal that the device is recording all the specified data and that all recordings are within the designed recording elements, this fact shall be noted, and maintenance and testing shall be performed as necessary until a subsequent test is successful.

(4) When a successful test is accomplished, a copy of the data-verification results shall be maintained in any medium with the maintenance records for the locomotive until the next one is filed.

(5) A railroad's event recorder periodic maintenance shall be considered effective if 90 percent of the recorders on locomotives inbound for periodic inspection in any given

calendar month are still fully functional; maintenance practices and test intervals shall be adjusted as necessary to yield effective periodic maintenance.

4. Section 229.27 is amended by revising the introductory text and by adding a new paragraph (d) to read as follows:

§ 229.27 Annual tests.

A locomotive, except for a DMU or MU locomotive, shall be subjected to the tests and inspections prescribed in paragraphs (a), (b), and (c) of this section. A DMU locomotive and an MU locomotive shall be subjected to the tests and inspections prescribed in paragraphs (b) and (c) of this section. A locomotive, including a DMU locomotive and an MU locomotive, equipped with a microprocessor-based event recorder that includes a self-monitoring feature, shall be subjected to the tests and inspections prescribed in paragraph (d) of this section, at intervals that do not exceed 368 calendar days.

* * * * *

(d) A microprocessor-based event recorder with a self-monitoring feature equipped to verify that all data elements required by this part are recorded, requires further maintenance only if either or both of the following conditions exist:

(1) The self-monitoring feature displays an indication of a failure. If a failure is displayed, further maintenance and testing must be performed until a subsequent test is successful. When a successful test is accomplished, a record, in any medium, shall be made of that fact and of any maintenance work necessary to achieve the successful result. This record

shall be available at the location where the locomotive is maintained until a record of a subsequent successful test is filed.

(2) A download of the event recorder, taken within the preceding 30 days and reviewed for the previous 48 hours of locomotive operation, reveals a failure to record a regularly recurring data element or reveals that any required data element is not representative of the actual operations of the locomotive during this time period. If the review is not successful, further maintenance and testing shall be performed until a subsequent test is successful. When a successful test is accomplished, a record, in any medium, shall be made of that fact and of any maintenance work necessary to achieve the successful result. This record shall be kept at the location where the locomotive is maintained until a record of a subsequent successful test is filed. The download shall be taken from information stored in the certified crashworthy crash hardened event recorder memory module if the locomotive is so equipped.

5. Section 229.135 is revised to read as follows:

§ 229.135 Event recorders.

(a) Duty to equip and record. Except as provided in paragraphs (c) and (d) of this section, a train operated faster than 30 miles per hour shall have an in-service event recorder, of the type described in paragraph (b) of this section, in the lead locomotive. The presence of the event recorder shall be noted on Form FRA F6180-49A (by writing the make and model of event recorder with which the locomotive is equipped) under the REMARKS section,

except that an event recorder designed to allow the locomotive to assume the lead position only if the recorder is properly functioning is not required to have its presence noted on Form FRA F6180-49A. For the purpose of this section, "train" includes a locomotive or group of locomotives with or without cars. The duty to equip the lead locomotive may be met with an event recorder located elsewhere than the lead locomotive provided that such event recorder monitors and records the required data as though it were located in the lead locomotive. The event recorder shall record the most recent 48 hours of operation of the electrical system of the locomotive on which it is installed.

(b) Equipment requirements. Event recorders shall monitor and record data elements required by this paragraph with at least the accuracy required of the indicators displaying any of the required elements to the engineer.

(1) A lead locomotive originally manufactured before [INSERT DATE ONE (1) YEAR AFTER THE EFFECTIVE DATE OF THE RULE], including a controlling remote distributed power locomotive, a lead manned helper locomotive, a DMU locomotive, and an MU locomotive, except as provided in paragraphs (c) and (d) of this section, shall have an in-service event recorder that records the following data elements:

(i) Train speed;

(ii) Selected direction of motion;

(iii) Time;

(iv) Distance;

(v) Throttle position;

(vi) Applications and operations of the train automatic air brake;

(vii) Applications and operations of the independent brake;

(viii) Applications and operations of the dynamic brake, if so equipped; and

(ix) Cab signal aspect(s), if so equipped and in use.

(2) A locomotive originally manufactured before [INSERT DATE ONE (1) YEAR AFTER THE EFFECTIVE DATE OF RULE] and equipped with an event recorder that uses magnetic tape as its recording medium shall have the recorder removed from service on or before [INSERT DATE FOUR (4) YEARS AFTER THE EFFECTIVE DATE OF THE RULE] and replaced with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part and that records at least the same number of data elements as the recorder it replaces.

(3) A lead locomotive, a lead manned helper locomotive, and a controlling remotely distributed power locomotive, other than a DMU or MU locomotive, originally ordered on or after [INSERT DATE ONE (1) YEAR AFTER EFFECTIVE DATE OF RULE] or placed in service on or after [INSERT DATE FOUR (4) YEARS AFTER EFFECTIVE DATE OF RULE] shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part. The certified event recorder memory module shall be mounted for its maximum protection. (Although other mounting standards may meet this standard, an event recorder memory module mounted behind and below the top of the collision posts and above the platform level is deemed to be mounted "for its maximum

protection.") The event recorder shall record, and the certified crashworthy event recorder memory module shall retain, the following data elements:

(i) Train speed;

(ii) Selected direction of motion;

(iii) Time;

(iv) Distance;

(v) Throttle position;

(vi) Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer;

(vii) Applications and operations of the independent brake;

(viii) Applications and operations of the dynamic brake, if so equipped;

(ix) Cab signal aspect(s), if so equipped and in use;

(x) End-of-train (EOT) device loss of communication front to rear and rear to front;

(xi) Electronic controlled pneumatic braking (ECP) message (and loss of such message), if so equipped;

(xii) EOT armed, emergency brake command, emergency brake application;

(xiii) Indication of EOT valve failure;

(xiv) EOT brake pipe pressure (EOT and ECP devices);

(xv) EOT marker light on/off;

(xvi) EOT "low battery" status;

(xvii) Position of on/off switch for headlights on lead locomotive;

(xviii) Position of on/off switch for auxiliary lights on lead locomotive;

(xix) Horn control handle activation;

(xx) Locomotive number;

(xxi) Locomotive automatic brake valve cut in;

(xxii) Locomotive position in consist (lead or trail);

(xxiii) Tractive effort;

(xxiv) Cruise control on/off, if so equipped and in use; and

(xxv) Safety-critical train control data routed to the locomotive engineer's display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train

control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.

(4) A DMU locomotive and an MU locomotive originally ordered on or after [INSERT DATE ONE (1) YEAR AFTER EFFECTIVE DATE OF RULE] or placed in service on or after [INSERT DATE FOUR (4) YEARS AFTER EFFECTIVE DATE OF RULE] shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part. The certified event recorder memory module shall be mounted for its maximum protection. (Although other mounting standards may meet this standard, an event recorder memory module mounted behind the collision posts and above the platform level is deemed to be mounted "for its maximum protection.") The event recorder shall record, and the certified crashworthy event recorder memory module shall retain, the following data elements:

(i) Train speed;

(ii) Selected direction of motion;

(iii) Time;

(iv) Distance;

(v) Throttle position;

(vi) Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release

that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer;

(vii) Applications and operations of the independent brake, if so equipped;

(viii) Applications and operations of the dynamic brake, if so equipped;

(ix) Cab signal aspect(s), if so equipped and in use;

(x) Emergency brake application(s);

(xii) Wheel slip/slide alarm activation (with a property-specific minimum duration);

(xiii) Lead locomotive headlight activation switch on/off;

(xiv) Lead locomotive auxiliary lights activation switch on/off;

(xv) Horn control handle activation;

(xvi) Locomotive number;

(xvii) Locomotive position in consist (lead or trail);

(xviii) Tractive effort;

(xix) Brakes apply summary train line;

(xx) Brakes released summary train line;

(xxi) Cruise control on/off, if so equipped and used; and

(xxii) Safety-critical train control data routed to the locomotive engineer's display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed

duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.

(5) A locomotive equipped with an event recorder that is remanufactured, as defined in this part, on or after [INSERT DATE TWO (2) YEARS AFTER EFFECTIVE DATE OF RULE], shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D to this part and is capable of recording, at a minimum, the same data as the recorder that was on the locomotive before it was remanufactured.

(6) An event recorder originally manufactured after January 1, 2010, that is installed on any locomotive identified in paragraph (b)(1) of this section shall be an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D to this part and that is capable of recording, at a minimum, the same data as the event recorder that was previously on the locomotive.

(c) Removal from service. Notwithstanding the duty established in paragraph (a) of this section to equip certain locomotives with an in-service event recorder, a railroad may remove an event recorder from service and, if a railroad knows that an event recorder is not monitoring or recording required data, shall remove the event recorder from service. When a railroad removes an event recorder from service, a qualified person shall record the date that

the device was removed from service on Form FRA F6180-49A, under the REMARKS section, unless the event recorder is designed to allow the locomotive to assume the lead position only if the recorder is properly functioning.

(d) Response to defective equipment. Notwithstanding the duty established in paragraph (a) of this section to equip certain locomotives with an in-service event recorder, a locomotive on which the event recorder has been taken out of service as provided in paragraph (c) of this section may remain as the lead locomotive only until the next calendar-day inspection. A locomotive with an inoperative event recorder is not deemed to be in improper condition, unsafe to operate, or a non-complying locomotive under §§ 229.7 and 229.9, and, other than the requirements of Appendix D of this part, the inspection, maintenance, and testing of event recorders are limited to the requirements set forth in §§ 229.25(e) and 229.27(d).

(e) Preserving accident data. If any locomotive equipped with an event recorder, or any other locomotive-mounted recording device or devices designed to record information concerning the functioning of a locomotive or train, is involved in an accident/incident that is required to be reported to FRA under part 225 of this chapter, the railroad that was using the locomotive at the time of the accident shall, to the extent possible, and to the extent consistent with the safety of life and property, preserve the data recorded by each such device for analysis by FRA. This preservation requirement permits the railroad to extract and analyze such data, *provided* the original downloaded data file, or an unanalyzed exact copy of it, shall be retained in secure custody and shall not be utilized for analysis or any other purpose except by direction of FRA or the National Transportation Safety Board. This preservation requirement shall

expire one (1) year after the date of the accident unless FRA or the Board notifies the railroad in writing that the data are desired for analysis.

(f) Relationship to other laws. Nothing in this section is intended to alter the legal authority of law enforcement officials investigating potential violation(s) of State criminal law(s), and nothing in this chapter is intended to alter in any way the priority of National Transportation Safety Board investigations under 49 U.S.C. 1131 and 1134, nor the authority of the Secretary of Transportation to investigate railroad accidents under 49 U.S.C. 5121, 5122, 20107, 20111, 20112, 20505, 20702, 20703, and 20902.

(g) Disabling event recorders. Except as provided in paragraph (c) of this section, any individual who willfully disables an event recorder is subject to civil penalty and to disqualification from performing safety-sensitive functions on a railroad as provided in § 218.55 of this chapter, and any individual who tampers with or alters the data recorded by such a device is subject to a civil penalty as provided in appendix B of part 218 of this chapter and to disqualification from performing safety-sensitive functions on a railroad if found unfit for such duties under the procedures in part 209 of this chapter.

6. Appendix B to part 229 is amended by revising § 229.135 to read as follows:

Appendix B to Part 229 – Schedule of Civil Penalties [(1)]

* * * * *

Section	Violation	Willful Violation
* * * * *		
229.135 Event Recorders:		
(a) Lead locomotive without in-service event recorder.....	2,500	5,000
(b) Failure to meet equipment requirements.....	2,500	5,000
(c) Unauthorized removal or failure to remove from service.....	2,500	5,000
(d) Improper response to out of service event recorder..... (e) Failure to preserve data or unauthorized extraction of data.....	2,500	5,000
(g) Tampering with device or data.....	2,500	5,000
* * * * *		

* * * * *

7. A new Appendix D is added to Part 229 to read as follows:

APPENDIX D TO PART 229 – CRITERIA FOR CERTIFICATION OF CRASHWORTHY EVENT RECORDER MEMORY MODULE

Section 229.135(b) requires that certain locomotives be equipped with an event recorder that includes a certified crashworthy event recorder memory module. This appendix prescribes the requirements for certifying an event recorder memory module (ERMM) as crashworthy, including the performance criteria and test sequence for establishing the

crashworthiness of the ERMM as well as the marking of the event recorder containing the crashworthy ERMM.

A. General Requirements.

1. Each manufacturer that represents its ERMM as crashworthy shall, by marking it as specified in Section B of this appendix, certify that the ERMM meets the performance criteria contained in this appendix and that test verification data are available to a railroad or to FRA upon request.

2. The test verification data shall contain, at a minimum, all pertinent original data logs and documentation that the test sample preparation, test set up, test measuring devices and test procedures were performed by designated, qualified personnel using recognized and acceptable practices. Test verification data shall be retained by the manufacturer or its successor as long as the specific model of ERMM remains in service on any locomotive.

3. A crashworthy ERMM shall be marked by its manufacturer as specified in Section B of this appendix.

B. Marking Requirements.

1. The outer surface of the event recorder containing a certified crashworthy ERMM shall be colored international orange. In addition, the outer surface shall be inscribed, on the surface allowing the most visible area, in black letters on an international orange background, using the largest type size that can be accommodated, with the words **CERTIFIED DOT CRASHWORTHY**, followed by the ERMM model number (or other

such designation), and the name of the manufacturer of the event recorder. This information may be displayed as follows:

CERTIFIED DOT CRASHWORTHY

Event Recorder Memory Module Model Number

Manufacturer's Name

Marking "CERTIFIED DOT CRASHWORTHY" on an event recorder designed for installation in a railroad locomotive is the certification that all performance criteria contained in this appendix have been met and all functions performed by, or on behalf of, the manufacturer whose name appears as part of the marking, conform to the requirements specified in this appendix.

2. Retro-reflective material shall be applied to the edges of each visible external surface of an event recorder containing a certified crashworthy ERMM.

C. Performance Criteria for the ERMM.

An ERMM is crashworthy if it has been successfully tested for survival under conditions of fire, impact shock, static crush, fluid immersion, and hydro-static pressure contained in one of the two tables contained in this section of appendix D. (See Tables 1 and 2.) Each ERMM must meet the individual performance criteria in the sequence established in Section D of this appendix. Performance criteria are deemed to be met if the ERMM has preserved all of the data stored in it. The data set stored in the ERMM to be tested shall include all the recording elements required by § 229.135(b). The following tables describe alternative performance

criteria that may be used when testing an ERMM's crashworthiness. A manufacturer may utilize either table during its testing but may not combine the criteria contained in the two tables.

TABLE 1
ACCEPTABLE PERFORMANCE CRITERIA - OPTION A

Parameter	Value	Duration	Remarks
Fire, High Temperature	750°C (1400°F)	60 minutes	Heat source: Oven
Fire, Low Temperature	260°C (500°F)	10 hours	
Impact Shock	55g	100 ms	½ sine crash pulse
Static Crush	110kN (25,000 lbf)	5 minutes	
Fluid Immersion	#1 Diesel #2 Diesel Water Salt Water Lube Oil	Any single fluid, 48 hours	
	Fire Fighting Fluid	10 minutes, following immersion above	Immersion followed by 48 hours in a dry location without further disturbance.
Hydrostatic Pressure	Depth equivalent = 15 m. (50 ft.)	48 hours at nominal temperature of 25°c (77°F)	

TABLE 2
ACCEPTABLE PERFORMANCE CRITERIA - OPTION B

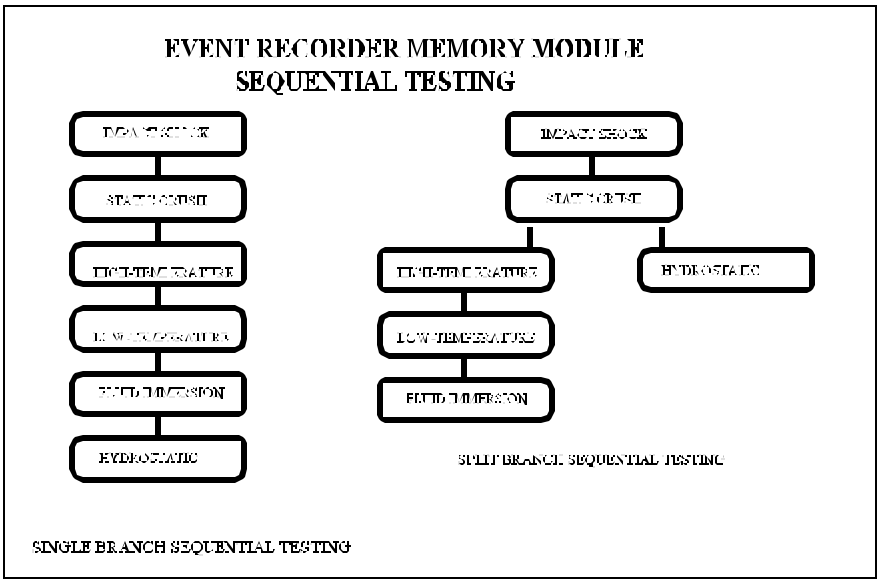
Parameter	Value	Duration	Remarks
Fire, High Temperature	1000°C (1832°F)	60 minutes	Heat source: Open flame
Fire, Low Temperature	260°C (500°F)	10 hours	Heat source: Oven
Impact Shock - Option 1	23gs	250 ms	
Impact Shock - Option 2	55gs	100 ms	½ sine crash pulse
Static Crush	111.2kN (25,000lbf)	5 minutes	
	445.5kN (100,000lbf)	(single "squeeze")	Applied to 25% of surface of largest face
Fluid Immersion	#1 Diesel #2 Diesel Water Salt Water Lube Oil Fire Fighting Fluid	48 hours each	
Hydrostatic Pressure	46.62 psig (= 30.5 m. or 100 ft.)	48 hours at nominal temperature of 25°c (77°F)	

D. Testing Sequence.

In order to reasonably duplicate the conditions an event recorder may encounter, the ERMM shall meet the various performance criteria, described in Section C of this appendix, in a set sequence. (See Figure 1). If all tests are done in the set sequence (single branch testing), the same ERMM must be utilized throughout. If a manufacturer opts for split branch testing, each branch of the test must be conducted using an ERMM of the same design type as used for the other branch. Both alternatives are deemed equivalent, and the choice of single branch

testing or split branch testing may be determined by the party representing that the ERMM meets the standard.

Figure 1



E. Testing Exception.

If a new model ERMM represents an evolution or upgrade from an older model ERMM that was previously tested and certified as meeting the performance criteria contained in Section C of this appendix, the new model ERMM need only be tested for compliance with those performance criteria contained in Section C of this appendix that are potentially affected by the upgrade or modification. FRA will consider a performance criteria to not be potentially affected if a preliminary engineering analysis or other pertinent data establishes that the

modification or upgrade will not affect the crashworthy performance criteria established by the older model ERMM. The manufacturer shall retain and make available to FRA upon request any analysis or data relied upon to make a determination relating to the crashworthiness impacts of any upgrade or modification to an older model ERMM.

Issued in Washington, DC, on .

Robert Jamison,

Acting Administrator,

Federal Railroad Administration.