DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 563

[Docket No. NHTSA–2024–0084]

RIN 2127–AM12

Event Data Recorders

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: This final rule amends regulations regarding event data recorders (EDRs) to extend the EDR recording period for timed data metrics from 5 seconds of pre-crash data at a frequency of 2 Hz to 20 seconds of pre-crash data at a frequency of 10 Hz. This final rule responds to the mandate of the Fixing America's Surface Transportation Act (FAST Act) to establish the appropriate recording period in NHTSA's EDR regulation.

DATES: *Effective Date:* This rule is effective January 17, 2025.

Compliance Dates: The compliance date is September 1, 2027. Vehicles produced by small-volume or limited-line manufacturers must comply with this final rule on or after September 1, 2029. Altered vehicles and vehicles manufactured in two or more stages must comply with this final rule if manufactured on or after September 1, 2030.

Petition for reconsideration: Petitions for reconsideration of this final rule must be received not later than February 3, 2025.

ADDRESSES: Petitions for reconsideration of this final rule must refer to the docket number set forth above (NHTSA–2024–0084) and be submitted to the Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue SE, Washington, DC 20590. Note that all petitions received will be posted without change to *https://www.regulations.gov,* including any personal information provided.

Confidential Business Information: If you wish to submit any information under a claim of confidentiality, you should submit your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given under **FOR FURTHER INFORMATION CONTACT**. In addition, you should submit a copy, from which you have deleted the claimed confidential business information, to Docket Management at the address given above. When you send a submission containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation (49 CFR part 512). Please see further information in the Regulatory Notices and Analyses section of this preamble.

Privacy Act: The petition will be placed in the docket. Anyone is able to search the electronic form of all documents received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477–78) or you may visit *https://www.transportation.gov/individuals/privacy/privacy-act-system-records-notices.*

Docket: For access to the docket to read background documents or comments received, go to *www.regulations.gov,* or the street address listed above. Follow the online instructions for accessing the dockets.

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SUPPLEMENTARY INFORMATION:

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I. Executive Summary

NHTSA established 49 CFR part 563 (part 563) in 2006, setting forth requirements for data elements, data capture and format, data retrieval, and data crash survivability of EDRs.[1] Part 563 does not mandate EDRs on vehicles, but is instead an ''if equipped'' standard applying only to light vehicles required to have frontal air bags that a manufacturer chooses to voluntarily equip with EDRs.[2] Part 563 ensures all EDRs subject to the regulation capture the same core set of data elements in a crash, standardizes the parameters (format, duration, etc.) of captured data elements, and sets minimum requirements for data survivability.[3] Part 563 further requires that manufacturers of vehicles with EDRs subject to part 563 make commercially available a tool for the purpose of downloading[4] the data collected by the EDR.

This rulemaking amends current NHTSA regulations regarding EDRs under part 563 by extending the capture and recording period for timed data metrics from 5 seconds of pre-crash data at a sample rate of 2 Hz to 20 seconds of pre-crash data at a sample rate of 10 Hz (*i.e.,* an increase from 2 samples per second to 10 samples per second). The objective of this amendment is to capture and record the appropriate amount of data to provide sufficient vehicle-related data to assist investigations of the cause of motor vehicle crashes. This rulemaking is issued in response to a statutory mandate under section 24303 of the Fixing America's Surface Transportation Act (FAST Act), Pub. L. 119–14 (Dec. 4, 2015).

The increased sample rate required by this final rule will provide crash investigators a better understanding of the sequence of pre-crash actions, and

[1] 71 FR 50998 (Aug. 28, 2006).

[2] In 2012, NHTSA proposed to convert part 563's ''if equipped'' requirements for EDRs into a new Federal Motor Vehicle Safety Standard (FMVSS) mandating the installation of EDRs in most light vehicles. The NPRM did not propose making any changes to the current EDR regulation's performance requirements, including those for the required data elements (77 FR 74144 (Dec. 13, 2012)). In 2019, NHTSA withdrew that proposal due to the near universal installation of EDRs on light vehicles (84 FR 2804 (Feb. 8, 2019)).

[3] Part 563 requires EDR data to survive the crash tests in FMVSS Nos. 208, ''Occupant crash protection,'' and 214, ''Side impact protection.''

[4] For the purposes herein, we are using the term ''downloading'' to refer to the process by which data are retrieved from an EDR. When downloading the data on an EDR, the original data set remains intact and unchanged in the memory banks of the EDR. NHTSA has also used the term ''imaging'' in other documents to refer to the same process. NHTSA uses imaging and downloading interchangeably.

the increased recording duration will provide more details on actions taken prior to crashes. Specifically, with the implementation of this final rule's increased recording duration, actions such as running a stop sign or red light could be captured in full and included in crash reconstruction when supplemented with roadway and traffic control information. The increased recorded duration could also help capture any corrective maneuvers taken by a vehicle prior to an initial road departure. The increased data recording frequency required by this final rule will help clarify the interpretation of recorded pre-crash information, including braking and steering actions taken by a vehicle. It will also help reduce potential uncertainty related to the relative timing of recorded data elements, and assist with the identification of potential pedal misapplication.

II. Background

A. Overview of the Event Data Recorder Technology and Regulatory History

Event data recorders are devices installed in a vehicle to capture and record technical information immediately before and during a crash on the status and operation of vehicle systems. An EDR reserves a random access memory (RAM) buffer the size of one EDR record to locally store data before the data are written to memory. The data are typically stored using Electrically Erasable Programmable Read-Only Memory (EEPROM) or data flash memory,[5] both of which are types of non-volatile memory. The RAM buffer is typically embedded in the microprocessor, a component of the EDR that may require an upgrade if the processing capabilities are insufficient to meet the new EDR data capture requirements. During a crash, one or more capacitors are used as backup power (energy reserve) to power the EDR, as the main battery is assumed to be cut off. The capacitor(s) must have sufficient energy to power the entire transfer of data. These components are housed in packaging and manufacturer development and validation stages are aimed at ensuring the EDR functions as intended.

EDR event data are permanently recorded at the end of a specified event. In most cases, data are captured during events meeting a pre-determined threshold of severity or in events severe enough to cause air bag deployment. This information can aid crash investigators in assessing the performance of specific safety equipment, including event air bag deployment strategies, air bag operation, and event severity. Captured information can also help NHTSA and others identify potential opportunities for safety improvements in current and future vehicles and implement more effective safety regulations. It may also help first responders assess the severity of a crash, estimate the probability of serious injury in vehicles equipped with Advanced Automatic Crash Notification (AACN) systems, and improve defect investigations and crash data collection quality.

NHTSA established 49 CFR part 563 (part 563) on August 28, 2006, setting forth requirements for the accuracy, collection, storage, survivability, and retrievability of data in vehicles equipped with EDRs.[6] Tables I and II of part 563 detail the various data elements covered under the standard. Table I lists 15 data elements all EDRs subject to part 563 are required to record, along with the recording interval (duration) and sampling frequency. Table II lists data elements that EDRs subject to part 563 are not required to record, but that are subject to part 563 if they are recorded. Two data elements in Table II are listed as ''if equipped,'' meaning if a vehicle has the specified equipment, the specified information must be recorded. Table II also provides the recording interval (duration) and sampling frequency for each listed data element. In addition, all data elements in Tables I and II must be reported according to the range, accuracy, and resolution in Table III of part 563. Relevant to this final rule, there are currently seven data elements in Table I and Table II that must be captured for a duration of 5 seconds prior to the crash (speed, engine throttle, service brake, engine RPM, ABS activity, stability control, and steering input). NHTSA established this 5-second duration after concluding this length would ensure the usefulness of the data in crash reconstruction while minimizing the risk of overtaxing an EDR's microprocessor during the data capture process, which could cause a malfunction resulting in data loss.[7]

Part 563 became fully effective on September 1, 2012. Since this time, the adoption of EDRs has been nearly universal, as NHTSA's internal analysis estimates 99.5 percent of model year 2021 passenger cars and other vehicles with a gross vehicle weight rating (GVWR) of 3,855 kilograms (kg) (8,500 pounds) or less are equipped with part 563 compliant EDRs.[8]

B. The Fixing America's Surface Transportation Act

This rulemaking addresses a statutory mandate under section 24303 of the FAST Act, which requires NHTSA to ''submit to Congress a report that contains the results of a study conducted by the Administrator to determine the amount of time event data recorders installed in passenger motor vehicles should capture and record for retrieval vehicle-related data in conjunction with an event in order to provide sufficient information to investigate the cause of motor vehicle crashes.'' [9] The FAST Act further provides that, within two years of submitting this report to Congress, NHTSA ''shall promulgate regulations to establish the appropriate period during which event data recorders installed in passenger motor vehicles may capture and record for retrieval vehicle-related data to the time necessary to provide accident investigators with vehicle-related information pertinent to crashes involving such motor vehicles.'' [10] This final rule promulgates regulations to establish appropriate EDR data recording durations as mandated under the FAST Act.

III. Notice of Proposed Rulemaking

A. Developments Culminating in the NPRM

To meet the agency's initial obligation under section 24303 of the FAST Act, NHTSA contracted with researchers at Virginia Polytechnic Institute and State University (Virginia Tech) to conduct a study (the ''EDR Duration Study'') to determine the amount of time EDRs should capture and record information to provide sufficient vehicle-related data to support investigation of the cause of motor vehicle crashes. The study focused on three crash types that could potentially benefit from more than the currently required 5 seconds of pre-crash data: rear-end, intersection, and roadway departure crashes. These three crash modes were selected because they comprised approximately 70 percent of

[5] Flash memory is an electronic computer memory storage medium that can be electrically erased and reprogrammed and can retain stored information even when power is removed.

[6] 71 FR 50998 (Aug. 28, 2006).

[7] NHTSA proposed a recording duration of 8 seconds in the NPRM for what became the 2006 final rule (69 FR 32942 (June 14, 2004)). However, NHTSA decided to reduce the duration in response to public comments (71 FR 50998, 51020 (Aug. 28, 2006)).

[8] 87 FR 37289 (June 22, 2022). *See supra* note 2 and accompanying text. The 2012 NPRM estimated that about 92 percent of model year 2010 light vehicles had some EDR capability.

[9] Pub. L. 114–94, 129 Stat. 1312, December 4, 2015.

[10] *Id.*

all passenger vehicle crashes annually,[11] require relatively longer maneuvering times, and represent the most prevalent and relatively severe crashes based on fatalities.

The EDR Duration Study [12] took place in two phases. Phase I sought to estimate how frequently EDRs fail to record sufficient pre-crash data. Phase I did not analyze the amount of pre-crash data required to capture crash causation beyond the 5 seconds currently required under part 563. Analyzing cases in the National Automotive Sampling System-Crashworthiness Data System (NASS–CDS) database, Phase I determined part 563's current recording duration of 5 seconds failed to capture the initiation of all driver crash avoidance maneuvers for each of the three crash types studied. Evasive steering initiation represented the largest percentage of avoidance maneuvers not captured by the 5 second recording duration in all three crash types.[13] The study concluded the 5-second recording duration may be insufficient in many cases to determine the factors leading to a crash or to capture the pre-crash actions taken by a driver to avoid collision, potentially resulting in crash investigators having insufficient crash-related EDR information to determine crash causation.

Phase II of the EDR Duration Study sought to determine what recording duration would provide crash investigators with sufficient data to determine crash causation. The study analyzed data from naturalistic driving studies (NDS) [14] to understand the complete duration (5 seconds or greater) of driver pre-crash actions in the following three types of crashes: rear-end, intersection, and road departure. Phase II found that 20 seconds of pre-crash data would encompass the 90th percentile recording duration required for the three crash modes and crash avoidance maneuvers analyzed. This conclusion means that, based on the cumulative distributions for all three crash modes and crash avoidance maneuvers analyzed, 20 seconds of pre-crash data recording captures the driver pre-crash actions in 90 percent of the dataset.[15] Table 1 summarizes the relevant Phase II findings. A more detailed summary of the EDR Duration Study can be found in the NPRM associated with this rulemaking.

TABLE 1—SUMMARY OF RECORDING DURATION NECESSARY TO CAPTURE PRE-CRASH ACTIONS FROM EDR DURATION STUDY

Driver pre-crash maneuver	Duration of pre-crash action (seconds)	
	50th percentile	90th percentile
Rear-End Crash:		
Time to Closest Approach	4.5	12.3
Intersection Crash:		
Approach + Traversal	12.6–15.1	[16] 16.0–18.6
Road Departure Crash: *		
Drift out of lane to Recovery	3.2	6.0

* Lane excursion events were examined in the 100-car NDS.

On September 28, 2018, following completion of the EDR Duration Study, NHTSA submitted a Report to Congress summarizing the study results to the House Committee on Energy and Commerce and the Senate Committee on Commerce, Science, and Transportation, as required by section 24303 of the FAST Act.[17]

B. Summary of the NPRM

On June 22, 2022, pursuant to section 24303 of the FAST Act, NHTSA issued a notice of proposed rulemaking (NPRM) to amend part 563.[18] The NPRM relied on the findings of the EDR Duration Study and information gathered from NHTSA's defects investigation experience, which has demonstrated EDR data can be used to assist the agency in assessing whether a vehicle operated properly at the time of an event can help detect undesirable operations.[19] Based on these findings and information, the NPRM proposed extending the recording interval and data sample rate of pre-crash data elements under part 563 from 5 seconds of pre-crash data at a frequency of 2 Hz to 20 seconds of pre-crash data at a frequency of 10 Hz (*i.e.,* an increase from 2 samples per second to 10 samples per second). The seven frequency-based pre-crash data elements affected by the proposed amendments are:

- Three required data elements in Table I of part 563: ''Speed, Vehicle Indicated,'' ''Engine throttle, % full (or accelerator pedal, % full),'' and ''Service brake, on/off,''
- Four ''if recorded'' data elements in Table II of part 563: ''Engine RPM,'' ''ABS activity (engaged, non-engaged),'' ''Stability control (on, off, engaged),'' and ''Steering input.''

In support of the proposal, the NPRM explained that the EDR Duration Study concluded extending part 563's recording duration from 5 to 20 seconds would help capture critical pre-crash

[11] Derived from the NHTSA report ''Target Crash Population for Crash Avoidance Technologies in Passenger Vehicles,'' March 2019, DOT HS 812 653.

[12] Event Data Recorder Duration Study [Appendix to a Report to Congress. Report No. DOT HS 813 082B], 2022, *https://doi.org/10.21949/1530244.*

[13] From Phase I, the EDR failed to record the initiation of steering in 80% of rear-end crashes, 64% of intersection crashes, and 88% of road departure crashes.

[14] Phase II used data from two previously conducted naturalistic driving studies: a 2002 100-car study conducted by Virginia Tech, and the 2016 Second Strategic Highway Research Program (SHRP–2) NDS conducted by the Transportation Research Board of The National Academies.

[15] This duration is influenced heavily by the inclusion of intersection crashes. Without the inclusion of intersection crashes, 12.3 seconds of data would encompass the 90th percentile recording duration for rear-end and road departure crashes.

[16] The range of time shown for intersection crashes was derived from intersections with different numbers of lanes. The lower bound represents time for 2-lane intersections and the upper bound represents time for 7-lane intersections.

[17] The 2018 report ''Event Data Recorder Study'' is available at *https://www.nhtsa.gov/reports-to-congress.* An appendix to the report to Congress was later published in March 2022 with more details on the EDR Duration Study. *See* ''Event Data Recorder Duration Study [Appendix to a Report to Congress. Report No. DOT HS 813 082B],'' 2022, *https://doi.org/10.21949/1530244.*

[18] 87 FR 37289 (June 22, 2022)

[19] In 2010, NHTSA began to obtain data from Toyota EDRs as part of its inquiry into allegations of unintended acceleration, and as a follow-up to the recalls of some Toyota models for sticking and entrapped accelerator pedals. The Toyota unintended acceleration study (NHTSA Report No. NHTSA–NVS–2011–ETC, ''Technical Assessment of Toyota electronic Throttle Control (ETC) Systems,'' January 2011) helped determine the root cause of each crash.

data. The NPRM also proposed increasing the EDR sampling frequency of pre-crash data from 2 Hz to 10 Hz,[20] explaining that an increased sampling rate, in addition to an increased pre-crash recording duration, is critical in determining crash causation. In support of the proposal, the NPRM explained that in some crash circumstances (*e.g.,* brake application and release or rapid reversals in steering input of less than 0.5 seconds), 2 Hz may be insufficient to identify crash causation factors, as it is possible for an EDR recording at 2 Hz to miss rapid vehicle control inputs. Thus, although more crash causation information would be captured with the proposed 20 second time duration, this data could be misinterpreted without a refinement and increase in the EDR sampling acquisition frequency.

The NPRM further explained an improved data sampling rate is needed because of how fast the sequence of events leading to crashes can happen and how fast the vehicle's systems need to activate in response to such events, such as crash avoidance technologies activation (*e.g.,* antilock braking system and electronic stability control). In support of increasing the EDR sampling frequency of pre-crash data from 2 Hz to 10 Hz, the NPRM noted the current sampling rate of 2 Hz is well below the timing necessary to understand the performance and effectiveness of such systems. Additionally, it explained the EDR output for the pre-crash data elements is not synchronized,[21] even at the sampling rate of 2 Hz, which could result in uncertainty when comparing data at specific points in time with precision. Finally, the NPRM pointed out a greater sampling rate for the pre-crash data elements would reduce potential uncertainty related to the relative timing of data elements, specifically for correlating the driver's commands and the vehicle's performance.

In discussing the benefits of the proposal, the NPRM stated increasing the recording time for the pre-crash data would help ensure that data on the initiation of pre-crash actions and maneuvers is captured for most crashes. The NPRM further explained that increased data will enhance the usefulness of the recorded information and potentially lead to further improvements in the safety of current and future vehicles. The NPRM acknowledged the proposed changes could add additional costs, as increased EDR memory may be required in some cases. However, the agency explained it believed needed memory changes could be incorporated into the existing or planned memory design in vehicles, based on how slight any increased memory requirements needed to accommodate the added EDR data storage would be. The agency further explained its belief that in most cases the amount of additional memory necessary to comply with the proposed requirements would be less than the unused memory on a vehicle's airbag control module (ACM) chip. Finally, the agency stated it anticipated the proposal would require no additional processor speed or backup power needs, despite the proposed increases in recording duration and frequency.

The NPRM proposed an effective date of the first September 1 one year after the publication of the final rule. The agency explained that a one-year lead time was appropriate because increasing the required pre-crash data recording time should not require any additional hardware or substantial redesign of either the EDR or the vehicle and would likely require only minimal software changes.

NHTSA sought comments on several aspects of the NPRM, including:

1. The need and practicability of increasing the pre-crash recording duration.
2. The need and practicability of increasing the sampling rate.
3. Whether current EDRs will need to increase their memory capacity or change the memory implementation strategy (*i.e.,* short term memory buffer verse long-term storage) to meet the new requirements.
4. Whether the NPRM's cost estimates and assumptions are accurate, including comments on whether there are other costs (*e.g.,* redesign for a larger unit, additional capacity for Random-Access Memory (RAM), etc.), or other factors the agency needs to consider.
5. Any potential impact of the NPRM's proposal on the ACM processor and associated cost.
6. Comments on the proposed lead time.
7. Comments on the DOT's Office of the Secretary's Privacy Office (DOT Privacy Office) tentative determination that the proposed rulemaking does not create privacy risk, as no new or substantially changed technology would collect, maintain, or disseminate information in an identifiable form because of the proposed rule.

The agency received responses from a wide variety of stakeholders and interested persons in response to the NPRM's request for comments. These comments are available in the docket for the NPRM[22] and are discussed in detail in the response to comments section below.

C. Requirements of the Final Rule

After careful consideration of comments received and the requirements of the FAST Act, NHTSA is promulgating this final rule to amend regulations regarding EDRs. Under this final rule, the recording duration and data sample rate of 7 data elements in Tables I and II under part 563 will increase to 20 seconds at 10 Hz from the previous requirements of 5 seconds at 2 Hz, as proposed by the NPRM and shown in Table 2.

TABLE 2—NEW EDR REQUIREMENTS UNDER FINAL RULE

Data element	Previous requirements		Requirements under final rule	
	Recording interval/time [1] (relative to time zero) (sec)	Data sample rate (samples per second)	Recording interval/time (relative to time zero) (sec)	Data sample rate (samples per second)
Recording interval/time (relative to time zero)				
Speed, vehicle indicated	−5.0 to 0	2	−20.0 to 0	10

[20] Table I in part 563 currently requires an EDR to capture pre-crash data at a sample rate of 2 samples per second (Hz). The same sample rate applies to Table II elements of engine revolutions per minute (RPM), anti-lock braking system (ABS) status, electronic stability control (ESC) status, and steering input.

[21] While true time synchronization of data originating from the vehicle network may not be possible, the increased sample rate for pre-crash data elements may reduce the potential uncertainty related to the relative timing of data elements, specifically for correlating the driver's commands and the vehicle's performance.

[22] NHTSA–2022–0021.

TABLE 2—NEW EDR REQUIREMENTS UNDER FINAL RULE—Continued

Data element	Previous requirements		Requirements under final rule	
	Recording interval/time [1] (relative to time zero) (sec)	Data sample rate (samples per second)	Recording interval/time (relative to time zero) (sec)	Data sample rate (samples per second)
Engine Throttle, % full (or accelerator pedal, % full)	−5.0 to 0	2	−20.0 to 0	10
Service brake, on/off	−5.0 to 0	2	−20.0 to 0	10
Data Elements Required for Vehicles Under Specified Minimum Conditions [2] (Table II)				
Engine rpm	−5.0 to 0	2	−20.0 to 0	10
ABS activity (engaged, non-engaged)	−5.0 to 0	2	−20.0 to 0	10
Stability control (on, off, or engaged)	−5.0 to 0	2	−20.0 to 0	10
Steering input	−5.0 to 0	2	−20.0 to 0	10

[1] Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is −0.1 to 1.0 sec (*e.g.,* T = −1 would need to occur between −1.1 and 0 seconds.)

[2] If the data for these data elements is recorded in non-volatile memory for the purpose of subsequent downloading, they must meet the recording duration and frequency requirements in part 563.

The approach of this final rule is generally consistent with that of the NPRM. Minor non-substantive changes have been made to the final rule's regulatory text in the interest of simplification and organizational purposes, including by maintaining the current language of § 563.3. Additionally, based on comments received we have adjusted estimated costs and modified the lead time to provide manufacturers the time necessary to make any software, testing, and development changes required to ensure the EDR captures and records pre-crash data without affecting air bag deployment, while still fulfilling the agency's statuary mandate in a reasonable amount of time.

D. Lead Time

The NPRM sought to provide adequate lead time to manufacturers to allow them to incorporate necessary changes as part of their routine production cycles while also limiting the transition costs associated with the standardization of EDR data. To that end, the NPRM proposed an effective date of the first September 1 one year after the publication of the final rule. The NPRM estimated that 99.5 percent of model year 2021 passenger cars and other vehicles with a GVWR of 3,855 kg or less had part 563-compliant EDRs. As discussed in the cost section of the NPRM, the agency believed that increasing the required pre-crash data recording duration and data sample rate would not require additional hardware or substantial redesign of the EDR or vehicle and would likely require only minimal software changes and testing for validation.

Comments

NHTSA received several comments criticizing the agency's proposed one-year lead time, with commenters stating it did not consider the complexity of EDR implementation, along with the time needed for testing and validation to ensure the primary and secondary functionalities of the EDR. Commenters expressed that a lead time of one year could compromise safety and suggested alternative lead times ranging around 3 to 4 years. Several commenters also suggested a phase-in schedule extending out several years following publication of the final rule to allow manufacturers more time to significantly redesign the current software and hardware on their EDRs. The Motor & Equipment Manufacturers Association (MEMA) stated that software for a new vehicle is typically completed 18 months prior to the start of production, and that suppliers also require 18 months to deliver a validated update to manufacturers, along with an additional 18 months to test and certify the new system. Commenters also sought exemptions for vehicle platforms nearing the end of their lifecycle within 1–2 years of the Final Rule.

The Alliance for Automotive Innovation (Auto Innovators) expressed concern that the short lead time, additional memory requirements, and other system resources necessary to meet the proposed increase in pre-crash recording duration and frequency could result in some manufacturers being forced to deactivate the EDR function entirely, or to shift EDR resources by choosing not to record Table II or ADAS system status data elements.

Though supportive of the proposal, the Insurance Institute for Highway Safety and Highway Loss Data Institute (IIHS–HLDI) commented that if manufacturers were not able to meet the new requirements given the one-year lead time, they may instead choose to disable EDR functionality. IIHS–HLDI indicated support of a longer lead time to avoid the loss of any EDR data before the new requirements can be met.

The National Transportation Safety Board (NTSB) indicated the proposed lead time was reasonable and that the proposed changes from 5 seconds of pre-crash data at 2 Hz to 20 seconds of pre-crash data at 10 Hz should be practical to implement.

Agency Response

NHTSA acknowledges comments from vehicle manufacturers and others stating that the NPRM's proposed lead time would not allow manufacturers to incorporate the proposed changes as part of their regular production cycle. NHTSA agrees with comments received stating that a longer lead time is needed to allow manufacturers the flexibility to better manage the implementation of the final rule and alleviate unnecessary redesign costs for EDRs. Following review of comments received and further analysis, this final rule doubles the proposed lead time to accommodate manufacturer concerns, while also fulfilling the agency's statuary mandate under the FAST Act in a reasonable amount of time. As a result, the revised requirements will be implemented beginning with vehicles manufactured on or after September 1, 2027. Limited line [23] and small-volume

[23] Limited line manufacturer means a manufacturer that sells three or fewer carlines, as that term is defined in 49 CFR 583.4, in the United States during a production year.

manufacturers [24] will only need to produce compliant EDRs on or after September 1, 2029. Manufacturers producing altered vehicles or vehicles in two or more stages will have one additional year, until September 1, 2030, for compliance.

Extending the lead time beyond 2 years is not necessary. NHTSA understands that some vehicle models already have sufficient hardware to meet the requirements of this final rule, with one manufacturer indicating that a majority of its vehicle models are already equipped with sufficient hardware. NHTSA acknowledges that those EDRs would still potentially require up to 2 years of software development and testing to ensure their quality meets this final rule's part 563 requirements and that air bag deployment, if the EDR function shares resources with the restraint systems, is not affected by the extended duration and sampling rate of the EDR pre-crash data. Based on NHTSA's internal analysis of EDR records in the Crash Investigation Sampling System (CISS), other manufacturers also have some EDR modules that could meet the requirements of this final rule without hardware changes.

The agency did consider a phase-in period in response to timing concerns raised by manufacturers, but ultimately did not find that compelling reasons were presented to justify a phase-in period. However, in acknowledgment that some EDRs will require changes to meet the requirements of this final rule, the agency is doubling the initially proposed lead time to provide manufacturers with sufficient time to make the minor modifications adopted in this final rule. In support of this decision, NHTSA is aware that manufacturers across the globe can meet much shorter EDR lead times in other markets, such as Europe and Japan. NHTSA is not aware of any peculiarities of the U.S. market that would necessitate lead times double, triple, or quadruple the lead times in other markets.

NHTSA also acknowledges the concern raised by some commenters that manufacturers may choose to deactivate EDRs because of their inability to meet the requirements within the proposed 1-year lead time. NHTSA does not share that concern, and in any event, this final rule's extended lead time, which provides additional flexibility to manufacturers, should mitigate this concern. However, this final rule does not change the voluntary nature of part 563, and manufacturers remain free to decide if their vehicle will have EDR functionality based on their own considerations. Although the system that activates air bags in a vehicle may share resources with the EDR functionality, we emphasize that the performance of systems that deploy air bags (*e.g.,* supplemental restraint system) to mitigate injuries in a crash should not be negatively affected in order to develop an EDR that meets today's new requirements.

IV. Final Rule and Response to Comments

NHTSA received 21 comments on the proposed rule from a wide variety of commenters, including: advocacy groups, supplier and trade associations, vehicle manufacturers, manufacturer associations, insurance institutes, industry association consultants, engineer organizations, and members of the public.

The safety advocacy groups included the Advocates for Highway & Auto Safety (Advocates) and the Center for Auto Safety (CAS). The supplier and trade associations included Robert Bosch LLC and Bosch Automotive Service Solutions (Bosch) and MEMA. Manufacturers and manufacturer associations included Nissan Motor Co., LTD. (Nissan), Ford Motor Company (Ford), American Honda Motor Co. (Honda), General Motors Company (GM), and Auto Innovators. Insurance institutes and industry associations commenting on the NPRM included the National Association of Mutual Insurance Companies (NAMIC), State Farm Insurance Companies (State Farm), and joint comments from the Insurance Institute for Highway Safety (IIHS) and Highway Loss Data Institute (HLDI). The consultants and engineering organizations included the Event Data Recorder Committee of SAE International (SAE), the Collision Safety Institute (CSI), and QuantivRisk, Inc. NHTSA also received comment from the NTSB, and four comments from members of the public.

Overall, safety advocates (CAS and Advocates), insurance institutes and industry associations (NAMIC, IIHS–HLDI, and State Farm), NTSB, and three public commentors generally supported the proposed amendment. However, they recommended NHTSA consider expanding part 563 requirements through such additions as new data elements for emerging safety systems like advanced driver-assistance systems (ADAS) and automated driving systems (ADS), increased vehicle weight limits applicable to all newly manufactured passenger vehicles, and a revised trigger threshold to include crashes involving vulnerable road users. These commenters also expressed support for the agency's work with international organizations to harmonize EDR requirements, including groups like the United Nations Economic Commission for Europe (UN ECE), the World Forum for Harmonization of Vehicle Regulations (WP.29), and EDR technical working groups (*e.g.,* SAE International).

Other commenters questioned and criticized some aspects of the NPRM, including the proposed lead time and estimated costs. Commenters in this group included vehicle manufacturers and manufacturer associations, industry suppliers and trade associations (including MEMA), industry experts and engineering organizations (SAE, CSI, and QRI), and one individual member of the public. Several commenters indicated the NPRM's proposed lead time was insufficient and suggested longer lead times.

The following sections address the key issues raised by commenters in response to the NPRM, including concerns related to the recording duration and frequency (or sample rate), the EDR duration study, EDR components, additional data elements, privacy, benefits, costs, and other expressed concerns.

A. Recording Duration and Sampling Rate

The agency sought comment on the NPRM's proposal to increase the EDR pre-crash recording duration and sample rates under part 563. Comments received expressed mixed views, with many comments critical of the proposal and expressing strong concerns with the EDR Duration study, suggesting that the NPRM's extended duration proposal should not have relied upon the study's findings.

General Comments

Several commenters did not support the NPRM's proposal to extend part 563's recording duration requirements, expressing skepticism that recording data beyond current part 563 requirements would improve crash causation investigations. SAE, referencing the agency's technical report on ''Characteristics of Fatal Rollover Crashes,'' [25] acknowledged that rollover

[24] Small-volume manufacturer as defined in 49 CFR 571.127, ''Automatic emergency braking systems for light vehicles,'' is an original vehicle manufacturer that produces or assembles fewer than 5,000 vehicles annually for sale in the United States.

[25] DOT HS 809 438 (SAE stated the report concluded that EDR data are proven as a valuable

Continued

crashes generally require a longer amount of recorded data but stated they do not justify the added duration of pre-crash data. SAE explained that increasing recording duration will, in almost all cases, merely represent static operating conditions. Ford stated that additional studies on vehicles with active safety features and EDRs compliant with part 563 are necessary to more accurately determine any anticipated safety benefit of extending the pre-crash recording duration at a higher sampling rate.

GM, commenting that it already voluntarily added 3 seconds of pre-crash data to its latest Generation EDR, stated eight seconds of pre-crash data is more than sufficient to understand crash dynamics and vehicle performance based on its experience working with accident reconstructionists, police, and other authorities.

CSI stated there is no need to increase EDR recording duration, but suggested the sample rate could be phased in over a longer lead time to allow for other revisions to part 563. Bosch indicated the current data sample rate of 2 Hz may not capture all data when a multi-impact crash occurs but emphasized that an increased sample rate would require significant changes in EDR hardware and software. Bosch agreed that increased pre-crash data frequency could capture additional events, such as braking interventions, lane change maneuvers, and steering maneuvers.

Ford, seeking to clarify information cited by the agency in the proposal, also stated that although the EDR in the referenced 2007 Ford [26] was capable of recording more than 20 seconds of pre-crash data, it did not meet the crash test performance and survivability requirements of part 563. Ford explained that the pre-crash data in the 2007 Ford was stored in the Powertrain Control Module (PCM), which served as a diagnostics tool not equipped with a power energy reserve. Ford stated it later replaced the PCM recording capability with a part 563-compliant EDR that uses the Restraint Control Module (RCM) to record PCM data for 5 seconds prior to a crash event.

Several commenters supported some or all aspects of the proposal, stating it would provide more information for crash investigations and safety data. IIHS–HLDI stated it would provide researchers with a greater understanding of the role different factors like vehicle, driver, and roadway/environment play leading up to a crash. NAMIC agreed more pre-crash data would help insurers, researchers, manufacturers, and regulators understand and determine crash causation, while also helping crash avoidance research. NAMIC also stated that the benefits of more pre-crash data on vehicle dynamics and system status, driver inputs, vehicle crash signatures, restraint usage/deployment status, and post-crash data, such as the activation of an automatic collision notification system, would provide greater safety value than any associated costs with increased memory capacity and potential EDR unit redesigns. State Farm supported the proposed duration and frequency changes to EDRs, and suggested vehicles should at minimum record all available information relevant to the crash.

Many commenters supported extending recorded categories rather than extending the duration and/or sampling rate of existing part 563 data retention requirements to improve crash analysis. The NTSB stated although the proposed rule addresses data elements currently in part 563, a complete understanding of crashes involving vehicles with ADAS would necessitate more pre-crash data than is currently required. CAS stated that even longer durations and higher sample frequencies could be beneficial for data not currently included in part 563, such as progressive sensor degradation, object event detection, response processing, and performance of sensor and data processing components.

EDR Duration Study

Many commenters criticized the NPRM's reliance on the EDR Duration Study's finding that 20 seconds of pre-crash data encompasses the 90th percentile recording duration necessary to capture the initiation of driver actions. SAE stated the study failed to demonstrate that the recommended 20-second recording duration would improve crash causation investigations. SAE further stated that the study focused on determining the duration necessary to assess driver behavior, rather than crash causation, and reiterated its previous comments critiquing the study.[27]

Specifically, SAE stated the study should have assessed more than the speed, braking, and steering actions of the vehicle, noting that engine throttle percentage, accelerator pedal percentage, engine RPM, cruise control status, anti-lock braking system (ABS) activity, lateral acceleration, and yaw rate are all useful data elements when studying the cause of a crash event. SAE also stated the vehicles in the study lacked modern safety features, such as pre-collision braking and electronic stability control, which could have prevented some of the accidents or provided intervention within the current recording duration of 5 seconds.

SAE asserted the study contained flawed assumptions about current automotive braking system architectures. SAE also stated there were two false assumptions concerning steering input. First, SAE explained the EDR Duration Study concluded that the availability of steering angle data, an optional data element, was very limited, thus reducing its significance in Phase I of the study. Second, SAE stated the study assigned steering angle data the same importance as the other data elements, and that the study's authors erroneously assumed a weighted distribution would compensate for the small number of cases with steering input. In response to this assumption, SAE stated actual field-related data from more recent part 563 compliant vehicles covering a wider range of manufacturers should have been used, and that the study's analysis should have been updated with current systems data. SAE also discussed the resolution of the steering input data, explaining that some pre-part 563 EDRs reported steering input data with a range of +/− 16 degrees, meaning a steering maneuver beyond 16 degrees would need to be made to be detected and recorded in the EDR. SAE stated that depending on vehicle speed, a steering input of less than 16 degrees could have significance in relation to vehicle dynamics; however, if no such recorded input occurred, the study concluded the driver was not moving the steering wheel.

SAE also critiqued the study's lack of distinction between accelerator pedal position and engine throttle position, stating it purposely ignored EDR data recorded more than 5 seconds before a crash, and further stated that if all 8 seconds of pre-crash data, where available, were reviewed, the study could have confirmed whether the service brake was on at 5 seconds prior to a crash event. SAE explained this information could demonstrate whether pre-crash data beyond 5 seconds would change overall reconstruction results. Finally, in relation to the study's 1-Hz

source to determine vehicle speed, evasive maneuvers, and passenger status).

[26] NHTSA, Special Crash Investigation No. IN10013, *available at https://crashviewer.nhtsa.dot.gov/nass-sci/GetBinary.aspx?Report&ReportID=804261920&CaseID=804261915&Version=-1.*

[27] SAE provided comments and presented to NHTSA in response to the EDR Duration Study. *See* NHTSA–2022–0021–0005 and NHTSA–2022–0021–0006.

recording frequency in older vehicles, SAE and Auto Innovators stated brake pedal application can occur multiple times within one second, and state changes could be missed in the sample period. Several commenters expressed support for SAE's comments on the study.

Agency Response

This final rule adopts the NPRM's proposed part 563 EDR pre-crash data recording and frequency durations. This final rule's implementation will fulfill the FAST Act mandate and provide additional information on the status of vehicle systems and the actions taken prior to a crash.

General Comments

The agency acknowledges criticisms raised by several commenters, including suggestions that further studies are needed to determine the safety benefits of additional EDR pre-crash data. However, NHTSA is confident the EDR Duration Study provides a solid basis for this final rule's increase to 20 seconds of pre-crash data based on the study's findings on the amount of pre-crash actions missed in the 5 seconds prior to a recorded event by the EDR, particularly for in-road departure and intersection crashes. The EDR Duration Study found part-563's 5-second recording duration insufficient to record important information in a substantial percentage of crashes in which the EDR is triggered. This information, including the initiation of crash avoidance driving maneuvers, *e.g.,* pre-crash braking, would assist investigators with crash reconstruction. The study also found that 20 seconds of pre-crash data would encompass the 90th percentile recording duration required for the three crash modes and the crash avoidance maneuvers analyzed.

In support of the increased frequency requirement of this final rule, NHTSA understands some manufacturers already equip vehicles with EDRs that record data at 5 or 10 Hz, and in some cases multiple rates. NHTSA agrees with commenters who expressed support for the proposed increase by stating the increased frequency could capture events like braking interventions, lane change maneuvers, and steering maneuvers that may be missed at 2 Hz.

In response to Ford's comment regarding the 2007 Ford vehicle included in the EDR Technology Study [28] and referenced in the NPRM, the agency is aware that the EDR in question was manufactured prior to the implementation of part 563. The agency did not reference it in the NPRM as a basis to state that all current EDRs are capable of recording 20 seconds of data. Instead, it serves as an example to show that manufacturers have already developed systems that record more than 5 seconds of pre-crash data. Finally, in response to comments encouraging the recording of additional data elements, this topic falls outside the scope of the NPRM and will not be addressed in this rulemaking. The agency may address the recording of additional data elements, including ADAS system status and performance parameters, in future rulemaking. Additional details on the estimated benefits of this final rule are discussed in section V.

EDR Duration Study

Many comments received criticized certain aspects of the EDR Duration Study and the NPRM's reliance on it in extending the recording duration of part 563. The agency does not find these arguments compelling. The study adequately met the FAST Act's mandate to conduct a study to determine the amount of time event data recorders installed in passenger motor vehicles should capture and record for retrieval vehicle-related data in conjunction with an event to provide sufficient information to investigate the cause of motor vehicle crashes.

Specifically, as required by the FAST Act, the study presented the durations necessary to provide sufficient information to investigate the cause of motor vehicle crashes. The agency does not agree with comments stating that the study incorrectly focused on driver actions rather than crash causation. The FAST Act required the agency to address data needed to assess crash causation. As such, vehicle dynamics were not the focus of the EDR Duration Study. Crash causation is crucial for effective crash investigation. Because many studies, some using police-accident reports [29] or EDR data, have shown that driver error is often the cause of crashes,[30] an understanding of pre-crash vehicle actions is critical to determining an appropriate recording duration. One study used the crashes in the Naturalistic Driving Study (NDS) to determine that driver error contributed to 93% of observed crashes.[31] In the EDR Duration Study, ''behavior'' is used synonymously with ''action.'' Therefore, the study's objective in Phase II was to determine a recording duration that provides more certainty of capturing the complete duration of pre-crash actions.

In response to SAE's critique that speed, braking, and steering were studied exclusive to each other in Phase 1 of the EDR Duration Study and not with the rest of the EDR data, NHTSA acknowledges SAE's comment that crash reconstructionists analyze vehicle speed in conjunction with brake status. However, these two factors were not combined in Phase 1 because the study successfully addressed the research questions without studying whether enough brake pedal pressure was being applied to decelerate the vehicle. The study analyzed each pre-crash action individually because the study's objective focused on whether any braking input, steering input, or accelerator release occurred.

NHTSA also acknowledges SAE's statement that the study assumed the Service Brake On indicator signified driver intent to actively brake the vehicle, when it could instead be related to disengaging cruise control status or a slightly engaged brake pedal (*e.g.,* resting a foot on the pedal). In response to this comment, NHTSA states the EDR Duration Study solely focused on the pre-crash action itself, regardless of whether that action resulted in decreased vehicle speed. As such, any braking action can still be considered a valid pre-crash action of the driver.

In response to SAE's comment that weighted distributions were incorrectly used to compensate for the small number of cases with steering input in Phase I, NHTSA disagrees. Weighted distributions were used as the standard result format for all the data elements in the study, regardless of the sample size. Additionally, NASS–CDS data are designed for use in a weighted fashion because of its nationally representative structure.

In criticizing the study, SAE and Auto Innovators commented that the EDR Duration Study assumed that no recorded steering input meant the driver was not moving the steering wheel, but that pre-part 563 EDRs required a steering input change of more than 16 degrees to be captured by the EDR so active steering maneuvers in the dataset

[28] Gabler, H.C., Tsoi, A., Hinch, J., Ruth, R., Bowman, D., & Winterhalter, M. (2020, June). Light-vehicle event data recorder technologies (Report No. DOT HS 812 929). National Highway Traffic Safety Administration.

[29] Singh, Santokh. Critical reasons for crashes investigated in the national motor vehicle crash causation survey. No. DOT HS 812 115. 2015.

[30] Dingus, Thomas A., et al. ''Driver crash risk factors and prevalence evaluation using naturalistic driving data.'' Proceedings of the National Academy of Sciences 113.10 (2016): 2636–2641.

[31] Khattak, Asad J., et al. ''A taxonomy of driving errors and violations: Evidence from the naturalistic driving study.'' Accident Analysis & Prevention 151 (2021): 105873.

may not have been captured. The EDR Duration Study could only use the EDR data available (which included pre-part 563 EDRs) to evaluate what pre-crash actions were captured. The study assumed that if a non-zero steering angle was recorded at −5 s, the initiation of a pre-crash steering maneuver was not captured. NHTSA does not believe that the current resolution for steering input (5 degrees) would change the results of Phase 1 of the EDR Duration Study since the authors defined the steering input time as the time between the event and the earliest non-zero steering angle recorded. NHTSA agrees that, based on vehicle speed, a change in steering input less than the 16-degree resolution could be significant.

In response to comments on the issue of whether the accelerator pedal position or engine throttle position was used to assess driver action, the EDR Duration Study used the accelerator pedal position to indicate a depressed pedal, as the objective of the study was driver action prior to crash. NHTSA acknowledges that accelerator pedal position and engine throttle position do not always correspond (especially given modern vehicles with drive-by-wire technology). The study used accelerator pedal position as it is related to the driver's input, whereas the engine throttle position can lag behind that input. NHTSA also acknowledges SAE's comment that the EDR Duration Study ignored data extending beyond 5 seconds. Specifically, where EDRs recorded 8 seconds of pre-crash data in the study, the results were truncated to 5 seconds to combine them with the remainder of the dataset that only had 5 seconds of pre-crash data to make the brake pedal, accelerator pedal, and steering input data consistent. Doing so is consistent with the 5 seconds of pre-crash data required by part 563 prior to this final rule. This was done in Phase 1, as this part of the study evaluated whether 5 seconds of data was sufficient for capturing the initiation of pre-crash maneuvers in rear-end, road departure and intersection crashes. The authors of the EDR Duration Study could not use EDR data to determine the duration beyond 5 seconds needed to capture crash causation, because most EDR data only records 5 seconds of pre-crash data per the minimum requirements in part 563. Therefore, as required by the FAST Act, to determine the amount of time event data recorders installed in passenger motor vehicles should capture and record for retrieval vehicle-related data in conjunction with an event to provide sufficient information to investigate the cause of motor vehicle crashes, Phase 2 of the study used two naturalistic driving studies (NDS) (100-Car NDS and SHRP–2 NDS). These studies were used because they include more than 5 seconds of data prior to an event.[32]

Further, although some commenters stated that older vehicles used in the study had EDR data recorded at a sample rate less than the part 563 requirements (2 Hz), the EDR Duration Study acknowledged the uncertainties of the sample rate (1 Hz vs. 2 Hz) of data numerous times throughout the report. The study's results were presented in terms of the observed EDR data, the ''Lower Bound,'' and ''Upper Bound,'' which assumed the actual pre-crash action for EDRs recording at 1 Hz was one time step earlier than the reported time (*e.g.,* if an initial braking action occurred at −4 s the action was assumed to occur at −5 s). NHTSA believes that presenting the results in this corridor fashion was appropriate and provided a fair and transparent representation of the range of times the driver action may have occurred. In response to SAE and Auto Innovators' comments that a pre-crash braking action can occur multiple times within the time span of 1 second (1 Hz) or 0.5 seconds (2 Hz), NHTSA notes that this fact supports increasing the recording frequency of pre-crash data, as required by this final rule, so that multiple pre-crash actions are captured by the EDR.

NHTSA also acknowledges comments received stating that the vehicles used in the study lacked modern safety features that could have prevented some crashes and provided intervention within 5 seconds of the crash event. However, NHTSA observes the available EDR data used in the study did not generally include any details on active safety features, as part 563 does not require the capturing of those elements, which are at times voluntarily recorded by manufacturers. Therefore, any pre-crash data related to modern safety features could not be included as part of the research in Phase 1 of the study.

NHTSA does not know if active safety features will be universally adopted in future vehicles or recorded for the purposes of crash reconstruction. However, NHTSA points out that ABS and electronic stability control (ESC) were studied in Phase 2 of the EDR Duration Study, which used naturalistic driving data from newer vehicles. The ABS activation times in that data ranged from 2–9 seconds prior to the crash, further demonstrating that a 5-second duration is not always sufficient to capture all the pre-crash actions of the vehicle. Finally, some comments criticizing the EDR Duration study addressed areas outside the scope of this rulemaking and the research questions and conclusions made by the study, such as how beneficial the additional data will be when used with vehicle dynamics for crash reconstruction and that pre-crash data would benefit more from additional data elements rather than extending the time capture pre-crash. As such, the agency is not addressing these comments in this final rule.

[32] The two NDS studies used in the EDR Duration study collected data in normal driving conditions over the course of millions of trips and miles.

B. EDR Components

EDR Comments Overview

The agency sought comment on whether the NPRM's proposed changes would affect current EDRs, including in terms of creating any increased memory needs, processor speed burdens, or other issues not considered by the proposal. Many commenters, including OEMs, manufacturers' associations, industry suppliers, trade associations, industry experts, and engineer organizations generally agreed that while the proposed 20 seconds of pre-crash data could be recorded by EDRs, some EDRs may require significant hardware and software changes to meet these demands. Commenters stated the memory (RAM and read-only Memory (ROM)), energy reserve, and microprocessor (or microcontroller) of EDRs may all need to be upgraded or expanded. Bosch stated that some manufacturers may have EDRs capable of accommodating the new requirements using current hardware. Nissan suggested that some of its EDR modules could record for 20 seconds without requiring hardware changes, given enough time for testing and development.

Agency Response

Following careful consideration of comments received, this final rule is extending the EDR recording period for timed data metrics from 5 seconds of pre-crash data at a frequency of 2 Hz to 20 seconds of pre-crash data at a frequency of 10 Hz. NHTSA acknowledges some current EDRs may require significant hardware and software changes to meet this final rule's recording requirements. However, the changes made by this final rule are necessary to fulfill the Fast Act's requirement that the agency ''shall promulgate regulations to establish the appropriate period during which event data recorders installed in passenger

motor vehicles may capture and record for retrieval vehicle-related data to the time necessary to provide accident investigators with vehicle-related information pertinent to crashes involving such motor vehicles.'' [33]

Based on the data submitted to NHTSA by vehicle manufacturers and EDR records available from CISS, many newer EDRs already have sufficient memory, processing performance, and reserve energy capacity to capture and record 20 seconds of pre-crash data at 10 Hz. If necessary, manufacturers could potentially reconfigure these EDRs by reallocating memory to meet the new recording requirements for pre-crash data in this final rule, as the reallocation of memory would not entail any additional energy or processor capability. NHTSA acknowledges the subject systems would still need to undergo development and testing to ensure they function as intended with no adverse effect on the activation of air bags in a crash event with air bag deployment.

The agency is aware that memory is not solely used to record EDR data, as it is shared by other functions of the ACM. However, many modern EDRs, particularly those updated to meet UN ECE Regulation No. 160,[34] likely already have sufficient capability to meet the pre-crash recording duration and sample rate requirements of this final rule without disrupting how EDR data are currently recorded. Based on the CISS EDR data available, NHTSA is aware of at least one manufacturer that has made such EDR upgrades to a large portion of its newer models, such that only software changes would be needed to comply with the final rule.[35] Further, EDRs that currently capture and record more than 1600 bytes of pre-crash data could allocate resources to, at minimum, record the three required Table I data elements for 20 seconds at 10 Hz.

Additional analysis on comments received and the agency's response in the areas of EDR memory, data processing, energy reserve, design, and the development process is provided below.

[33] Public Law 114–94, 2015 HR 22, Public Law 114–94, December 4, 2015, 129 Stat 1312.

[34] UN ECE Regulation No. 160 requires all new types of M1 and N1 vehicles in Europe to have an EDR beginning July 6, 2022, and further requires all new vehicles to have an EDR beginning July 7, 2024. Table 1 in Annex 4 of UN R160 lists twenty-three mandatory pre-crash data elements to be captured by the EDR.

[35] For example, EDR records from vehicle 2 in CISS Case Number: 1–20–2022–129–03.

Memory

Comments

Many commenters indicated the current amount of non-volatile memory in EDRs may not be sufficient to record 20 seconds of pre-crash data captured at 10 Hz. The NPRM indicated an increase in pre-crash recording duration from 5 seconds to 20 seconds with an accompanying increase in recording frequency from 2 Hz to 10 Hz, would require 1.33 kilobytes (kB) of additional memory (a factor of 2.43 increase from the baseline) if all 7 pre-crash data elements were recorded. However, SAE stated some suppliers estimated the memory would increase by a factor of 8.5. SAE explained that adding more memory to meet the new data capture requirements would involve a complex process, as reallocating memory from other data elements would require an entire development process for each type of EDR.[36]

GM stated that to meet the proposed requirements in the NPRM, the memory for its latest generation EDR would have to increase from approximately 720 bytes per recorded event to 8260 bytes, or an increase by a factor of approximately 11.5 based on 46 pre-crash data elements. GM explained this estimate must be multiplied by 3 to account for 3 separate EDR-recorded event buffers. GM further stated it is desirable to have a consistent sampling rate for all pre-crash data elements to reduce software complexity, and that it does not have a design in production that can simply incorporate the requirements in spare memory.

GM explained memory allocation is one of the first steps of new product development, used to determine the specifications for the microprocessor, memory storage size and type, energy reserve, and power supply, and that changes to the type of memory required would have a significant impact on the design specifications for EDRs. Honda, Nissan, and Ford also stated that meeting the requirements proposed in the NPRM would require additional non-volatile memory. CSI and MEMA stated memory estimates should consider that the ACM and any other system housing the EDR shares processor power and memory with the EDR, and that additional memory is rarely available in existing systems. QuantivRisk, Inc. and CSI also stated that adding memory would require additional development and testing costs.

[36] Manufacturers typically have more than one type of EDR installed across their vehicle models.

Agency Response

NHTSA acknowledges comments received from industry, OEMs, and trade associations suggesting that EDRs would require more memory than that estimated by the NPRM (for both data capture and recording) to meet the NPRM's proposed requirements. Necessary memory upgrades could include both non-volatile memory for storing the recorded crash data, and volatile memory (or RAM) for data processing (read into and write over). Currently, part 563's specified recording duration of 5 seconds at 2 samples per second generates a total of 11 samples for each pre-crash data element (2 samples per second $\times$ 5 seconds + 1 initial sample).

The EDR Technology Study, reporting on information provided by EDR subject experts from OEMs and ACM/EDR suppliers, found a typical recorded crash event requires approximately 929 bytes (77 bytes for pre-crash data elements) to record all of the Table I and Table II data elements for a single event.[37] Depending on the redundancy strategy for data quality control, a typical recorded EDR requires approximately 1.86 kB per event. To record data for 20 seconds at 10 Hz, 201 samples ($10 \times 20 + 1$) would be captured, or an additional 190 samples per pre-crash data element over the previous requirements of 5 seconds at 2 Hz. In total, an additional 1,330 (190×7) data points must be captured, processed, and recorded per crash event if all 7 pre-crash data elements are recorded (Table II lists optional data elements if they are recorded by the EDR). An EDR is required to record these elements for up to two events in a multi-event crash.[38] To capture two events, the EDR would require an additional 2,660 bytes of memory for the additional data, as required by this final rule. Similarly, an equal amount of RAM would be needed for data processing.

Memory reallocation may be necessary for older generation EDRs to meet this final rule's required Table I elements. Additionally, manufacturers with EDRs that voluntarily record data elements not listed in Tables I and II [39]

[37] See Tables 20 and 21 in DOT HS 812 929. Table I data elements require 72 bytes and Table II data elements require 857 bytes.

[38] For EDR data capture, part 563 requires the memory for air bag deployment events to be locked to prevent any future overwriting of the data. For non-air bag deployment events, the EDR can capture and record the current data, up to two events.

[39] Comments received from GM and Honda support the contention that some EDRs are

Continued

of part 563 may need to reallocate memory if memory allocation is nearing capacity or there is insufficient memory to meet the requirements of this final rule. However, NHTSA accepts this potential as Congress unambiguously signaled its desire for the agency to prioritize the time necessary to provide accident investigators vehicle-related information pertinent to crashes through the FAST Act statutory mandate. This final rule's additional lead time should considerably minimize any required memory reallocation. Further, any memory reallocation needed to meet the requirements of this final rule could potentially be carried out by only capturing those elements required by Table I, as only Table I elements must be recorded if an EDR is installed.

In relation to recording requirements, GM suggested that it is preferable to record all pre-crash data elements captured by its latest generation EDR, including those required by part 563 and those voluntarily captured, at the same sample rate to not increase software complexity. However, EDRs that record data elements at different recording intervals and data sample rates already exist (*e.g.,* some EDRs capture and record data at both 5 s/10 Hz and 5 s/2 Hz). Further, although manufacturers may choose to do so, NHTSA is not requiring manufacturers to record all pre-crash data at 20 seconds and 10 Hz; rather they must only apply that standard to those elements listed in Table I and, if recorded, Table II of part 563.

If an EDR does record numerous data elements not listed in part 563 at 20 seconds and 10 Hz, NHTSA agrees that the amount of extra memory needed to record that data could significantly increase. However, the recording of additional elements outside of Table I is not required by this final rule, and the minimum amount of extra memory needed to record the three pre-crash Table I elements is only approximately 570 bytes (1,040 bytes if considering two events). The estimate provided by the agency for the additional memory needed (2,660 bytes) is for all 7 mandatory and optional pre-crash data elements captured at 20 s and 10 Hz, and for the recording of multiple events. The decision to install additional memory necessary for data buffering and redundancy is a voluntary decision by a manufacturer and is not required by part 563. As discussed in the NPRM, many manufacturers already have EDRs with sufficient hardware capabilities to capture and record more pre-crash data, or will have the time to develop such EDRs given this final rule's additional lead time allowing for EDR development and testing/validation. For example, vehicle models equipped with EDRs containing 32 kB of flash data storage (memory) or greater should already have sufficient capacity to capture the increased amount of pre-crash data required by this final rule.

For EDRs containing insufficient memory to record the data elements in Table I and II at this final rule's required recording interval/data sample rate, manufacturers may be able meet the new requirements through various means. For example, if EDR memory is currently used to record other data elements not required in part 563, OEMs could reallocate the available memory to record the mandatory data elements at 20 seconds and 10 Hz. If no excess memory is available because a portion of the memory is used for purposes outside of capturing and recording EDR data, modification should not be overly burdensome, as only 1.33 kB of additional memory is needed under this final rule to record the seven pre-crash data elements. Further, if an OEM solely recorded the data elements required by Table I, only approximately 0.57 kB of additional memory would be needed to meet the requirements of this final rule (an increase from 33 samples to 603 samples for Table I pre-crash data elements).

Where memory reallocation is not possible or preferred and additional memory is necessary, manufacturers could increase the memory capacity of the EEPROM, or embed higher capacity flash memory chips with similar costs, since flash memory typically costs less than EEPROM.[40] For example, information from manufacturers in the EDR Technology Study indicated a typical 2013 microprocessor used in vehicle applications had 32 kB or 64 kB of flash data as part of the ACM, and that most companies are replacing the older memory technology (EEPROM) with flash memory located on the microprocessor. As previously stated, EDRs containing 32 kB of flash data storage (memory) or greater should have sufficient capacity to capture the increased amount of pre-crash data required by this final rule.

Finally, in response to comments expressing concern that the NPRM failed to capture all costs associated with any EDR memory increases needed to meet the requirements of this final rule, NHTSA acknowledges these concerns and, following careful consideration, has adjusted estimated costs accordingly in the Final Regulatory Evaluation (FRE) accompanying this final rule. Additional details on the updated cost estimates of this final rule are discussed in section V.

Data Processing

Comments

Several commenters expressed concern that the proposal would create increased data processing needs. SAE and Auto Innovators stated that, depending on current microprocessor capacity, the proposed data requirements would necessitate additional energy capacity, speed, and memory upgrades, which would also require a new microprocessor and circuit board. SAE and Auto Innovators indicated these modifications would require a complete redesign of the EDR from both a hardware and software perspective. GM stated none of its current EDR designs can support the 20 second requirement without changes to the microprocessor. Honda commented that the NPRM's proposed increases in recording duration and frequency will increase the amount of RAM in the microcontroller unit (MCU) required to record the data, necessitating a physically larger and higher performance MCU. Honda explained that the proposed changes would also require the MCU ROM and processor performance (*e.g.,* clock frequency) to increase.

Agency Response

NHTSA acknowledges the concerns raised by several commenters, including Honda, GM, SAE, and Auto Innovators, that the proposed requirements may necessitate microprocessors with higher clock speeds and an increased amount of ROM depending on the performance specifications of the current microprocessor used to capture and record EDR data. NHTSA also acknowledges comments stating that the NPRM's proposed increase in RAM would necessitate a physically larger and higher performance microprocessor. However, these changes may only be necessary in older generation EDRs or EDRs that are recording data at or near the memory capacity. Further, although some older generation EDRs may lack the performance specifications needed

recording data beyond the Table I and II part 563 elements.

[40] NHTSA understands that manufacturers have moved from EEPROM to flash memory located on the microprocessor for memory storage. The agency did not receive specific comments on how much flash memory EDRs are using to record pre-crash for 5 seconds or on the amount of memory that would be needed to capture the additional data, including additional memory for redundancy. Therefore, it is difficult to discuss examples of how the different components would need to be upgraded.

to capture and record the increased duration and frequency of pre-crash data required by this final rule (including clock speed of the microprocessor, available ROM, RAM, and flash memory), many newer EDRs have the necessary MCU specifications to record for 20 seconds. NHTSA acknowledges these newer versions would require a period of software development to change how data are buffered, written to memory, and tested to validate the EDR and ensure that all systems interacting with the EDR perform as intended. However, these concerns should be alleviated through the additional lead time provided by this final rule, which should allow manufacturers to make any EDR design changes needed to meet the requirements of this final rule.

Energy Reserve and Design Concerns

Comments

Several comments stated that the proposal would require increased energy reserve. Auto Innovators explained the EDR function is typically integrated into a vehicle's ACU or ACM and includes reserve energy to successfully deploy the restraint systems, facilitate high voltage shutoffs for electric vehicles, and record EDR data into non-volatile memory if vehicle power is lost early in the crash event. GM stated the increased write time duration would require more energy reserve, and that a microprocessor with a higher current draw could affect the energy reserve. For many existing units to meet the new requirements, Auto Innovators stated that the amount of additional, voluntary data elements recorded by the EDR would need to be reduced, or that the air bag control/EDR module would require redesign to accommodate the additional reserve power capacity. Both Auto Innovators and SAE stated that many current EDRs record more than the minimum part 563 requirements, and that these additional data elements would also have to be recorded for 20 seconds.

Several commenters stated the proposed changes would require larger and, in some cases, multiple capacitors to meet the extended pre-crash recording period, as the EDR module operates under its own power supply during a crash. Commenters indicated larger capacitors pose engineering challenges in terms of lifespan, durability, and ability to charge during normal operation. Auto Innovators stated the additional energy capacity required to meet the new requirements would considerably increase the footprint of the ACU/EDR, and that enough physical space may not exist in optimum locations for current vehicles (selected for crash sensing and durability) to accommodate increases in ACU/EDR size. Commenters explained needed changes to the size of the module could require redesign and affect placement in the vehicle, increasing design complexity and increasing costs for both consumers and manufacturers.

Agency Response

The ACU requires reserve energy (provided by capacitors) in the event of a loss of battery power in the vehicle. This reserve energy exists for the EDR to capture and record data, while also ensuring the vehicle's air bags can properly deploy. NHTSA acknowledges several comments received from industry stating that meeting the proposed EDR requirements may necessitate capacitors with increased capacitance, which may in turn require overall hardware changes and potential design changes to the EDR. However, none of the comments received stated that additional power was necessary across all EDR modules, instead only suggesting that more power may be required.

Based on comments received, NHTSA understands that some manufacturers equip EDRs that voluntarily record pre-crash data elements not listed as part of the minimum requirements in part 563. Any data elements not listed in part 563 that a manufacturer may choose to capture are not required to be recorded for 20 seconds at 10 Hz. A large amount of voluntarily recorded pre-crash data all recorded at 20 seconds could increase the amount of reserve energy required to write to memory and provide backup power, which could necessitate redesign of the EDR packaging. However, as previously stated, NHTSA is only requiring EDRs to record the three pre-crash data elements in Table I and the four pre-crash data elements in Table II (if they are recorded by the EDR) for 20 seconds. Although manufacturers may prefer to record all data at the same duration and sample rate, there are examples of EDRs in CISS that record data at different durations and sample rates. Manufacturers are of course free to record voluntarily captured elements as they prefer.

Based on NHTSA's analysis, the costs of capacitors, especially in large quantities, is relatively low. For example, an EDR capacitator upgrade from 3.3 µF to 10.0 µF would cost approximately $0.02 per unit, based on market research.[41] Further, EDRs with sufficient memory capacity to allow for some memory reallocation would not require an increase in reserve energy. The physical size of capacitors can vary according to many different constraints such as: manufacturer, dielectric type, target application, mounting style, capacitance, voltage rating. Based on NHTSA's research, there are 6.8 µF capacitors and a 10.0 µF capacitors with similar specifications beside capacitance that have the same physical dimensions in terms of diameter and surface mount area. Varying other parameters (*e.g.,* voltage rating) only changes the physical dimensions of these capacitors by 1 mm or less. Ultimately, the manufacturer chooses where to place the EDR housing within its vehicles. NHTSA has included cost estimates that cover software development and design validation but does not believe such small hardware components will significantly affect the size of the physical casing that holds the electronic components of the EDR.

Therefore, this final rule adopts the NPRM's proposal to extend the EDR recording period for timed data metrics from 5 seconds of pre-crash data to 20 seconds of pre-crash data at a frequency of 10 Hz. Manufacturers should be able to meet these requirements given the lead time and relatively low cost of capacitors to implement any required upgrades.

Development and Validation

Comments

SAE and Auto Innovators stated that in addition to costs incurred from the proposed EDR component upgrades, the proposal would also require associated development and integration costs, including validation and testing at component, sub-system, and vehicle levels. These commenters stated that costs and associated lead times are further amplified because the EDR application is most often coupled with a safety restraint management system requiring rigorous safety system validation and verification. Nissan, explaining it confirms the functionality of the EDR in coordination with other compliance crash tests completed in less than 20 seconds, commented that the proposal would require additional or new crash test procedures to retrieve data from a vehicle. SAE commented that capturing 20 seconds of data would require a crash test facility over 985 feet

[41] Based on quotes from DigiKey, the average unit price for 3.3 µF capacitors is $0.11 and the average unit price for 10.0 µF capacitors is $0.13. Therefore, $0.02 was used as the upgrade cost for reserve energy.

long, and that no such test facility currently exists. GM also expressed concerns in relation to vehicle level validation, asking if the proposal would require a crash of sufficient length to encompass the entire 20 seconds of pre-crash data. GM explained that such a requirement would impact vehicle barrier facilities and testing protocol, resulting in additional costs.

Agency Response

Several commenters expressed concerns that the proposed rule would incur new costs, including for a new crash test facility and additional or new crash test procedures to record and retrieve the appropriate amount of data. In response, the agency points out that vehicles do not have to operate at the speeds specified for crash testing under such scenarios as FMVSS No. 208 or FMVSS No. 214 to meet the new EDR recording requirements of this final rule. New or altered test procedures may be needed to validate the EDR, but manufacturers should not need new crash test facilities to meet the new data capture requirements. Manufacturers may instead use other means that do not require the vehicle to travel at crash test speeds (*i.e.,* 56 kph or 35 mph) for 20 seconds to capture pre-crash data as testing validation for this final rule's data capture requirements. For example, tests may be conducted by initially operating the vehicle at a minimum speed before acceleration or by idling the vehicle prior to accelerating to the speeds necessary for other crash tests. The availability of these alternative options and the extended lead time provided by this final rule will help mitigate any potential incurred costs.

C. Additional Data Elements

Comments

Many commenters stated that part 563 should include the recording of additional ADAS/ADS data elements to improve EDR data effectiveness. Commenters stated the incorporation of new crash avoidance, pre-crash, and post-crash data elements would provide a greater safety value to improve driver-assistive safety technologies compared with increased recording duration and frequency. Several commenters recommended that a standard format for capturing and reporting data related to advanced safety systems should be defined and included as part of the EDR requirements. Some commenters encouraged NHTSA to follow a similar path to the European Union's (EU) recent mandate requiring the equipping of new vehicles with EDRs that record ADAS elements. Bosch recommended the use of other recorders to record information like driver and ADS state to determine the control of the vehicle before an event triggering EDR recording, such as the Data Storage System for Automated Driving (DSSAD) recommended by the UN ECE, or the SAE ADS data logger (SAE J3197).

Agency Response

While NHTSA agrees with commenters that additional data elements may be beneficial for collision reconstruction, this topic falls outside the scope of this rulemaking. The NPRM did not address the addition of any new data elements, and the rulemaking responds to the FAST Act's instruction to promulgate regulations establishing the appropriate amount of time that EDRs should capture and record data.

The agency may address the recording of additional data elements, including ADAS system status and performance parameters, in future rulemaking. Manufacturers may of course continue to include or add pre-crash data elements outside of those listed in part 563[42] to EDRs but must also comply with this final rule. Manufacturers may also continue to log data from modern safety features in other vehicle systems.

D. Privacy Considerations

Comments

As explained in the NPRM, the DOT Privacy Office has determined that this rulemaking does not create privacy risk because no new or substantially changed technology will collect, maintain, or disseminate information in an identifiable form. NHTSA requested comment on this determination.

In response to this request, SAE stated that when part 563 was initially proposed it specified a recording duration of 8 seconds, which the agency reduced to 5 seconds to apply prudent judgment in balancing securing data with the privacy rights of an individual vehicle operator.[43] SAE cited the comment submitted by the Electronic Privacy Information Center (EPIC) in response to the initial proposal of establishing part 563, in which EPIC cited several Fair Information Practices (FIPs) limiting data collection based on purpose-specific principles and cautioned NHTSA against an incremental expansion of EDR data records as mandated policy. SAE stated NHTSA should demonstrate a clear public benefit for the proposed increased data capture duration, contrasted with a balance of personal privacy. Auto Innovators stated that expanding the pre-crash recording time to 20 seconds will capture a significant amount of driver behavior, much of which will not have any significant impact on the determination of crash causation factors that cannot currently be obtained by other crash reconstruction methods.

Agency Response

The agency emphasizes that EDRs do not record personally identifiable data, and captured data are regularly overwritten, except for specified crash events meeting the trigger threshold to retain data. Increasing the pre-crash recording duration from 5 seconds to 20 seconds should not increase privacy concerns, as no new or substantially changed technology will collect, maintain, or disseminate information in an identifiable form. Further, the Driver Privacy Act of 2015, part of the FAST Act[44] and implemented after the establishment of part 563, states that the owner or lessee of a motor vehicle is the owner of the data collected by an EDR. Recorded EDR data may only be retrieved for the purpose of improving motor vehicle safety and vehicle safety research (provided the data are not personally identifiable), or through the vehicle owners' consent or a court or administrative order. These privacy protections should alleviate expressed privacy concerns while allowing the agency to fulfill the FAST Act's mandate to establish the appropriate recording period in NHTSA's EDR regulation.

E. International Harmonization

Comments

Several commenters expressed support for international harmonization of EDR functions. Specifically, SAE, Honda, Auto Innovators, MEMA, and Bosch stated they support a harmonized approach with UN ECE Regulation No. 160.[45] Commenters noted that UN Regulation No. 160–01, which went into effect in July 2024, has adopted additional data elements for modern safety technologies. SAE recommended maintaining a mandated EDR practice

[42] Examples of some pre-crash data elements not listed in part 563 but recorded by some 2021 EDR-equipped light vehicles include: adaptive cruise control status, AEB status, brake pedal position, cruise control status, drive mode, forward collision warning, ignition status, lane departure warning, road departure mitigation status, tire pressure status, traction control system status, and wheel speed.

[43] 71 FR 50998 (Aug. 28, 2006).

[44] Public Law 114–94, § 24301–24302, 129 Stat. 1312, 1713–14 (2015).

[45] UNECE WP.29 has established the EDR/DSSAD Informal Working Group (IWG) to develop internationally harmonized performance specifications/regulations for EDR functions.

consistent with global EDR regulations to ease manufacturers' financial burden and avoid penalizing US vehicle buyers. In support of this approach, SAE discussed other global requirements, including those of Korea (KMVSS 56–2), Japan (J–EDR 2015), China (GB 39732–2020), EU (2022/545 based on UN R160), and Russia (Fed article 26 162–03), which all require a minimum of 5 seconds of pre-crash data captured at 2 Hz. Honda stated it has developed its EDRs to accommodate not only part 563 requirements, but also the various EDR regulations for China and UN R160 (00 and 01 Series).

Agency Response

NHTSA acknowledges that some other international EDR regulations specify a 5 second pre-crash data recording duration at 2 Hz. However, the agency has decided to proceed with the extended EDR data recording and frequency requirements proposed in the NPRM based on the requirements of the FAST Act and the findings of the EDR Duration Study, which found that capturing data at an increased recording duration and sample rate will enhance certainty when interpreting pre-crash data, resulting in improved crash investigations. In response to comments encouraging international harmonization in such areas as additional data elements for modern safety technologies, this topic falls outside the scope of the NPRM and will not be addressed in this rulemaking. However, the agency may address such topics in future EDR rulemakings, following review of the results of ongoing international efforts related to EDRs.

F. Other Considerations

Comments

NHTSA received several other comments generally related to part 563. One individual supported an increased EDR duration but stated there is a need to update part 563's trigger threshold definition. This commenter stated that the current trigger threshold, which specifies an 8 km/h change in vehicle velocity within a 150 ms interval, may not capture non-air bag deployment events, such as collisions involving a vulnerable road user and a vehicle. IIHS–HLDI provided similar comments and suggested modifying part 563 to include automatic emergency braking (AEB) activation status as a trigger threshold, as many vehicles are equipped with AEB systems. The Institute also stated that adding data on vehicle-to-pedestrian collisions would improve roadway design and help refine vehicle structures and crash avoidance systems to mitigate the severity of those collisions.

One individual commenter stated part 563 should apply to all newly manufactured vehicles, regardless of weight. The commenter explained that some newer electric vehicles may weigh more than the applicability requirement of an unloaded vehicle weight of 5,500 lb. and would therefore be exempt from complying with part 563.

Agency Response

Although multiple commenters encouraged additional amendments to part 563, these suggestions fall outside the scope of the proposed rulemaking and are thus not included in this final rule. However, NHTSA may consider additional amendments to part 563 as part of a future rulemaking.

V. Summary of Estimated Benefits and Costs

The requirements specified in this final rule affect vehicle manufacturers that produce light vehicles with a GVWR not greater than 3,855 kg (8,500 pounds) and voluntarily install EDRs in their vehicles. This rule also applies to final-stage manufacturers and alterers. Both the agency and the public have historically benefited from incorporating EDR information into crash and defects investigations, as the inclusion of EDR data leads to improved investigations and better understanding of injury causes and mechanisms.

The NPRM stated the proposed increased recording time for the pre-crash data would provide benefits by helping to ensure that data on the initiation of pre-crash actions and maneuvers are captured for most crashes. The agency explained this increased data would enhance the usefulness of the recorded information, potentially leading to further improvements in the safety of current and future vehicles. The agency also stated the proposed increase in data recording frequency would clarify the interpretation of recorded pre-crash information for crash investigators and researchers.

In relation to costs, the NPRM acknowledged that increasing the recording time of the pre-crash data could add additional costs for increased memory if an EDR had little or no excess memory in the module. In the NPRM, the agency stated it understood that about 99.5 percent of model year 2021 passenger cars and other vehicles with a GVWR of 3,855 kg or less are already equipped with part 563-compliant EDRs, that no additional hardware would be required by the proposed amendment, and that compliance costs would be negligible. The agency sought comment on potential costs and benefits associated with the NPRM's proposals.

Comments

Most commenters stated the proposal to increase the amount of pre-crash data captured and recorded would result in significant costs, including because of the need to upgrade and validate EDRs in vehicles. Many OEMs stated that costs would hinder the implementation of the proposed final rule, with some citing concerns over whether a real-world safety gap exists to justify costs incurred. Commenters stated the proposed changes would increase memory requirements, resulting in an increased overall EDR price. Commenters also stated software and hardware changes would be needed to meet the 20-second pre-crash capture requirements, including, where necessary, increased capacitance to provide power to the EDR and to make necessary changes to the printed circuit board.

Specifically, SAE pointed to a study done by the Federal Motor Carrier Safety Administration (FMCSA) on heavy-duty and commercial data recorders, referenced in the NPRM, stating it raised questions concerning the applicability of the cost estimates for flash memory. SAE also listed the following component changes and costs that must be considered for multiple module designs: microprocessor upgrade, additional memory (both RAM and nonvolatile memory), energy reserve increase, PCB design changes, module housing changes, potential mounting changes in vehicle software and hardware engineering design and development cost, component validation cost, vehicle validation cost for new module designs, and vehicle level recertification.

GM expressed concerns over the burdens associated with increased EDR complexity and the inability of different regions to arrive at a more common technical solution, pointing to recently implemented worldwide EDR regulations that maintain the 5-second pre-crash recording interval and sample rates historically required by part 563. GM further stated the cost estimate in the NPRM is not negligible and does not fully encompass all the required changes proposed by the NPRM, which could include component validation, full vehicle validation, and vehicle recertification of the EDR and the Sensing and Diagnostic Module.

Auto Innovators submitted additional comments related to costs following the

closing of the NPRM comment period.[46] These comments stated that, based on member responses, the estimated average cost of development and testing to meet the proposed rule would be $8.4 million dollars per manufacturer, with an average estimated cost increase of $5.40 per vehicle to develop an EDR meeting the proposed rule. Given those estimates, Auto Innovators stated that, assuming an average annual light duty vehicle production of 16.4 million vehicles for 17 OEMs, the cost burden for the first year would be $231.36 million. Auto Innovators explained this is the sum of each OEM's development/test costs and that, assuming the same annual production took place, the annual cost burden following the first year of implementation of the final rule would be $88.56 million, based on the annual affected vehicle production times the incremental EDR module cost.

Commenters also stated manufacturers may require vehicle crash tests to ensure the data transferred from sensors in the vehicle to the EDR are not affected by hardware updates. Commenters stated costs to consumers and lead-time implications are especially important because of such issues as supply chain disruptions, microchip shortages, high inflation, and economic uncertainty. Auto Innovators also stated NHTSA should consider equity issues given the average new car price of vehicles.

In support of the proposal, NAMIC commented that the costs to increase the recording duration are warranted by the benefits of more and better pre-crash data, even if costs in addition to memory are required (*e.g.,* redesign for a larger unit, additional RAM, etc.). NAMIC stated the proposed changes provide greater safety value than any additional costs to the vehicle. CAS stated the price of flash memory used to estimate costs in the NPRM was overestimated and that OEMs may receive discounts for bulk memory purchases. CAS further stated the incremental cost associated with upgrading the memory would not prevent the expansion of EDR data storage.

Agency Response

The agency does not agree with comments expressing skepticism over the benefits of the NPRM's proposed increased recording duration and frequency requirements. This final rule's requirements will improve crash investigations and crash data collection quality, ultimately assisting the agency and others in identifying potential opportunities for safety improvement in vehicles already on the road, improving future vehicle designs, and creating more effective safety regulations. The increased information captured by the requirements of this final rule will aid not only the agency, but also crash investigators, first responders, and others.

However, following review the agency does find certain comments received stating that the NPRM did not consider additional costs associated with the NPRM's proposal compelling. As such, NHTSA has revised the cost estimates originally provided in the NPRM to include two different EDR versions: those solely requiring software changes to meet the proposed rule and those requiring both hardware and software changes. The updated estimated benefits and costs associated with this final rule are detailed below.

A. Benefits

EDR data are invaluable for improving system performance. EDR data improve crash investigations and crash data collection quality, which assists safety researchers, vehicle manufacturers, and the agency to better understand vehicle crashes and help determine crash causation.[47] Similarly, vehicle manufacturers can use EDR data to improve vehicle designs and develop more effective vehicle safety countermeasures. For example, as mentioned in the NPRM, the Toyota unintended acceleration study[48] confirmed the significant value of EDR pre-crash data.[49] The agency successfully used this EDR data to assist in determining the root cause of the events and to support the safety recalls. Further, in 2016, the agency used EDR data to establish crash scenarios and vehicle dynamics when evaluating the efficacy of vehicle-to-vehicle (V2V) communication technologies in an NPRM for V2V.[50]

The requirements of this final rule will fulfill the outstanding need of adequate recording of pre-crash actions for investigation and reconstruction without overtasking the vehicle's power and memory needs for capturing EDR data. The amendments may also result in foundational upgrades to the hardware and software for a modernized EDR, which could in turn support the capture and recording of other data elements. This final rule's increased recording duration and refined resolution may also provide OEMs with more granular pre-crash information that manufacturers can use to evaluate and develop improvements for vehicle systems. NHTSA acknowledges that, similar to the establishment of part 563, it is difficult to estimate the exact portion of benefits creditable to an increased amount of EDR data after a standard is implemented or a safety countermeasure is developed. While stored data are valuable in terms of safety research and emergency response, it is not easy to quantify how they translate to the improvement of vehicle safety. However, increased recording duration and frequency will provide many overall benefits to the public, as described below.

Increased Recording Duration

Per the findings of the EDR Duration Study, the current part 563 EDR pre-crash recording duration of 5 seconds does not capture the initiation of pre-crash braking and steering maneuvers in a substantial percentage of cases. Based on the findings of the study a recording duration of 20 seconds is required to ensure that the initiation of pre-crash actions and maneuvers can be captured for most crashes. The three crash modes examined in the EDR Duration Study—rear-end, intersection, and roadway departure—comprised about 70 percent of all passenger vehicle crashes, annually.[51] Separately, these crashes represent the most prevalent, relatively longer maneuvered times required, and relatively severe crashes (based on fatalities). Therefore, the newly required 20 second recording time is adequate to record the pre-crash actions for almost all crashes given the collective frequency of these three crash types and what they represent.

Increasing the recording duration of pre-crash data will help ensure that data on the initiation of crash avoidance driving maneuvers are captured for most crashes. This increased recording duration will enhance the usefulness of

[46] NHTSA–2022–0021–0025.

[47] Even though crash investigators gather insightful information about the dynamics of crashes, some parameters cannot be determined or cannot be as accurately measured (such as the change in velocity) by traditional post-crash investigation procedures, such as visually examining and evaluating physical evidence, *e.g.,* the crash-involved vehicles and skid marks.

[48] NHTSA Report No. NHTSA–NVS–2011–ETC, ''Technical Assessment of Toyota Electronic Throttle Control (ETC) Systems,'' February 2011.

[49] In March 2010 NHTSA began obtaining data from Toyota EDRs as part of its inquiry into allegations of unintended acceleration (UA), and as follow-up to the recalls of some Toyota models. The study analyzed cases in which the accelerator pedal became stuck or entrapped, seeking to determine the root cause of each crash.

[50] Preliminary Regulatory Impact Analysis, FMVSS No. 150, Vehicle-to-Vehicle Communication Technologies for Light Vehicles, December 2016, HS 812 359.

[51] Derived from the NHTSA report ''Target Crash Population for Crash Avoidance Technologies in Passenger Vehicles,'' March 2019, DOT HS 812 653.

the recorded information, potentially leading to further improvements in the safety of current and future vehicles. The study also found that a better understanding of pre-crash actions will assist in the evaluation of emerging crash avoidance systems (*e.g.,* lane departure warning, lane keeping assist, forward collision avoidance, automatic emergency braking, and intersection safety assistance systems).

The 20 second extended recording duration will be particularly useful in intersection crashes, which have an approach stage as the vehicle comes to the intersection and a traversal stage in which the vehicle is exposed in the intersection. Based on the EDR Duration Study, the currently required 5-second recording duration captures less than 1 percent of the total intersection event time, which includes the approach and traversal stage. The study found that 15 seconds would capture 50 percent of the total intersection event time, and 20 seconds would capture 95 percent of the total intersection event time. With this final rule's increased recording duration, actions such as running a stop sign, rolling stops, or running a red light could be captured in full and included in the crash reconstruction when supplemented with roadway and traffic control information. In road departure crashes, longer durations could also capture any corrective maneuvers by the vehicle before the initial road departure.

Increased Recording Frequency

Currently most EDRs capture pre-crash data at a frequency of 2 Hz. However, based on EDR records in the NASS–CDS and CISS (Crash Investigation Sampling System) databases, some manufacturers already use models that voluntarily capture pre-crash data at 5 Hz or 10 Hz. Further, some vehicle manufacturers and suppliers have indicated their support for an increased frequency rate. When manufacturers and suppliers were asked about near-term plans for EDRs in the EDR Technology Study, some respondents expressed interest in adding, ''higher sampling frequency and longer recording interval for pre-crash data, *i.e.,* sampling interval better than 1/10 of a second.'' [52]

In support of the benefits of this final rule's amendments to part 563, an increase in data recording frequency will help clarify the interpretation of recorded pre-crash information. For example, rapid vehicle control inputs (*e.g.,* brake application and release or rapid reversals in steering input of less than 0.5 seconds) may not be logged by an EDR that records data at 2 Hz. Although 20 seconds of pre-crash data will capture more crash causation information, a refinement in acquisition frequency is also needed to assuage data misinterpretation concerns. An improved data sampling rate is also needed due to the nature of crashes, which can include a quick sequence of events prior to a crash that require a vehicle's crash avoidance technologies, such as Anti-lock Braking System and Electronic Stability Control, to activate quickly. To understand the performance and effectiveness of such systems, the sample rate of pre-crash data elements should be increased. In addition, as EDR output for pre-crash data elements is not synchronized,[53] including at the previously required sample rate of 2 Hz, uncertainty could exist when an investigator is attempting to compare data at specific points in time with precision. The higher sample rate required by this final rule will reduce this potential uncertainty in relation to the relative timing of recorded data elements, to better correlate a driver's commands and a vehicle's performance.

This final rule's increased sample rate will also benefit crash causation analysis and pre-crash behavior. For example, additional events like momentary highly dynamic steering inputs, ABS, or ESC activation that are not recorded at the 2-Hz sample rate could be captured at 10 Hz. For multi-impact crash events, a sample rate of 10 Hz will allow the EDR to better capture the actions that occur when a vehicle undergoes a series of events (*e.g.,* lane departure resulting in striking an object followed by striking another object in immediate succession).

Further, an increase in recording frequency could help investigators better identify where vehicle dynamics prior to a crash event relate to pedal misapplication. Pedal misapplication crashes occur when a driver presses one pedal while intending to press another pedal. In an emergency braking situation, pedal misapplication would result in the driver pressing the accelerator pedal hard. Identifying and decreasing pedal misapplication events is important, as a recent study observed pedal misapplication rates involved a much higher percentage of events than previously estimated.[54] While data points can be estimated to account for data gaps when recorded at 2 Hz, driver actions may not be captured by the EDR at the time they occur. This informational gap may result in underestimations of the accelerator application rate, resulting in a failure to identify pedal misapplication entirely, if, for example, the driver fully presses the accelerator pedal to 100 percent for a quarter of a second. An increased recording frequency of 10 Hz will help identify events involving pedal misapplication, potentially providing additional information on how to mitigate these events and improve vehicular safety.

Finally, in addition to the many benefits provided by this final rule's requirement to increase part 563's data recording frequency requirements to 10 Hz, manufacturers' voluntary integration of ADAS data elements recorded at a sample rate of 10 Hz could provide valuable insights on the performance of new technologies. For example, some vehicle manufacturers already voluntarily collect EDR data on the status and operation of ADAS technologies (*e.g.,* activation of forward crash warning alerts, automatic emergency braking activations, and lane keeping assist technologies). In voluntarily collecting this information, manufacturers have generally adopted the sample rate used for pre-crash data elements voluntarily recorded by the EDR (2 Hz), but some current EDRs capture data at 10 Hz. Evidence has shown that an increased sample rate of 10 Hz will help provide the resolution needed to understand the real-world performance and effectiveness of these advanced crash avoidance systems and better estimate the actions of the vehicle prior to a crash, such as the traveling trajectory.[55] This information will in turn allow researchers to better determine the timing of the sequence of pre-crash actions.

B. Costs

The Preliminary Regulatory Evaluation (PRE) the NPRM relied on to estimate costs considered only vehicles equipped with EDRs containing sufficient memory, microprocessor specifications, and reserve energy to record 20 seconds of data at 10 Hz.

[52] DOT HS 812 929, pg. 39. Five vehicle manufacturers and three suppliers were interviewed as part of the study.

[53] While true time synchronization of data originating from the vehicle network may not be possible, the increased sample rate for pre-crash data elements may reduce the potential uncertainty related to the relative timing of data elements, specifically for correlating the driver's commands and the vehicle's performance.

[54] Smith, C.P., Sherony, R., Gabler, H.C., and Riexinger, L.E., ''Identifying Pedal Misapplication Behavior Using Event Data Recorders,'' SAE Int. J. Advances & Curr. Prac. in Mobility 5(1):206–216, 2023, doi:10.4271/2022–01–0817.

[55] Matsumura, H., and Itoh, T., ''Study on Estimation of Traveling Trajectory Using the Recording Data in the Event Data Recorder,'' SAE Int. J. Adv. & Curr. Prac. in Mobility 5(2):580–594, 2023, *https://doi.org/10.4271/2022-01-0837.*

NHTSA acknowledges comments criticizing the NPRM's cost estimates for not adequately accounting for any changes needed to meet the proposed amendments.

For example, the NPRM estimated additional memory costs by multiplying the additional 1,330 bytes to record for 20 seconds at 10 Hz by the cost of flash memory (0.072 cents/megabyte) reported in the EDR Technology Study. This calculation resulted in a cost estimate of $0.003 for additional memory per event. However, in response to comments received, the agency reviewed online estimates, which indicate that the unit cost for a 16 kB, 32 kB, and 64 kB EEPROM is $0.41, $0.46, and $0.56, respectively.[56] This pricing results in an additional cost of $0.15 to increase memory from 16 kB to 64 kB.[57] As such, this final rule is updating the estimated unit cost for memory upgrade (if all seven pre-crash data elements are recorded) to be $0.13 per vehicle. The $0.13 per vehicle includes $0.06 per vehicle to upgrade the storage memory and $0.07 per vehicle to upgrade the RAM, both based on two events being recorded.

Although the PRE still applies to EDRs with sufficient memory, microprocessor specifications, and reserve energy to meet this final rule's requirements, NHTSA acknowledges it did not comprehensively consider costs associated with older EDR technologies and the corresponding level of upgrades potentially required in vehicles equipped with them, including costs for redesign and validation. Per comments received, NHTSA understands not all vehicles are equipped with EDRs containing sufficient memory/processor capability/reserve energy to require only software changes.[58] Based on feedback from commenters and in acknowledgement of this issue, NHTSA has revisited the cost estimates presented in the NPRM to determine the costs associated with meeting the requirements of this final rule given the wide variety of EDRs currently available.

Unlike the PRE, this final rule includes estimated costs for EDRs currently compliant with part 563 that need upgrades to meet this final rule's new recording duration and frequency requirements. These updated cost estimates are presented via a ''lower bound'' and ''upper bound'' to capture the potential range for the total cost of the final rule. These bounds are in place to avoid speculating on how many vehicles and EDR platforms would only require software changes to meet the new data capture requirements versus those that would require hardware and software changes.

Description of Upper and Lower Bound Cost Estimates

The cost estimates presented in the Final Regulatory Evaluation (FRE) now represent a ''lower bound'' reflecting the incremental costs of ''upgraded EDRs'' that already have the capacity to comply with this final rule.[59] The ''upper bound'' represents all the potential components of an EDR that may require upgrades to transition from a ''base EDR'' to an ''upgraded EDR'' to meet the requirements of this final rule. For this category of EDRs, the estimated costs encompass more than the incremental costs required to meet this final rule. As EDRs currently vary in hardware capabilities, the actual cost of the final rule should fall somewhere between the lower bound and upper bound of the cost estimates laid out below.

Every part 563 pre-crash data element will require the capturing of an additional 190 data points to meet the 20 second recording duration and 10 Hz frequency requirement of this final rule. Specifically, for the 3 required data elements in Table I, the total number of additional data points is 570. For all 7 pre-crash data elements in Table I and II, the total number of additional data points is 1,330. The NPRM explained that manufacturers could accommodate this needed increase in memory by using the existing memory already available for capturing and recording EDR data (typically in the ACM). The NPRM estimated associated costs for these additional memory needs (1.33 kB for all 7 pre-crash elements) would be $0.003 per vehicle based on a conservative estimate of $0.002/kB. However, as previously acknowledged, these estimated costs did not account for EDRs requiring hardware upgrades based on insufficient reserve energy or microprocessors.

While many newer generation EDRs record at rates between 5 Hz to 10 Hz, most EDRs still record 5 seconds of pre-crash data. Although the agency has a large pool of EDR data, ascertaining the exact hardware specifications among various EDRs for the purposes of this rulemaking is not practical, as EDR modules come with a variety of chip designs capable of accomplishing similar functionality with similar costs, and this information is proprietary. The varied and proprietary nature of EDR designs thus makes defining a representative ''base EDR'' challenging. Further, EDR designs vary not only by manufacturer, but also often by vehicle model, and EDR capabilities are not standardized. Indeed, they must only meet the minimum requirements in part 563. For example, some EDRs record more than 5 seconds of pre-crash data, some record more than two events, and some voluntarily record more optional data elements than those specified in Table I or Table II of part 563. Further, some EDRs record the required and optional pre-crash data at different sample rates.

Despite the lack of available data needed to perform a comprehensive assessment of EDR design specifications and corresponding functionalities, the agency used its best knowledge to adequately describe a representative base EDR representing the upper bound for the cost estimates based on the specifications in Table 3. We assumed that a base EDR does not have sufficient excess memory to record pre-crash data for 20 seconds at 10 Hz, requiring the microcontroller and reserve energy to be upgraded or increased to meet the requirements of this final rule. We also assumed that a base level EDR must be fully upgraded/modernized, meaning its associated costs are well in excess of the incremental costs associated with making an already updated EDR compliant with the final rule. This cost is more representative of a vehicle manufacturer updating its EDR capability with an eye towards recording additional data elements, such as data elements required by UN R160. If a manufacturer chooses to capture and record ADAS-related pre-crash data elements not listed in part 563, then hardware components may need to be upgraded well beyond what is required by this final rule. However, as mandated by the FAST Act, NHTSA is only changing the duration and sample rate of part 563 pre-crash data elements.

For the lower bound of cost estimates, we assumed a vehicle is already

[56] *See https://www.mouser.com/c/semiconductors/memory-ics/eeprom* as of July 25, 2023.

[57] Note that RAM is generally more expensive than EEPROM, but NHTSA does not have a comparable price comparison because of a lack of data and online product information specifically for RAM designed for vehicle use. However, based on NHTSA's internal analysis, RAM is approximately 20.0 percent more expensive than EEPROM given the same memory capacity. As a result, updating RAM would cost $0.07 (= 0.06 * 1.20).

[58] The cost of upgrading this class of EDRs now reflects the ''upper bound'' of the cost analysis provided below and represents the need to go from a ''base EDR'' to an ''upgraded EDR.''

[59] The agency recognizes that even with the approach taken in the PRE, manufacturers would still need to test and validate any redesigned EDR to ensure it would function as intended and not negatively affect the performance of the air bag systems in the vehicle.

equipped with an EDR capable of capturing pre-crash data for 20 seconds at 10 Hz, as well as additional unrequired data (*i.e.,* it has already been upgraded by the vehicle manufacturer from the base level previously discussed to the fully modernized level). In this scenario, the ''upgraded EDR'' would not require hardware changes but may still require development time for software changes, testing, and validation. As a result, the estimated cost for this scenario would only include software redesign and EDR validation. An upgraded EDR representing the lower bound is described by the specifications in Table 3.

As shown in Table 3, the estimated cost to upgrade only the hardware of the base EDR to that of the upgraded EDR is $1.33 per EDR. This cost estimate includes an increase in the non-volatile memory capacity, a higher-performance MCU, and more reserve energy to capture and record the data and backup power to the system.

TABLE 3—BASE EDR AND UPGRADED EDR HARDWARE SPECIFICATIONS USED FOR COST ESTIMATES

Component		Base EDR	Upgraded EDR
Non-Volatile Memory	EEPROM or Flash	16 kB	64 kB.
Microcontroller (32-bit)	ROM	512 kB	1 MB.
	Memory	48 kB	96 kB.
	RAM	48 kB	96 kB.
	Clock Frequency	80 MHz	120 MHz.
Reserve Energy	Capacitance	3.3 μF	10 μF.
Estimated costs to upgrade hardware for increased data capture (per unit)			
		$1.33	$0.00.

Following publication of the NPRM and review of comments received NHTSA carried out a Final Regulatory Evaluation (FRE), available under the same docket number as this final rule, to estimate the total unit cost per EDR. The total unit cost consists of the following components: (1) increased memory capacity, (2) microcontroller upgrades, (3) energy reserve upgrade, (4) EDR redesign and validation, (5) assembling related material and labor costs, and (6) data imaging tool upgrade. The aggregated unit cost is the additional cost for an EDR to comply with the final rule. Based on these findings, the agency now estimates that the cost to upgrade EDRs to meet the new requirements under this final rule would range between $0.87 and $2.20 per vehicle equipped with an EDR.[60]

NHTSA estimates that this final rule will affect approximately 15.23 million light vehicles annually with a GVWR less than 8,501 lbs. This number is derived from Ward's Automotive Yearbook 2022 and the agency's NCAP data. Based on Ward's data, from 2012 to 2021, the average annual sales of light vehicles with a GVWR less than 14,001 lbs was approximately 16.21 million. Due to the incompatible GVWR categorization in Ward's data, NHTSA was not able to directly parse out the number of light vehicles, *i.e.,* GVWR less than 8,501 lbs, so NCAP data was used. NCAP data includes the precise GVWR and expected sales volume, but only for models of vehicles that manufacturers reported to the agency. In other words, NCAP might not be adequate for assessing the absolute annual vehicle sale volume since the expected sold volume might not be the actual volume sold and the reported models might not be comprehensive. However, NCAP is a reasonable, available source to derive the relative proportion of vehicles by GVWR. Based on 2021 and 2022 NCAP, an average of 6 percent of reported light vehicles had a GVWR greater than 8,500 lbs. Multiplying the annual sales from Ward's data by the percentage of affected vehicles results in 15.23 million (= 16.21 million * 0.94). Based on approximately 15.23 million affected vehicles sold annually, the total estimated annual costs range from $13.26 million to $33.52 million.[61] The FRE's estimated unit cost per EDR for each cost component, the total unit cost, and the total annual costs for the lower and upper bound estimates are shown in Table 4.

TABLE 4—COST ESTIMATES FOR INCREASED RECORDING DURATION OF EDR PRE-CRASH DATA

Cost To Modernize EDR From Indicated Baseline		
Cost components	Upgraded EDR (lower bound)	Base EDR (upper bound)
Memory Capacity Increase	$0.00	$0.13
EEPROM/Flash Increase	0.00	0.06
Buffer (Volatile Memory)	0.00	0.07
Microcontroller Upgrades	0.00	1.10
Energy Reserve Upgrade	0.00	0.02
EDR Redesign and Validation	0.87	0.87
Labor for Assembling	0.00	0.08
Data Imaging Tool Upgrade	0.00	0.00
Aggregated Unit Cost	0.87	2.20

[60] All costs are in 2022 values.

[61] Costs for testing, evaluation, and other fixed costs are factored into the component unit costs by a 1.5 markup factor from its variable cost.

TABLE 4—COST ESTIMATES FOR INCREASED RECORDING DURATION OF EDR PRE-CRASH DATA—Continued

Cost To Modernize EDR From Indicated Baseline		
Cost components	Upgraded EDR (lower bound)	Base EDR (upper bound)
Total Number of Affected Vehicles	15,230,000	
Total Cost of the Rule (in Millions)	$13.26	$33.52

Given the lack of reliable available data discussed above, NHTSA has used the cost estimates provided by Auto Innovators in response to the NPRM to estimate the cost for redesign and validation in the FRE.[62] Auto Innovators provided an estimated average development/testing cost of $8.4 million per OEM, based on feedback from OEMs. This estimate would amount to a total of $142.8 million collectively for the 17 OEMs that provided estimates to Auto Innovators and would only be considered part of the cost burden for the first year. Applying this cost to 16.4 million vehicles sold annually[63] over 10 years, the estimated cost per vehicle for this component is $0.87. In the FRE for this final rule, the estimated $0.87 for redesign and validation has been applied equally in both the lower bound and upper bound scenarios. Estimated costs for memory, microprocessors, and capacitors were derived from an online search, with sources presented in the FRE for this rulemaking. The components were filtered using the following specifications: automotive grade or use, reel package, and surface-mount. The sourced online sale unit prices were quoted for small quantities compared to the large quantities that OEMs may order for production. The unit prices were further discounted to 30 percent of the unit price.[64] The costs for wiring and assembly have been adjusted for inflation from the estimated assembly costs presented in the 2006 EDR final rule.

In acknowledgment of the updated estimated costs laid out in the FRE, NHTSA has added lead time to this final rule to allow OEMs additional time to comply with this final rule. This lead time should mitigate costs that may be required for OEMs to meet this final rule. The added lead time will also allow for the phasing out of older EDR systems prior to the implementation of the 20 second and 10 Hz requirements. Phasing out these EDRs will help negate required upgrades and any costs associated with the necessary components and costs needed to develop and test the package.

VI. Rulemaking Analyses and Notices

Executive Orders 12866, 13563, and 14094, and DOT Regulatory Policies and Procedures

We have considered the potential impact of this rule under Executive Order 12866, Executive Order 13563, Executive Order 14094, and DOT Order 2100.6A. This final rule is nonsignificant under E.O. 12866 and E.O. 14094 and was not reviewed by the Office of Management and Budget. It is also not considered ''of special note to the Department'' under DOT Order 2100.6A, *Rulemaking and Guidance Procedures.*

As discussed in this final rule and the NPRM, the additional pre-crash data that would be collected by EDRs under this final rule would be valuable for the advancement of vehicle safety by enhancing and facilitating crash investigations, the evaluation of safety countermeasures, advanced restraint and safety countermeasure research and development, and certain safety defect investigations. Improvements in vehicle safety could occur indirectly from the collection of these data.

We estimate that approximately 99.5 percent of model year 2021 passenger cars and other vehicles with a GVWR of 3,855 kg or less are already equipped with part 563-compliant EDRs. As discussed in the section on the cost impacts of this final rule, the agency believes that a portion of currently equipped EDRs would not require additional hardware to meet the requirements of this final rule and that the compliance costs would be low for software testing and validation. Additionally, this final rule's lead time should allow manufacturers to choose how best to equip compliant EDRs in applicable vehicles by the effective date of this final rule, while also mitigating costs. Updated cost estimates have been provided for EDRs that would require hardware and software updates.

Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires agencies to evaluate the potential effects of their proposed and final rules on small businesses, small organizations, and small Government jurisdictions. The Act requires agencies to prepare and make available an initial and final regulatory flexibility analysis (RFA) describing the impact of proposed and final rules on small entities. An RFA is not required if the head of the agency certifies that the proposed or final rule will not have a significant impact on a substantial number of small entities. I hereby certify that this rule would not have a significant economic impact on a substantial number of small entities. Additional details related to the basis of this finding can be found in the FRE for this rulemaking final rule.

The factual basis for the certification (5 U.S.C. 605(b)) is set forth below. Although the agency is not required to issue an initial regulatory flexibility analysis, this section discusses many of the issues that an initial regulatory flexibility analysis would address.

This final rule creates minor amendments to 49 CFR part 563, Event Data Recorders (EDRs), to extend the recording period for pre-crash elements in voluntarily installed EDRs from 5 seconds of pre-crash data at a sample rate of 2 Hz to 20 seconds of pre-crash data at a sample rate of 10 Hz. This final rule applies to vehicle manufacturers that produce light vehicles with a GVWR not greater than 3,855 kg (8,500 pounds) and voluntarily install EDRs in their vehicles. It also applies to final-stage manufacturers and alterers. We know of no Federal rules which duplicate, overlap, or conflict with the final rule.

The Small Business Administration's size standard regulation at 13 CFR part 121, ''Small business size regulations,'' prescribes small business size standards by North American Industry Classification System (NAICS) codes.

[62] NHTSA–2022–0021–0025.

[63] Annual production of vehicles typically fitted with part 563 compliant EDRs averaged between 2015–2019 (pre-COVID). *See https://www.epa.gov/automotive-trends/explore-automotive-trends-data#SummaryData.*

[64] Online quotes are for a sale quantity that is significantly less than the quantity that would be purchased by the manufacturers. To account for the efficiency of mass production and pricing power, NHTSA uniformly discounted these unit prices by 70 percent to represent the component price for manufacturers. This 70 percent discount may be conservative based on the agency's knowledge.

NAICS code 336211, Motor Vehicle Body Manufacturing, prescribes a small business size standard of 1,000 or fewer employees. NAICS code 336390, Other Motor Vehicle Parts Manufacturing, prescribes a small business size standard of 1,000 or fewer employees. Most motor vehicle manufacturers would not qualify as a small business. There are a number of vehicle manufacturers that are small businesses.

This final rule will directly affect 20 single stage motor vehicle manufacturers.[65] None of these are qualified as a small business. However, NHTSA analyzed current small manufacturers, multistage manufacturers, and alterers that currently have part 563 compliant EDRs and found that 13 motor vehicle manufacturers affected by this rulemaking would qualify as small businesses. While these 13 motor vehicle manufacturers qualify as small businesses, none of them would be significantly affected by this rulemaking for several reasons. First, vehicles that contain EDRs are already required to comply with part 563. These small businesses generally adhere to original equipment manufacturers' instructions in manufacturing modified and altered vehicles. Based on our knowledge, original equipment manufacturers do not permit a final stage manufacturer or alterer to modify or alter sophisticated devices such as air bags or EDRs. Therefore, multistage manufacturers and alterers will be able to rely on the certification and information provided by the original equipment manufacturer for EDRs

This rule may require hardware changes and will require adjusting the recording time and sampling rate for up to seven pre-crash data elements. As previously stated, the agency believes some current or planned systems can accommodate these changes. Additionally, NHTSA believes the market for the vehicle products of the 13 small vehicle manufacturers is highly inelastic, meaning that purchasers of their products are enticed by the desire to have a highly customized vehicle. Generally, under this circumstance, if any prices increase, the price of competitor's models will also need to be raised by a similar amount, since all light vehicles must comply with the standards. Therefore, any reasonable price increase will not have any effect on sales of these vehicles. NHTSA also designed the final rule to provide two years of lead time before the implementation of this final rule. Limited line[66] and small-volume manufacturers[67] will only need to produce compliant EDRs on or after September 1, 2029. Manufacturers producing altered vehicles or vehicles in two or more stages will have one additional year, until September 1, 2030, for compliance. This additional time provides any affected entities flexibility and ample time to make the necessary assessments to acquire a basis for certifying their vehicles' compliance.

Executive Order 13132 (Federalism)

NHTSA has examined this rule pursuant to Executive Order 13132 (64 FR 43255, August 10, 1999) and concluded that no additional consultation with States, local governments, or their representatives is mandated beyond the rulemaking process. The agency has concluded that this rule will not have sufficient federalism implications to warrant consultation with State and local officials or the preparation of a federalism summary impact statement. The rule does not have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

NHTSA rules can preempt in two ways. First, the National Traffic and Motor Vehicle Safety Act contains an express preemption provision: When a motor vehicle safety standard is in effect under this chapter, a State or a political subdivision of a State may prescribe or continue in effect a standard applicable to the same aspect of performance of a motor vehicle or motor vehicle equipment only if the standard is identical to the standard prescribed under this chapter. 49 U.S.C. 30103(b)(1). It is this statutory command by Congress that preempts any non-identical State legislative and administrative law addressing the same aspect of performance. The express preemption provision described above is subject to a savings clause under which compliance with a motor vehicle safety standard prescribed under this chapter does not exempt a person from liability at common law. 49 U.S.C. 30103(e). Pursuant to this provision, State common law tort causes of action against motor vehicle manufacturers that might otherwise be preempted by the express preemption provision are generally preserved.

NHTSA rules can also preempt State law if complying with the FMVSS would render the motor vehicle manufacturers liable under State tort law. Because most NHTSA standards established by an FMVSS are minimum standards, a State common law tort cause of action that seeks to impose a higher standard on motor vehicle manufacturers will generally not be preempted. If and when such a conflict does exist—for example, when the standard at issue is both a minimum and a maximum standard—the State common law tort cause of action is impliedly preempted. *See Geier* v. *American Honda Motor Co.,* 529 U.S. 861 (2000).

Pursuant to Executive Orders 13132 and 12988, NHTSA has considered whether this rule could or should preempt State common law causes of action. The agency's ability to announce its conclusion regarding the preemptive effect of one of its rules reduces the likelihood that preemption will be an issue in any subsequent tort litigation. To this end, the agency has examined the nature (*i.e.,* the language and structure of the regulatory text) and objectives of this rule and finds that this rule, like many NHTSA rules, would prescribe only a minimum safety standard. As such, NHTSA does not intend this rule to preempt state tort law that would effectively impose a higher standard on motor vehicle manufacturers. Establishment of a higher standard by means of State tort law will not conflict with the minimum standard adopted here. Without any conflict, there could not be any implied preemption of a State common law tort cause of action.

This final rule proposes technical amendments to an already existing regulation.[68] When 49 CFR part 563 was promulgated in 2006, NHTSA explained its view that any state laws or regulations that prohibit the types of EDRs addressed by part 563 would create a conflict and therefore be preempted. As a result, regarding this final rule, NHTSA does not believe there are current state laws or regulations for EDRs that conflict with part 563 or with the overall minor

[65] BMW, Fiat/Chrysler (Ferrari and Maserati), Ford, Geely (Volvo), General Motors, Honda (Acura), Hyundai, Kia, Lotus, Mazda, Mercedes, Mitsubishi, Nissan (Infiniti), Porsche, Subaru, Suzuki, Tata (Jaguar and Land Rover), Tesla, Toyota (Lexus), and Volkswagen/Audi.

[66] Limited line manufacturer means a manufacturer that sells three or fewer carlines, as that term is defined in 49 CFR 583.4, in the United States during a production year.

[67] Small-volume manufacturer as defined in § 571.127, ''Automatic emergency braking systems for light vehicles,'' is an original vehicle manufacturer that produces or assembles fewer than 5,000 vehicles annually for sale in the United States.

[68] The 2006 final rule promulgating 49 CFR part 563 discussed preemption at length. *See* 71 FR 50907, 51029 (Aug. 28, 2006).

change to capture time proposed by this document.

Further, the amendments required by this final rule are directed by the FAST Act, which directs NHTSA to conduct a study to determine the amount of time EDRs should capture and record data to provide sufficient information for crash investigators, and conduct a rulemaking based on this study to establish the appropriate recording period in part 563. NHTSA conducted an EDR Duration Study and submitted a Report to Congress summarizing the results of this study in September 2018. This final rule fulfills the rulemaking mandated by the FAST Act. To the extent there are state laws with different capture times than that required by this final rule, Congress made the determination in the FAST Act that the capture time required by part 563 should be extended. NHTSA is issuing this final rule in accordance with that statutory mandate.

Executive Order 12988 (Civil Justice Reform)

When promulgating a regulation, Executive Order 12988 specifically requires that the agency must make every reasonable effort to ensure that the regulation, as appropriate: (1) Specifies in clear language the preemptive effect; (2) specifies in clear language the effect on existing Federal law or regulation, including all provisions repealed, circumscribed, displaced, impaired, or modified; (3) provides a clear legal standard for affected conduct rather than a general standard, while promoting simplification and burden reduction; (4) specifies in clear language the retroactive effect; (5) specifies whether administrative proceedings are to be required before parties may file suit in court; (6) explicitly or implicitly defines key terms; and (7) addresses other important issues affecting clarity and general draftsmanship of regulations.

Pursuant to this Order, NHTSA notes as follows. The preemptive effect of this rule is discussed above in connection with E.O. 13132. NHTSA notes further that there is no requirement that individuals submit a petition for reconsideration or pursue other administrative proceeding before they may file suit in court.

Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 et. seq., as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. NHTSA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. This rule does not meet the criteria in 5 U.S.C. 804(2) to be considered a major rule. The rule will be effective sixty days after the date of publication in the **Federal Register**.

Executive Order 13609 (Promoting International Regulatory Cooperation)

Executive Order 13609, ''Promoting International Regulatory Cooperation,'' promotes international regulatory cooperation to meet shared challenges involving health, safety, labor, security, environmental, and other issues and to reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

The agency is currently participating in the negotiation and development of technical standards for Event Data Recorders in the United Nations Economic Commission for Europe (UNECE) World Forum for Harmonization of Vehicle Regulations (WP.29). As a signatory member, NHTSA is obligated to initiate rulemaking to incorporate safety requirements and options specified in Global Technical Regulations (GTRs) if the U.S. votes in the affirmative to establish the GTR. No GTR for EDRs has been developed at this time. NHTSA has analyzed this rule under the policies and agency responsibilities of Executive Order 13609 and has determined this rulemaking would have no effect on international regulatory cooperation.

National Environmental Policy Act

NHTSA has analyzed this rule for the purposes of the National Environmental Policy Act. In accordance with 49 CFR 1.81, 42 U.S.C. 4336, and DOT NEPA Order 5610.1C, NHTSA has determined that this rule is categorically excluded pursuant to 23 CFR 771.118(c)(4) (planning and administrative activities, such as promulgation of rules, that do not involve or lead directly to construction). This rulemaking, which amends regulations regarding Event Data Records (EDRs) to extend the EDR recording period of timed data metrics from 5 seconds of pre-crash data at a frequency of 2Hz to 20 seconds of pre-crash data at a frequency of 10 Hz, is not anticipated to result in any environmental impacts, and there are no extraordinary circumstances present in connection with this rulemaking.

Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (PRA), a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid Office of Management and Budget (OMB) control number. This final rule makes amendments that relate to an information collection that is subject to the PRA, but the amendments are not expected to increase the burden associated with the information collection. In compliance with the requirements of the PRA, NHTSA published a notice in the **Federal Register** on August 26, 2021 (86 FR 47719), seeking public comment and providing a 60-day comment period. NHTSA followed up with a second notice, published on March 17, 2022 (87 FR 15302), announcing that the agency was submitting the information collection request to OMB for approval. OMB approved the collection without change on September 29, 2022 (OMB Control No. 2127–0758).

National Technology Transfer and Advancement Act

Under the National Technology Transfer and Advancement Act of 1995 (NTTAA) (Pub. L. 104–113), ''all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.'' Voluntary consensus standards are technical standards (*e.g.,* materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as SAE International (SAE). The NTTAA directs us to provide Congress, through OMB, explanations when we decide not to use available and applicable voluntary consensus standards. The NTTAA requires agencies to use voluntary consensus standards in lieu of government-unique standards except where inconsistent with law or otherwise impractical.

There are several consensus standards related to EDRs, most notably those standards published by SAE (J1698—Event Data Recorder) and the Institute of Electrical and Electronics Engineers (IEEE) (Standard 1616, IEEE Standard for Motor Vehicle Event Data Recorder). NHTSA carefully considered the consensus standards applicable to EDR data elements in establishing part 563. Consensus standards for recording time/intervals, data sample rates, data

retrieval, data reliability, data range, accuracy and precision, and EDR crash survivability were evaluated by NHTSA and adopted when appropriate. The FAST Act directed NHTSA to conduct a study to determine the amount of time EDRs should capture and record pre-crash data to provide sufficient information for crash investigators, and to conduct a rulemaking based on this study to establish the appropriate recording period in NHTSA's EDR regulation. NHTSA conducted the EDR Duration Study and submitted a Report to Congress summarizing the results of this study in September 2018. This rulemaking exceeds the pre-crash data recording durations of the SAE and IEEE standards (*i.e.,* SAE and IEEE recommend recording 8 seconds of pre-crash data) based upon the new information obtained from the EDR Duration Study. The results of the study on EDR recording duration suggest that the recommended recording duration by these standards would not capture the initiation of crash avoidance maneuvers. NHTSA declines to adopt the voluntary consensus standards for the pre-crash recording because such a decision would be inconsistent with the best available information to the agency and conflict with the outcome of a study required by the FAST Act.

Unfunded Mandates Reform Act

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA), Public Law 104–4, requires Federal agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector, of more than $100 million annually (adjusted for inflation with base year of 1995). Adjusting this amount by the implicit gross domestic product price deflator for the year 2020 results in $158 million (113.625/71.868 = 1.581). Before promulgating a rule for which a written statement is needed, section 205 of the UMRA generally requires the agency to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows the agency to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the agency publishes with the final rule an explanation of why that alternative was not adopted.

This final rule would not result in expenditures by State, local, or tribal governments, in the aggregate, or by the private sector in excess of $158 million (in 2020 dollars) annually. As a result, the requirements of section 202 of the Act do not apply.

Executive Order 13045 (Protection of Children From Environmental Health and Safety Risks)

Executive Order 13045, ''Protection of Children from Environmental Health and Safety Risks,'' (62 FR 19885, April 23, 1997) applies to any proposed or final rule that: (1) is determined to be ''economically significant,'' as defined in E.O. 12866, and (2) concerns an environmental health or safety risk that NHTSA has reason to believe may have a disproportionate effect on children. If a rule meets both criteria, the agency must evaluate the environmental health or safety effects of the rule on children and explain why the rule is preferable to other potentially effective and reasonably feasible alternatives considered by the agency. This rulemaking is not subject to the Executive order because it is not economically significant as defined in E.O. 12866.

Executive Order 13211

Executive Order 13211 (66 FR 28355, May 18, 2001) applies to any rulemaking that: (1) is determined to be significant as defined under E.O. 12866, and is likely to have a significantly adverse effect on the supply of, distribution of, 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. This rulemaking is not subject to E.O. 13211.

Privacy

The E-Government Act of 2002, Public Law 107–347, sec. 208, 116 Stat. 2899, 2921 (Dec. 17, 2002), requires Federal agencies to conduct a Privacy Impact Assessment when they develop or procure new information technology involving the collection, maintenance, or dissemination of information in identifiable form or they make substantial changes to existing information technology that manages information in identifiable form. A PIA is an analysis of how information in identifiable form is collected, stored, protected, shared, and managed. The purpose of a PIA is to demonstrate that system owners and developers have incorporated privacy protections throughout the entire life cycle of a system.

The Agency submitted a Privacy Threshold Analysis analyzing this rulemaking to the DOT, Office of the Secretary's Privacy Office (DOT Privacy Office). The DOT Privacy Office has determined that this rulemaking does not create privacy risk because no new or substantially changed technology would collect, maintain, or disseminate information in an identifiable form because of this rule. NHTSA also notes that the Driver Privacy Act of 2015 assigns ownership of EDR data to the vehicle owner, provides limitations on data retrieval from EDR data, and generally prohibits access to EDR data with specific exceptions to this general rule.

Plain Language Requirement

E.O. 12866 requires each agency to write all rules in plain language. Application of the principles of plain language includes consideration of the following questions:

- Have we organized the material to suit the public's needs?
- Are the requirements in the rule clearly stated?
- Does the rule contain technical language or jargon that isn't clear?
- Would a different format (grouping and order of sections, use of headings, paragraphing) make the rule easier to understand?
- Would more (but shorter) sections be better?
- Could we improve clarity by adding tables, lists, or diagrams?
- What else could we do to make the rule easier to understand?

NHTSA has considered these questions and attempted to use plain language in promulgating this final rule. If readers have suggestions on how we can improve our use of plain language, please write us.

Regulation Identifier Number (RIN)

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

List of Subjects in 49 CFR Part 563

Motor vehicle safety, Motor vehicles, Reporting and record keeping requirements.

In consideration of the foregoing, NHTSA amends 49 CFR part 563 as follows:

PART 563—EVENT DATA RECORDERS

■ 1. Revise the authority citation for part 563 to read as follows:

Authority: 49 U.S.C. 322, 30101, 30111, 30115, 30117, 30166, 30168; delegation of authority at 49 CFR 1.95.

■ 2. Add definitions for ''*Limited-line manufacturer*'' and ''*Small-volume manufacturer*'' in alphabetical order to § 563.5(b) to read as follows:

§ 563.5 Definitions.

* * * * *

(b) * * *

* * * * *

Limited-line manufacturer means a manufacturer that sells three or fewer carlines, as that term is defined in 49 CFR 583.4, in the United States during a production year.

* * * * *

Small-volume manufacturer means an original vehicle manufacturer that produces or assembles fewer than 5,000 vehicles annually for sale in the United States.

* * * * *

■ 3. Revise § 563.7 to read as follows:

§ 563.7 Data elements.

(a) *Data elements required for all vehicles.* Each vehicle equipped with an EDR must record all of the data elements listed in table I to § 563.7(a), during the interval/time and at the sample rate specified in that table.

TABLE I TO § 563.7(a)—DATA ELEMENTS REQUIRED FOR ALL VEHICLES EQUIPPED WITH AN EDR

Data element	Recording interval/time [1] (relative to time zero)	Data sample rate (samples per second)
Delta-V, longitudinal	0 to 250 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	100
Maximum delta-V, longitudinal	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Time, maximum delta-V	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Speed, vehicle indicated	−20.0 to 0 sec [4]	[4] 10
Engine throttle, % full (or accelerator pedal, % full)	−20.0 to 0 sec [4]	[4] 10
Service brake, on/off	−20.0 to 0 sec [4]	[4] 10
Ignition cycle, crash	−1.0 sec	N/A
Ignition cycle, download	At time of download [3]	N/A
Safety belt status, driver	−1.0 sec	N/A
Frontal air bag warning lamp, on/off [2]	−1.0 sec	N/A
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, driver.	Event	N/A
Frontal air bag deployment, time to deploy, in the case of a single stage air bag, or time to first stage deployment, in the case of a multi-stage air bag, right front passenger.	Event	N/A
Multi-event, number of event	Event	N/A
Time from event 1 to 2	As needed	N/A
Complete file recorded (yes, no)	Following other data	N/A

[1] Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is −0.1 to 1.0 sec (*e.g.,* T = −1 would need to occur between −1.1 and 0 seconds.)

[2] The frontal air bag warning lamp is the readiness indicator specified in S4.5.2 of FMVSS No. 208, and may also illuminate to indicate a malfunction in another part of the deployable restraint system.

[3] The ignition cycle at the time of download is not required to be recorded at the time of the crash, but shall be reported during the download process.

[4] For vehicles manufactured before September 1, 2027, the required recording interval is −5.0 to 0 sec relative to time zero and the required data sample rate is 2 samples per second. For vehicles manufactured before September 1, 2029 by small-volume manufacturers and limited-line manufacturers, the required recording interval is −5.0 to 0 sec relative to time zero and the required data sample rate is 2 samples per second. For vehicles manufactured before September 1, 2030 by manufacturers producing altered vehicles or vehicles in two or more stages, the required recording interval is −5.0 to 0 sec relative to time zero and the required data sample rate is 2 samples per second.

(b) *Data elements required for vehicles under specified conditions.* Each vehicle equipped with an EDR must record each of the data elements listed in column 1 of table II to § 563.7(b) for which the vehicle meets the condition specified in column 2 of that table, during the interval/time and at the sample rate specified in that table.

TABLE II TO § 563.7(b)—DATA ELEMENTS REQUIRED FOR VEHICLES UNDER SPECIFIED MINIMUM CONDITIONS

Data element name	Condition for requirement	Recording interval/time [1] (relative to time zero)	Data sample rate (per second)
Lateral acceleration	If recorded [2]	N/A	N/A
Longitudinal acceleration	If recorded	N/A	N/A
Normal acceleration	If recorded	N/A	N/A
Delta-V, lateral	If recorded	0–250 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	100

TABLE II TO § 563.7(b)—DATA ELEMENTS REQUIRED FOR VEHICLES UNDER SPECIFIED MINIMUM CONDITIONS—Continued

Data element name	Condition for requirement	Recording interval/time [1] (relative to time zero)	Data sample rate (per second)
Maximum delta-V, lateral	If recorded	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Time maximum delta-V, lateral	If recorded	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Time for maximum delta-V, resultant.	If recorded	0–300 ms or 0 to End of Event Time plus 30 ms, whichever is shorter.	N/A
Engine rpm	If recorded	−20.0 to 0 sec [5]	[5] 10
Vehicle roll angle	If recorded	−1.0 up to 5.0 sec [3]	10
ABS activity (engaged, non-engaged).	If recorded	−20.0 to 0 sec [5]	[5] 10
Stability control (on, off, or engaged).	If recorded	−20.0 to 0 sec [5]	[5] 10
Steering input	If recorded	−20.0 to 0 sec [5]	[5] 10
Safety belt status, right front passenger (buckled, not buckled).	If recorded	−1.0 sec	N/A
Frontal air bag suppression switch status, right front passenger (on, off, or auto).	If recorded	−1.0 sec	N/A
Frontal air bag deployment, time to nth stage, driver [4].	If equipped with a driver's frontal air bag with a multi-stage inflator.	Event	N/A
Frontal air bag deployment, time to nth stage, right front passenger [4].	If equipped with a right front passenger's frontal air bag with a multi-stage inflator.	Event	N/A
Frontal air bag deployment, nth stage disposal, driver, Y/N (whether the nth stage deployment was for occupant restraint or propellant disposal purposes).	If recorded	Event	N/A
Frontal air bag deployment, nth stage disposal, right front passenger, Y/N (whether the nth stage deployment was for occupant restraint or propellant disposal purposes).	If recorded	Event	N/A
Side air bag deployment, time to deploy, driver.	If recorded	Event	N/A
Side air bag deployment, time to deploy, right front passenger.	If recorded	Event	N/A
Side curtain/tube air bag deployment, time to deploy, driver side.	If recorded	Event	N/A
Side curtain/tube air bag deployment, time to deploy, right side.	If recorded	Event	N/A
Pretensioner deployment, time to fire, driver.	If recorded	Event	N/A
Pretensioner deployment, time to fire, right front passenger.	If recorded	Event	N/A
Seat track position switch, foremost, status, driver.	If recorded	−1.0 sec	N/A
Seat track position switch, foremost, status, right front passenger.	If recorded	−1.0 sec	N/A
Occupant size classification, driver	If recorded	−1.0 sec	N/A
Occupant size classification, right front passenger.	If recorded	−1.0 sec	N/A
Occupant position classification, driver.	If recorded	−1.0 sec	N/A
Occupant position classification, right front passenger.	If recorded	−1.0 sec	N/A

[1] Pre-crash data and crash data are asynchronous. The sample time accuracy requirement for pre-crash time is −0.1 to 1.0 sec (*e.g.,* T = −1 would need to occur between −1.1 and 0 seconds.)

[2] "If recorded" means if the data is recorded in non-volatile memory for the purpose of subsequent downloading.

[3] "Vehicle roll angle" may be recorded in any time duration; −1.0 sec to 5.0 sec is suggested.

[4] List this element n − 1 times, once for each stage of a multi-stage air bag system.

[5] For vehicles manufactured before September 1, 2027, the required recording interval is −5.0 to 0 sec relative to time zero and the required data sample rate is 2 samples per second. For vehicles manufactured before September 1, 2029 by small-volume manufacturers and limited-line manufacturers, the required recording interval is −5.0 to 0 sec relative to time zero and the required data sample rate is 2 samples per second. For vehicles manufactured before September 1, 2030 by manufacturers producing altered vehicles or vehicles in two or more stages, the required recording interval is −5.0 to 0 sec relative to time zero and the required data sample rate is 2 samples per second.

Issued in Washington, DC, under authority delegated in 49 CFR 1.95 and 501.

Adam Raviv,

Chief Counsel.

[Final Rule, RIN 2127–AM12, 49 CFR part 563 Event Data Recorders]

[FR Doc. 2024–29862 Filed 12–17–24; 8:45 am]

BILLING CODE 4910–59–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 648

[Docket No. 241212–0325]

RIN 0648–BN01

Fisheries of the Northeastern United States; Framework Adjustment 15 to the Monkfish Fishery Management Plan; Framework Adjustment 6 to the Spiny Dogfish Fishery Management Plan

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule.

SUMMARY: NMFS is implementing regulations for Framework Adjustment 15 to the Monkfish Fishery Management Plan/Framework Adjustment 6 to the Spiny Dogfish Fishery Management Plan, which the New England and Mid-Atlantic Fishery Management Councils jointly recommended and NMFS approved. This action establishes area-based gear requirements for vessels fishing with gillnets in the monkfish fishery, starting on January 1, 2026, and for vessels fishing with gillnets in the spiny dogfish fishery starting on May 1, 2025. This action is necessary to minimize bycatch of Atlantic sturgeon in the monkfish and spiny dogfish fisheries to the extent practicable and fulfill requirements of the Biological Opinion on Ten Fishery Management Plans in the Greater Atlantic Region and the New England Fishery Management Council's Omnibus Habitat Amendment 2.

DATES: Effective May 1, 2025.

ADDRESSES: Copies of the Framework 15/Framework 6 document, including the Regulatory Flexibility Act Analysis and other supporting documents for the measures, are available from Dr. Cate O'Keefe, Executive Director, New England Fishery Management Council, 50 Water Street, Mill 2, Newburyport, MA 01950 and Dr. Christopher M. Moore, Executive Director, Mid-Atlantic Fishery Management Council, 800 North State Street, Suite 201, Dover, DE 19901. The Framework 15/Framework 6 document is also accessible via the internet at: *https://www.nefmc.org/management-plans/monkfish* or *https://www.mafmc.org/dogfish.*

FOR FURTHER INFORMATION CONTACT: Spencer Talmage, Fishery Policy Analyst, (978) 281–9232.

SUPPLEMENTARY INFORMATION:

Background

The New England Fishery Management Council (New England Council) and the Mid-Atlantic Fishery Management Council (Mid-Atlantic Council) (collectively, the Councils) jointly manage both the Monkfish and Spiny Dogfish Fishery Management Plans (FMP). The New England Council is the administrative lead for the Monkfish FMP, while the Mid-Atlantic Council is the lead for the Dogfish FMP.

NMFS issued a Biological Opinion on May 27, 2021, that considered the effects of the authorization of two interstate fishery management plans (ISFMP) and eight Federal FMPs, including the Monkfish and Spiny Dogfish FMPs, on Endangered Species Act (ESA)-listed species and designated critical habitat through a formal Section 7 consultation. The Biological Opinion determined that NMFS's authorization of the eight FMPs and two ISFMPs may adversely affect, but is not likely to jeopardize, Atlantic sturgeon. The Biological Opinion included an Incidental Take Statement and Reasonable and Prudent Measures (RPM) with accompanying Terms and Conditions to minimize the impacts of incidental take of Atlantic sturgeon. The RPMs required that NMFS convene a working group to review all of the available information on Atlantic sturgeon bycatch in the federally permitted large-mesh gillnet fisheries and, by May 27, 2022, develop an Action Plan to reduce Atlantic sturgeon bycatch in these fisheries by 2024.

NMFS initially issued the Action Plan on May 26, 2022, and revised it on September 26, 2022, to incorporate feedback from the Councils and public. The Councils subsequently developed this joint framework action—Framework 15 to the Monkfish FMP and Framework 6 to the Dogfish FMP—to address the recommendations of the Action Plan and fulfill the requirements of the Biological Opinion.

Under the Magnuson-Stevens Fishery Conservation and Management Act, we approve, disapprove, or partially approve measures that the Councils propose, based on consistency with the Act and other applicable law. We review proposed regulations for consistency with the FMP, plan amendment, the Magnuson-Stevens Act and other applicable law, and publish the proposed regulations, solicit public comment, and promulgate the final regulations. We have approved all of the measures in this joint framework action recommended by the Councils, as described below. The measures implemented in this final rule:

- Require vessels fishing on a monkfish day-at-sea (DAS) within the New Jersey Atlantic Sturgeon Bycatch Reduction Area to use low-profile gillnet gear, beginning on January 1, 2026;
- Prohibit dogfish vessels fishing in the New Jersey Atlantic Sturgeon Bycatch Reduction Area from leaving gillnet gear in the water overnight during the months of May and November, effective May 1, 2025; and
- Prohibit dogfish vessels fishing in the Delaware and Maryland Atlantic Sturgeon Bycatch Reduction Area and Virginia Atlantic Sturgeon Bycatch Reduction Area from leaving gillnet gear in the water overnight from November through March, effective May 1, 2025.

Approved Measures

1. Low-Profile Gillnet Gear

The regulations implemented by this final rule require vessels fishing on a Monkfish DAS within the New Jersey Atlantic Sturgeon Bycatch Reduction Area that are using large mesh (*i.e.,* greater than or equal to 10 inches (25.4 centimeters (cm)) to use low-profile gillnet gear, beginning on January 1, 2026. Low-profile gillnet gear is defined in this final rule as having:

- Mesh size ranging from 12 to 13 inches (30.48 to 33.02 cm);
- Net height ranging from 6 to 8 meshes tall;
- Net length of 300 feet (91.44 meters (m));
- Tie-down length of less than or equal to 30 inches (76.2 cm);