

Appendix E

Data Record Reporting Procedures for Over-the-Air Reprogrammed Vehicles and Engines Using SAE J1979-2

Proposed Revisions to the On-Board Diagnostic System Requirements and Associated Enforcement Provisions for Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles and Engines, and Heavy-Duty Engines

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Appendix E

Data Record Reporting Procedures for Over-the-Air Reprogrammed Vehicles and Engines Using SAE J1979-2

California Air Resources Board
June 1, 2021

Background

Pursuant to California's On-Board Diagnostic (OBD) requirements for light- and medium-duty vehicles (title 13, California Code of Regulations (CCR) section 1968.2(g)(8)) and heavy-duty engines (title 13, CCR section 1971.1(h)(6)), manufacturers are required to compile and submit in-use tracking data records grouped by test groups and engine families that are Over-the-Air (OTA) reprogrammed if any of the specified tracking data would be cleared as a result of the reprogramming event. The procedures below describe how the data records are to be constructed, formatted, and submitted to CARB for vehicles and engines using SAE J1979-2.

Data Fields and Format

The required data fields are presented in the table below. The first six fields describe the data record. The remaining fields are comprised of aggregated data parameters that OBD equipped vehicles and engines are required to make available. As indicated in the table, some of the data fields are computed from single data parameters read from reprogrammed vehicles. Others are the ratio of typically two data parameters. In these cases, the parameters are to be divided on an individual vehicle basis before the average and standard deviation are calculated. All averages and standard deviations shall be unweighted. All parameters shall be scaled as specified in the relevant industry standard (i.e., SAE J1979-2).

The header for the CSV file must exactly match the template below under "Example Record," with additional data fields appended at the end to report the in-use monitor performance ratio (IUMPR) parameter for each supported fault code. The additional data fields must be listed in numerical/alphabetical order based on the supported fault code from left to right. These additional data fields will be the only fields allowed to vary in the header.

No data fields may be omitted from the header row, even if the vehicle does not support certain parameters. Fields in the data row shall be left blank for unsupported data fields as shown in the example records. The first 10 emission increasing auxiliary emission control device (EI-AECD) activation parameters and the first 10 greenhouse gas (GHG) Active Technology parameters shall be reported. Any additional EI-AECD or GHG Active Technology parameters shall be omitted from the file. Each data record shall be submitted in a separate CSV file.

Submission Information and Deadlines

Manufacturers are required to collect and submit the data within 60 days of the release of the software update over the air. The data should not be aggregated until after 45 days from the release of the software. Vehicles or engines that are not successfully reflashed within this timeframe may be left out of the aggregated data record. Records should be posted to the manufacturers' space on CARB's DMS system using a filename based on the certification engine family/test group name and the date of the OTA release, as follows: family_OTA_mmddyyyy.csv.

Record Identification Fields

Field Name	Description	Vehicle/Engine Parameters	Format
FAMILY	Test Group, Engine Family Name, or Vehicle Family Name	Certification Identifier for Family or Test Group	Text
CALID	Calibration Identification Number	Calibration Identification Number	Text
CVN	Calibration Verification Number	Calibration Verification Number	Text
CALDATE	Date the calibration was released over the air	none - entered separately	Date DD/MM/YYYY
VEHCOUNT	Number of vehicle records included in the aggregate record	none - entered separately	Integer
CORRUPTCOUNT	Number of vehicle records rejected based on detected data errors	none - entered separately	Integer
ODOMETER-AVE	Vehicle odometer reading (average)	Odometer	Integer
ODOMETER-SD	Vehicle odometer reading (standard deviation)	Odometer	Floating Point

Vehicle/Engine Run Time and Emissions Performance Fields

Field Name	Description	Vehicle/Engine Parameters	Format
TERT-AVE	Total Engine Run Time (average)	Total Engine Run Time	Floating Point
TERT-SD	Total Engine Run Time (standard deviation)	Total Engine Run Time	Floating Point
TEIT-AVE	Total Engine Idle Time (average)	Total Engine Idle Time	Floating Point
TEIT-SD	Total Engine Idle Time (standard deviation)	Total Engine Idle Time	Floating Point
TRTPTOAPTERT-AVE	Total Run Time with PTO Active as a ratio of Total Engine Run Time (average) (HD OBD only)	Total Run Time wPTO Active / Total Engine Run Time	Floating Point
TRTPTOAPTERT-SD	Total Run Time with PTO Active as a ratio of Total Engine Run Time (standard deviation) (HD OBD Only)	Total Run Time wPTO Active / Total Engine Run Time	Floating Point
TRTAECDn1APTERT-AVE	Total Run Time for Timer 1 Activity for AECD(n) as a ratio of total engine run time (average)	Total Run Time wAECDn Active Timer 1/Total Engine Run Time	Floating Point
TRTAECDn1APTERT-SD	Total Run Time for Timer 1 Activity for AECD(n) as a ratio of total engine run time (standard deviation)	Total Run Time wAECDn Active Timer 1/Total Engine Run Time	Floating Point
TRTAECDn2APTERT-AVE	Total Run Time for Timer 2 Activity for AECD(n) as a ratio of total engine run time (average)	Total Run Time wAECDn Active Timer 2/Total Engine Run Time	Floating Point
TRTAECDn2APTERT-SD	Total Run Time for Timer 2 Activity for AECD(n) as a ratio of total engine run time (standard deviation)	Total Run Time wAECDn Active Timer 2/Total Engine Run Time	Floating Point
TRTNRDPTERT-AVE	Total run time with no reductant delivery as a ratio of total engine run time (average)	Total Run Time wNo Reductant Delivery/Total Engine Run Time	Floating Point
TRTNRDPTERT-SD	Total run time with no reductant delivery as a ratio of total engine run time (standard deviation)	Total Run Time wNo Reductant Delivery/Total Engine Run Time	Floating Point
TRTELT200PTERT-AVE	Total run time with exhaust temperature less than 200 degrees C as a ratio of total engine run time (average)	Total Run Time wExhaust<200C/Total Engine Run Time	Floating Point
TRTELT200PTERT-SD	Total run time with exhaust temperature less than 200 degrees C as a ratio of total engine run time (standard deviation)	Total Run Time wExhaust<200C/Total Engine Run Time	Floating Point

NOx Tracking Fields

Field Name	Description	Vehicle/Engine Parameters	Format
NOXEOEBn-L-AVE	Engine out NOx - lifetime for bin n (average)	Lifetime Engine Out NOx Bin n	Floating Point
NOXEOEBn-L-SD	Engine out NOx - lifetime for bin n (standard deviation)	Lifetime Engine Out NOx Bin n	Floating Point
NOXDn-L-AVE	Distance traveled for NOx bin n (average)	Lifetime Distance Traveled Bin n	Floating Point
NOXDn-L-SD	Distance traveled for NOx bin n (standard deviation)	Lifetime Distance Traveled Bin n	Floating Point
NOXRn-L-AVE	Engine run time for NOx bin n (average)	Lifetime Engine Run Time Bin n	Floating Point
NOXRn-L-SD	Engine run time for NOx bin n (standard deviation)	Lifetime Engine Run Time Bin n	Floating Point
NOXVFCBn-L-AVE	Vehicle fuel consumption for NOx bin n (average)	Lifetime Vehicle Fuel Consumption Bin n	Floating Point
NOXVFCBn-L-SD	Vehicle fuel consumption for NOx bin n (standard deviation)	Lifetime Vehicle Fuel Consumption Bin n	Floating Point
NOXEOMPEOEBn-L-AVE	Engine out NOx as a ratio to engine out energy for bin n (average).	Lifetime Engine Out NOx Bin n / Lifetime Engine Out Energy Bin n	Floating Point
NOXEOMPEOEBn-L-SD	Engine out NOx as a ratio to engine out energy for bin n (standard deviation)	Lifetime Engine Out NOx Bin n / Lifetime Engine Out Energy Bin n	Floating Point
NOXEOMPDTBn-L-AVE	Engine out NOx as a ratio to distance traveled for bin n (average)	Lifetime Engine Out NOx Bin n / Lifetime Distance Traveled Bin n	Floating Point
NOXEOMPDTBn-L-SD	Engine out NOx as a ratio to distance traveled for bin n (standard deviation)	Lifetime Engine Out NOx Bin n / Lifetime Distance Traveled Bin n	Floating Point
NOXEOMPERTBn-L-AVE	Engine out NOx as a ratio to engine run time for bin n (average)	Lifetime Engine Out NOx Bin n / Lifetime Engine Run Time Bin n	Floating Point
NOXEOMPERTBn-L-SD	Engine out NOx as a ratio to engine run time for bin n (standard deviation)	Lifetime Engine Out NOx Bin n / Lifetime Engine Run Time Bin n	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
NOXEOMPVFCBn-L-AVE	Engine out NOx as a ratio to vehicle fuel consumption for bin n (average)	Lifetime Engine Out NOx Bin n/Lifetime Vehicle Fuel Consumption Bin n	Floating Point
NOXEOMPVFCBn-L-SD	Engine out NOx as a ratio to vehicle fuel consumption for bin n (standard deviation)	Lifetime Engine Out NOx Bin n/Lifetime Vehicle Fuel Consumption Bin n	Floating Point
NOXTPMPEOEBn-L-AVE	Tailpipe NOx as a ratio to engine out energy for bin n (average)	Lifetime Tailpipe NOx Bin n/Lifetime Engine Out Energy Bin n	Floating Point
NOXTPMPEOEBn-L-SD	Tailpipe NOx as a ratio to engine out energy for bin n (standard deviation)	Lifetime Tailpipe NOx Bin n/Lifetime Engine Out Energy Bin n	Floating Point
NOXTPMPDTBn-L-AVE	Tailpipe NOx as a ratio to distance traveled for bin n (average)	Lifetime Tailpipe NOx Bin n/Lifetime Distance Traveled Bin n	Floating Point
NOXTPMPDTBn-L-SD	Tailpipe NOx as a ratio to distance traveled for bin n (standard deviation)	Lifetime Tailpipe NOx Bin n/Lifetime Distance Traveled Bin n	Floating Point
NOXTPMPERTBn-L-AVE	Tailpipe NOx as a ratio to engine run time for bin n (average)	Lifetime Tailpipe NOx Bin n/Lifetime Engine Run Time Bin n	Floating Point
NOXTPMPERTBn-L-SD	Tailpipe NOx as a ratio to engine run time for bin n (standard deviation)	Lifetime Tailpipe NOx Bin n/Lifetime Engine Run Time Bin n	Floating Point
NOXTPMPVFCBn-L-AVE	Tailpipe NOx as a ratio to vehicle fuel consumption for bin n (average)	Lifetime Tailpipe NOx Bin n/Lifetime Vehicle Fuel Consumption Bin n	Floating Point
NOXTPMPVFCBn-L-SD	Tailpipe NOx as a ratio to vehicle fuel consumption for bin n (standard deviation)	Lifetime Tailpipe NOx Bin n/Lifetime Vehicle Fuel Consumption Bin n	Floating Point
NOXEOEBn-LEA-AVE	Engine out NOx - lifetime for bin n (average)	Lifetime Engine Active Engine Out NOx Bin n	Floating Point
NOXEOEBn-LEA-SD	Engine out NOx - lifetime for bin n (standard deviation)	Lifetime Engine Active Engine Out NOx Bin n	Floating Point
NOXDTBn-LEA-AVE	Distance traveled for NOx bin n (average)	Lifetime Engine Active Distance Traveled Bin n	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
NOXDn-LEA-SD	Distance traveled for NOx bin n (standard deviation)	Lifetime Engine Active Distance Traveled Bin n	Floating Point
NOXRn-LEA-AVE	Engine run time for NOx bin n (average)	Lifetime Engine Active Engine Run Time Bin n	Floating Point
NOXRn-LEA-SD	Engine run time for NOx bin n (standard deviation)	Lifetime Engine Active Engine Run Time Bin n	Floating Point
NOXVFCn-LEA-AVE	Vehicle fuel consumption for NOx bin n (average)	Lifetime Engine Active Vehicle Fuel Consumption Bin n	Floating Point
NOXVFCn-LEA-SD	Vehicle fuel consumption for NOx bin n (standard deviation)	Lifetime Engine Active Vehicle Fuel Consumption Bin n	Floating Point
NOXEOMPEOEBn-LEA-AVE	Engine out NOx as a ratio to engine out energy for bin n (average)	Lifetime Engine Active Engine Out NOx Bin n/Lifetime Engine Active Engine Out Energy Bin n	Floating Point
NOXEOMPEOEBn-LEA-SD	Engine out NOx as a ratio to engine out energy for bin n (standard deviation)	Lifetime Engine Active Engine Out NOx Bin n/Lifetime Engine Active Engine Out Energy Bin n	Floating Point
NOXEOMPDTBn-LEA-AVE	Engine out NOx as a ratio to distance traveled for bin n (average)	Lifetime Engine Active Engine Out NOx Bin n/Lifetime Engine Active Distance Traveled Bin n	Floating Point
NOXEOMPDTBn-LEA-SD	Engine out NOx as a ratio to distance traveled for bin n (standard deviation)	Lifetime Engine Active Engine Out NOx Bin n/Lifetime Engine Active Distance Traveled Bin n	Floating Point
NOXEOMPERTBn-LEA-AVE	Engine out NOx as a ratio to engine run time for bin n (average)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Engine Run Time Bin n	Floating Point
NOXEOMPERTBn-LEA-SD	Engine out NOx as a ratio to engine run time for bin n (standard deviation)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Engine Run Time Bin n	Floating Point
NOXEOMPVFCBn-LEA-AVE	Engine out NOx as a ratio to vehicle fuel consumption for bin n (average)	Lifetime Engine Active Engine Out NOx Bin n/Lifetime Engine Active Vehicle Fuel Consumption Bin n	Floating Point
NOXEOMPVFCBn-LEA-SD	Engine out NOx as a ratio to vehicle fuel consumption for bin n (standard deviation)	Lifetime Engine Active Engine Out NOx Bin n/Lifetime Engine Active Vehicle Fuel Consumption Bin n	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
NOXTPMPEOEBn-LEA-AVE	Tailpipe NOx as a ratio to engine out energy for bin n (average)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Engine Out Energy Bin n	Floating Point
NOXTPMPEOEBn-LEA-SD	Tailpipe NOx as a ratio to engine out energy for bin n (standard deviation)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Engine Out Energy Bin n	Floating Point
NOXTPMPDTBn-LEA-AVE	Tailpipe NOx as a ratio to distance traveled for bin n (average)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Distance Traveled Bin n	Floating Point
NOXTPMPDTBn-LEA-SD	Tailpipe NOx as a ratio to distance traveled for bin n (standard deviation)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Distance Traveled Bin n	Floating Point
NOXTPMPERTBn-LEA-AVE	Tailpipe NOx as a ratio to engine run time for bin n (average)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Engine Run Time Bin n	Floating Point
NOXTPMPERTBn-LEA-SD	Tailpipe NOx as a ratio to engine run time for bin n (standard deviation)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Engine Run Time Bin n	Floating Point
NOXTPMPVFCBn-LEA-AVE	Tailpipe NOx as a ratio to vehicle fuel consumption for bin n (average)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Vehicle Fuel Consumption Bin n	Floating Point
NOXTPMPVFCBn-LEA-SD	Tailpipe NOx as a ratio to vehicle fuel consumption for bin n (standard deviation)	Lifetime Engine Active Tailpipe NOx Bin n/Lifetime Engine Active Vehicle Fuel Consumption Bin n	Floating Point

Greenhouse Gas Performance Fields

Field Name	Description	Vehicle/Engine Parameters	Format
GHGVFC-AVE	Vehicle fuel consumption (average)	Lifetime Vehicle Fuel Consumption	Floating Point
GHGVFC-SD	Vehicle fuel consumption (standard deviation)	Lifetime Vehicle Fuel Consumption	Floating Point
GHGEFC-AVE	Engine fuel consumption (average) (HD OBD only)	Lifetime Engine Fuel Consumption	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
GHGEFC-SD	Engine fuel consumption (standard deviation) (HD OBD only)	Lifetime Engine Fuel Consumption	Floating Point
GHGEIFC-AVE	Engine fuel consumption at idle (average) (HD OBD only)	Lifetime Engine Idle Fuel Consumption	Floating Point
GHGEIFC-SD	Engine fuel consumption at idle (standard deviation) (HD OBD only)	Lifetime Engine Idle Fuel Consumption	Floating Point
GHGPTOFC-AVE	Fuel consumed by engine for PTO activation (average) (HD OBD only)	Lifetime PTO Fuel Consumption	Floating Point
GHGPTOFC-SD	Fuel consumed by engine for PTO activation (standard deviation) (HD OBD only)	Lifetime PTO Fuel Consumption	Floating Point
GHGDT-AVE	Distance Traveled (average)	Lifetime Distance Traveled	Floating Point
GHGDT-SD	Distance Traveled (lifetime)	Lifetime Distance Traveled	Floating Point
GHGEOE-AVE	Output Energy from the Engine (average)	Lifetime Engine Output Energy	Floating Point
GHGEOE-SD	Output Energy from the Engine (standard deviation)	Lifetime Engine Output Energy	Floating Point
GHGEOEPDT-AVE	Engine Output Energy as a ratio to distance traveled (average)	Lifetime Engine Output Energy/Lifetime Distance Traveled	Floating Point
GHGEOEPDT-SD	Engine Output Energy as a ratio to distance traveled (standard deviation)	Lifetime Engine Output Energy/Lifetime Distance Traveled	Floating Point
GHGPKEPDT-AVE	Positive Kinetic Energy of vehicle as a ratio to distance traveled (average)	Lifetime Positive Kinetic Energy/Lifetime Distance Traveled	Floating Point
GHGPKEPDT-SD	Positive Kinetic Energy of vehicle as a ratio to distance traveled (standard deviation)	Lifetime Positive Kinetic Energy/Lifetime Distance Traveled	Floating Point
GHGEIFCPIRT-AVE	Engine idle fuel consumption as a function of engine idle run time (average) (HD OBD Only)	Lifetime Engine Idle Fuel Consumption/Lifetime Idle Run Time	Floating Point
GHGEIFCPIRT-SD	Engine idle fuel consumption as a function of engine idle run time (standard deviation) (HD OBD Only)	Lifetime Engine Idle Fuel Consumption/Lifetime Idle Run Time	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
GHGPTOFCPPTORT-AVE	PTO fuel consumption as a ratio to PTO activation run time (average) (HD OBD only)	Lifetime PTO Fuel Consumption/Lifetime PTO Activation Run Time	Floating Point
GHGPTOFCPPTORT-SD	PTO fuel consumption as a ratio to PTO activation run time (standard deviation) (HD OBD only)	Lifetime PTO Fuel Consumption/Lifetime PTO Activation Run Time	Floating Point
GHGIRTPERT-AVE	Engine idle run time as a ratio to engine run time (average)	Lifetime Idle Run Time/Lifetime Engine Run Time	Floating Point
GHGIRTPERT-SD	Engine idle run time as a ratio to engine run time (standard deviation)	Lifetime Idle Run Time/Lifetime Engine Run Time	Floating Point
GHGUSRTPERT-AVE	Engine run time at urban speeds as a ratio to total engine run time (average) (HD OBD only)	Lifetime Urban Speed Run Time/Lifetime Engine Run Time	Floating Point
GHGUSRTPERT-SD	Engine run time at urban speeds as a ratio to total engine run time (standard deviation) (HD OBD only)	Lifetime Urban Speed Run Time/Lifetime Engine Run Time	Floating Point
GHGPTORTPERT-AVE	Engine run time with PTO active as a ratio to total engine run time (average) (HD OBD only)	Lifetime PTO Run Time/Lifetime Engine Run Time	Floating Point
GHGPTORTPERT-SD	Engine run time with PTO active as a ratio to total engine run time (standard deviation) (HD OBD only)	Lifetime PTO Run Time/Lifetime Engine Run Time	Floating Point
GHGSSTRTPIRTPSSTRT-AVE	Engine run time with start-stop technology active as a ratio to the sum of engine idle run time and engine run time with start-stop technology active (average) (HD OBD only)	Lifetime Start-Stop Technology Run Time/(Lifetime Engine Idle Run Time + Lifetime Start-Stop Technology Run Time)	Floating Point
GHGSSTRTPIRTPSSTRT-SD	Engine run time with start-stop technology active as a ratio to the sum of engine idle run time and engine run time with start-stop technology active (standard deviation) (HD OBD only)	Lifetime Start-Stop Technology Run Time/(Lifetime Engine Idle Run Time + Lifetime Start-Stop Technology Run Time)	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
GHGAESTACPIRT-AVE	Auto Engine Shutdown Technology Activation Counts as a ratio of engine idle run time (average) (HD OBD only)	Lifetime Auto Engine Shutdown Technology Activation Counts/Lifetime Engine Idle Run Time	Floating Point
GHGAESTACPIRT-SD	Auto Engine Shutdown Technology Activation Counts as a ratio of engine idle run time (standard deviation) (HD OBD only)	Lifetime Auto Engine Shutdown Technology Activation Counts/Lifetime Engine Idle Run Time	Floating Point
GHGATRTnPERT-AVE	Engine run time while Active Technology n is active as a ratio to total engine run time (average) (HD OBD only)	Lifetime Active Technology n Run Time/Lifetime Engine Run Time	Floating Point
GHGATRTnPERT-SD	Engine run time while Active Technology n is active as a ratio to total engine run time (standard deviation) (HD OBD only)	Lifetime Active Technology n Run Time/Lifetime Engine Run Time	Floating Point
GHGATDTnPDT-AVE	Distance traveled while Active Technology n is active as a ratio to total distance (average) (HD OBD only)	Lifetime Active Technology n Distance Traveled/Lifetime Engine Run Time	Floating Point
GHGATDTnPDT-SD	Distance traveled while Active Technology n is active as a ratio to total distance (standard deviation) (HD OBD only)	Lifetime Active Technology n Distance Traveled/Lifetime Engine Run Time	Floating Point
GHGAOCTnC1RTPERT-AVE	Counter 1 runtime for active off-cycle technology n as a ratio to engine run time (average) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 1 Run Time/Lifetime Engine Run Time	Floating Point
GHGAOCTnC1RTPERT-SD	Counter 1 runtime for active off-cycle technology n as a ratio to engine run time (standard deviation) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 1 Run Time/Lifetime Engine Run Time	Floating Point
GHGAOCTnC1RTPDT-AVE	Counter 1 runtime for active off-cycle technology n as a ratio to distance traveled (average) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 1 Run Time/Lifetime Distance Traveled	Floating Point
GHGAOCTnC1RTPDT-SD	Counter 1 runtime for active off-cycle technology n as a ratio to distance traveled (standard deviation) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 1 Run Time/Lifetime Distance Traveled	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
GHGAOCTnC2RTPERT-AVE	Counter 2 runtime for active off-cycle technology n as a ratio to engine run time (average) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 2 Run Time/Lifetime Engine Run Time	Floating Point
GHGAOCTnC2RTPERT-SD	Counter 2 runtime for active off-cycle technology n as a ratio to engine run time (standard deviation) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 2 Run Time/Lifetime Engine Run Time	Floating Point
GHGAOCTnC2RTPDT-AVE	Counter 1 runtime for active off-cycle technology n as a ratio to distance traveled (average) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 2 Run Time/Lifetime Distance Traveled	Floating Point
GHGAOCTnC2RTPDT-SD	Counter 1 runtime for active off-cycle technology n as a ratio to distance traveled (standard deviation) (OBD II only)	Lifetime Active Off-Cycle Technology Counter 2 Run Time/Lifetime Distance Traveled	Floating Point
GHGEFCPEOE-AVE	Engine fuel consumption as a ratio to engine output energy (average) (HD OBD only)	Lifetime Engine Fuel Consumption/Lifetime Engine Output Energy	Floating Point
GHGEFCPEOE-SD	Engine fuel consumption as a ratio to engine output energy (standard deviation) (HD OBD only)	Lifetime Engine Fuel Consumption/Lifetime Engine Output Energy	Floating Point
GHGVFCPEOE-AVE	Vehicle fuel consumption as a ratio to engine output energy (average)	Lifetime Vehicle Fuel Consumption/Lifetime Engine Output Energy	Floating Point
GHGVFCPEOE-SD	Vehicle fuel consumption as a ratio to engine output energy (standard deviation)	Lifetime Vehicle Fuel Consumption/Lifetime Engine Output Energy	Floating Point
GHGVFCPERT-AVE	Vehicle fuel consumption as a ratio to engine run time (average)	Lifetime Vehicle Fuel Consumption/Lifetime Engine Run Time	Floating Point
GHGVFCPERT-SD	Vehicle fuel consumption as a ratio to engine run time (standard deviation)	Lifetime Vehicle Fuel Consumption/Lifetime Engine Run Time	Floating Point
GHGVFCPDT-AVE	Vehicle fuel consumption as a ratio to distance traveled (average)	Lifetime Vehicle Fuel Consumption/Lifetime Distance Traveled	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
GHGVFCPDT-SD	Vehicle fuel consumption as a ratio to distance traveled (standard deviation)	Lifetime Vehicle Fuel Consumption/Lifetime Distance Traveled	Floating Point
GHGEFCPDT-AVE	Engine fuel consumption as a ratio to distance traveled (average) (HD OBD only)	Lifetime Engine Fuel Consumption/Lifetime Distance Traveled	Floating Point
GHGEFCPDT-SD	Engine fuel consumption as a ratio to distance traveled (standard deviation) (HD OBD only)	Lifetime Engine Fuel Consumption/Lifetime Distance Traveled	Floating Point
GHGEFCPERT-AVE	Engine fuel consumption as a ratio to engine run time (average) (HD OBD only)	Lifetime Engine Fuel Consumption/Lifetime Engine Run Time	Floating Point
GHGEFCPERT-SD	Engine fuel consumption as a ratio to engine run time (standard deviation) (HD OBD only)	Lifetime Engine Fuel Consumption/Lifetime Engine Run Time	Floating Point
GHGWHROEPDTWWHRA-AVE	Waste heat recovery energy as a ratio to distance traveled while waste heat recovery technology is active (average) (HD OBD only)	Lifetime WHR Output Energy/Lifetime Distance Traveled While WHR Active	Floating Point
GHGWHROEPDTWWHRA-SD	Waste heat recovery energy as a ratio to distance traveled while waste heat recovery technology is active (standard deviation) (HD OBD only)	Lifetime WHR Output Energy/Lifetime Distance Traveled While WHR Active	Floating Point

Additional GHG Performance Parameters for Hybrid Vehicles

Field Name	Description	Vehicle/Engine Parameters	Format
HPSART-AVE	Propulsion system active run time (average)	Lifetime PSA Run Time	Floating Point
HPSART-SD	Propulsion system active run time (standard deviation)	Lifetime PSA Run Time	Floating Point
HIPSART-AVE	Propulsion system active run time while vehicle is at idle (average)	Lifetime Idle PSA Run Time	Floating Point
HIPSART-SD	Propulsion system active run time while vehicle is at idle (standard deviation)	Lifetime Idle PSA Run Time	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
HUPSART-AVE	Propulsion system active run time while vehicle is operating at urban speeds (average)	Lifetime Urban PSA Run Time	Floating Point
HUPSART-SD	Propulsion system active run time while vehicle is operating at urban speeds (standard deviation)	Lifetime Urban PSA Run Time	Floating Point
HIRTIPIPSART-AVE	Engine Idle Run Time as a ratio to PSA active run time while vehicle is at idle (average)	Lifetime Idle Run Time/Lifetime Idle PSA Run Time	Floating Point
HIRTIPIPSART-SD	Engine Idle Run Time as a ratio to PSA active run time while vehicle is at idle (standard deviation)	Lifetime Idle Run Time/Lifetime Idle PSA Run Time	Floating Point
HUSRTPUPSART-AVE	Engine run time while at urban speeds as a ratio to PSA active run time while at urban speeds (average)(HD OBD only)	Lifetime Urban Speed Run Time/Lifetime Urban PSA Run Time	Floating Point
HUSRTPUPSART-SD	Engine run time while at urban speeds as a ratio to PSA active run time while at urban speeds (standard deviation)(HD OBD only)	Lifetime Urban Speed Run Time/Lifetime Urban PSA Run Time	Floating Point
HPERTPPSART-AVE	Engine run time as a ratio to PSA run time (average)	Lifetime Engine Run Time/Lifetime PSA Run Time	Floating Point
HPERTPPSART-SD	Engine run time as a ratio to PSA run time (standard deviation)	Lifetime Engine Run Time/Lifetime PSA Run Time	Floating Point

Additional GHG Performance Fields for Plug-In Hybrid Vehicles

Field Name	Description	Vehicle/Engine Parameters	Format
PHDTCDEOPDT-AVE	Distance traveled in charge depleting mode with the engine off as a ratio to total distance traveled (average)	Lifetime Distance Traveled Charge Depleting Engine Off/Lifetime Distance Traveled	Floating Point
PHDTCDEOPDT-SD	Distance traveled in charge depleting mode with the engine off as a ratio to total distance traveled (standard deviation)	Lifetime Distance Traveled Charge Depleting Engine Off/Lifetime Distance Traveled	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
PHDTCDERPDT-AVE	Distance traveled in charge depleting mode with the engine running as a ratio to total distance traveled (average)	Lifetime Distance Traveled Charge Depleting Engine Running/Lifetime Distance Traveled	Floating Point
PHDTCDERPDT-SD	Distance traveled in charge depleting mode with the engine running as a ratio to total distance traveled (standard deviation)	Lifetime Distance Traveled Charge Depleting Engine Running/Lifetime Distance Traveled	Floating Point
PHDTDSCIMPDT-AVE	Distance traveled in driver selected charge increasing mode as a ratio to total distance traveled (average)	Lifetime Distance Traveled in Driver Selected Charge Increasing Mode/Lifetime Distance Traveled	Floating Point
PHDTDSCIMPDT-SD	Distance traveled in driver selected charge increasing mode as a ratio to total distance traveled (standard deviation)	Lifetime Distance Traveled in Driver Selected Charge Increasing Mode/Lifetime Distance Traveled	Floating Point
PHFCCDPDTCDER-AVE	Fuel consumed in charge depleting mode as a ratio to distance traveled in charge depleting mode with the engine running (average)	Lifetime Fuel Consumed Charge Depleting/Lifetime Distance Traveled Charge Depleting Engine Running	Floating Point
PHFCCDPDTCDER-SD	Fuel consumed in charge depleting mode as a ratio to distance traveled in charge depleting mode with the engine running (standard deviation)	Lifetime Fuel Consumed Charge Depleting/Lifetime Distance Traveled Charge Depleting Engine Running	Floating Point
PHFCDSCIMPDTDSCIM-AVE	Fuel consumed in driver selected charge increasing mode as a ratio to distance traveled in driver selected charge increasing mode (average)	Lifetime Fuel consumed in Driver Selected Charge Increasing Mode/Lifetime Distance Traveled in Driver Selected Charge Increasing Mode	Floating Point
PHFCDSCIMPDTDSCIM-SD	Fuel consumed in driver selected charge increasing mode as a ratio to distance traveled in driver selected charge increasing mode (standard deviation)	Lifetime Fuel consumed in Driver Selected Charge Increasing Mode/Lifetime Distance Traveled in Driver Selected Charge Increasing Mode	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
PHGECCDEOPDTCDEO-AVE	Grid energy consumed in charge depleting engine off mode as a ratio to distance traveled in charge depleting engine off mode (average)	Lifetime Grid Energy Consumed Charge Depleting Engine Off / Lifetime Distance Traveled Charge Depleting Engine Off	Floating Point
PHGECCDEOPDTCDEO-SD	Grid energy consumed in charge depleting engine off mode as a ratio to distance traveled in charge depleting engine off mode (standard deviation)	Lifetime Grid Energy Consumed Charge Depleting Engine Off / Lifetime Distance Traveled Charge Depleting Engine Off	Floating Point
PHGECCDERPDTCDER-AVE	Grid energy consumed in charge depleting mode with engine running as a ratio to distance traveled in charge depleting engine running mode (average)	Lifetime Grid Energy Consumed Charge Depleting Engine Running/Lifetime Distance Traveled Charge Depleting Engine Running	Floating Point
PHGECCDERPDTCDER-SD	Grid energy consumed in charge depleting mode with engine running as a ratio to distance traveled in charge depleting engine running mode (standard deviation)	Lifetime Grid Energy Consumed Charge Depleting Engine Running/Lifetime Distance Traveled Charge Depleting Engine Running	Floating Point
PHGETB-AVE	Total grid energy sent into battery (average)	Lifetime Total Grid Energy Sent Into Battery	Floating Point
PHGETB-SD	Total grid energy sent into battery (standard deviation)	Lifetime Total Grid Energy Sent Into Battery	Floating Point
PHGETBPDT-AVE	Total grid energy sent into battery as a ratio of total distance traveled (average)	Lifetime Total Grid Energy Sent Into Battery/Lifetime Distance Traveled	Floating Point
PHGETBPDT-SD	Total grid energy sent into battery as a ratio of total distance traveled (standard deviation)	Lifetime Total Grid Energy Sent Into Battery/Lifetime Distance Traveled	Floating Point

IUMPR Fields

Field Name	Description	Vehicle/Engine Parameters	Format
GENDEN-AVE	General Denominator (average)	General Denominator	Floating Point

Field Name	Description	Vehicle/Engine Parameters	Format
GENDEN-SD	General Denominator (standard deviation)	General Denominator	Floating Point
IGNCOUNT-AVE	Ignition Counter (average)	Ignition Counter	Floating Point
IGNCOUNT-SD	Ignition Counter (standard deviation)	Ignition Counter	Floating Point
PXXXX-XX-AVE	IUMPR Ratio (average) for Fault Code PXXXX-XX	Numerator/Denominator for Fault Code PXXXX-XX	Floating Point
PXXXX-XX-SD	IUMPR Ratio (standard deviation) for Fault Code PXXXX-XX	Numerator/Denominator for Fault Code PXXXX-XX	Floating Point
PYYYY-YY-AVE	IUMPR Ratio (average) for Fault Code PYYYY-YY	Numerator/Denominator for Fault Code PYYYY-YY	Floating Point
PYYYY-YY-SD	IUMPR Ratio (standard deviation) for Fault Code PYYYY-YY	Numerator/Denominator for Fault Code PYYYY-YY	Floating Point
PZZZZ-ZZ-AVE	IUMPR Ratio (average) for Fault Code PZZZZ-ZZ	Numerator/Denominator for Fault Code PZZZZ-ZZ	Floating Point
PZZZZ-ZZ-SD	DTC-Specific IUMPR Ratio (standard deviation) for Fault Code PZZZZ-ZZ	Numerator/Denominator for Fault Code PZZZZ-ZZ	Floating Point
...	Continue for IUMPR Ratios for all remaining Fault Codes in numerical/alphabetical order from left to right.	Numerator/Denominator for Remaining Fault Codes	Floating Point

NOTE: Replace "PXXXX-XX," "PYYYY-YY," "PZZZZ-ZZ," and so on with the actual 3-byte DTC values (e.g., P0400-9C, P0420-00). The parameters must be provided for every supported fault code for every monitor required to track and report IUMPR data.

Example Records:

The first row of the data record shall include the field names exactly as shown below, with the exception that additional data fields shall be appended at the end of the header reporting the IUMPR parameter for each supported fault code, with the additional data fields sorted in numerical/alphabetical order based on the supported fault code from left to right. These additional data fields will be the only fields allowed to vary in the header.

Following the header row are two additional rows of data. The first additional row is for a gasoline powered light-duty plug-in hybrid vehicle with a single cylinder bank, no secondary air, and four active GHG technologies. The second additional row is for a non-hybrid heavy-duty diesel engine with no NOx adsorber, four EI-AECDs, 4 active GHG technologies, and no start/stop technology. The column names are not repeated for the second example.

FAMILY, CALID, CVN, CALDATE, VEHCOUNT, CORRUPTCOUNT, ODOMETER-AVE, ODOMETER-SD, TERT-AVE, TERT-SD, TEIT-AVE, TEIT-SD, TRTPTOAPTERT-AVE, TRTPTOAPTERT-SD, TRTAECD11APTERT-AVE, TRTAECD11APTERT-SD, TRTAECD12APTERT-AVE, TRTAECD12APTERT-SD, TRTAECD21APTERT-AVE, TRTAECD21APTERT-SD, TRTAECD22APTERT-AVE, TRTAECD22APTERT-SD, TRTAECD31APTERT-AVE, TRTAECD31APTERT-SD, TRTAECD32APTERT-AVE, TRTAECD32APTERT-SD, TRTAECD41APTERT-AVE, TRTAECD41APTERT-SD, TRTAECD42APTERT-AVE, TRTAECD42APTERT-SD, TRTAECD51APTERT-AVE, TRTAECD51APTERT-SD, TRTAECD52APTERT-AVE, TRTAECD52APTERT-SD, TRTAECD61APTERT-AVE, TRTAECD61APTERT-SD, TRTAECD62APTERT-AVE, TRTAECD62APTERT-SD, TRTAECD71APTERT-AVE, TRTAECD71APTERT-SD, TRTAECD72APTERT-AVE, TRTAECD72APTERT-SD, TRTAECD81APTERT-AVE, TRTAECD81APTERT-SD, TRTAECD82APTERT-AVE, TRTAECD82APTERT-SD, TRTAECD91APTERT-AVE, TRTAECD91APTERT-SD, TRTAECD92APTERT-AVE, TRTAECD92APTERT-SD, TRTAECD101APTERT-AVE, TRTAECD101APTERT-SD, TRTAECD102APTERT-AVE, TRTAECD102APTERT-SD, TRTNRDPTERT-AVE, TRTNRDPTERT-SD, TRTELT200PTERT-AVE, TRTELT200PTERT-SD, NOXEOEB1-L-AVE, NOXEOEB1-L-SD, NOXDVB1-L-AVE, NOXDVB1-L-SD, NOXRTB1-L-AVE, NOXRTB1-L-SD, NOXVFCB1-L-AVE, NOXVFCB1-L-SD, NOXEOMPEOEB1-L-AVE, NOXEOMPEOEB1-L-SD, NOXEOMPDTB1-L-AVE, NOXEOMPDTB1-L-SD, NOXEOMPERTB1-L-AVE, NOXEOMPERTB1-L-SD, NOXEOMPVFCB1-L-AVE, NOXEOMPVFCB1-L-SD, NOXTPMPEOEB1-L-AVE, NOXTPMPEOEB1-L-SD, NOXTPMPDTB1-L-AVE, NOXTPMPDTB1-L-SD, NOXTPMPERTB1-L-AVE, NOXTPMPERTB1-L-SD, NOXTPMPVFCB1-L-AVE, NOXTPMPVFCB1-L-SD,

NOXEOEB2-L-AVE, NOXEOEB2-L-SD, NOXDTEB2-L-AVE, NOXDTEB2-L-SD, NOXRTB2-L-AVE, NOXRTB2-L-SD, NOXVFCB2-L-AVE, NOXVFCB2-L-SD, NOXEOMPEOEB2-L-AVE, NOXEOMPEOEB2-L-SD, NOXEOMPDTB2-L-AVE, NOXEOMPDTB2-L-SD, NOXEOMPRTB2-L-AVE, NOXEOMPRTB2-L-SD, NOXEOMPVFCB2-L-AVE, NOXEOMPVFCB2-L-SD, NOXTPMPEOEB2-L-AVE, NOXTPMPEOEB2-L-SD, NOXTPMPDTB2-L-AVE, NOXTPMPDTB2-L-SD, NOXTPMPRTB2-L-AVE, NOXTPMPRTB2-L-SD, NOXTPMPVFCB2-L-AVE, NOXTPMPVFCB2-L-SD, NOXEOEB3-L-AVE, NOXEOEB3-L-SD, NOXDTEB3-L-AVE, NOXDTEB3-L-SD, NOXRTB3-L-AVE, NOXRTB3-L-SD, NOXVFCB3-L-AVE, NOXVFCB3-L-SD, NOXEOMPEOEB3-L-AVE, NOXEOMPEOEB3-L-SD, NOXEOMPDTB3-L-AVE, NOXEOMPDTB3-L-SD, NOXEOMPRTB3-L-AVE, NOXEOMPRTB3-L-SD, NOXEOMPVFCB3-L-AVE, NOXEOMPVFCB3-L-SD, NOXTPMPEOEB3-L-AVE, NOXTPMPEOEB3-L-SD, NOXTPMPDTB3-L-AVE, NOXTPMPDTB3-L-SD, NOXTPMPRTB3-L-AVE, NOXTPMPRTB3-L-SD, NOXTPMPVFCB3-L-AVE, NOXTPMPVFCB3-L-SD, NOXEOEB4-L-AVE, NOXEOEB4-L-SD, NOXDTEB4-L-AVE, NOXDTEB4-L-SD, NOXRTB4-L-AVE, NOXRTB4-L-SD, NOXVFCB4-L-AVE, NOXVFCB4-L-SD, NOXEOMPEOEB4-L-AVE, NOXEOMPEOEB4-L-SD, NOXEOMPDTB4-L-AVE, NOXEOMPDTB4-L-SD, NOXEOMPRTB4-L-AVE, NOXEOMPRTB4-L-SD, NOXEOMPVFCB4-L-AVE, NOXEOMPVFCB4-L-SD, NOXTPMPEOEB4-L-AVE, NOXTPMPEOEB4-L-SD, NOXTPMPDTB4-L-AVE, NOXTPMPDTB4-L-SD, NOXTPMPRTB4-L-AVE, NOXTPMPRTB4-L-SD, NOXTPMPVFCB4-L-AVE, NOXTPMPVFCB4-L-SD, NOXEOEB5-L-AVE, NOXEOEB5-L-SD, NOXDTEB5-L-AVE, NOXDTEB5-L-SD, NOXRTB5-L-AVE, NOXRTB5-L-SD, NOXVFCB5-L-AVE, NOXVFCB5-L-SD, NOXEOMPEOEB5-L-AVE, NOXEOMPEOEB5-L-SD, NOXEOMPDTB5-L-AVE, NOXEOMPDTB5-L-SD, NOXEOMPRTB5-L-AVE, NOXEOMPRTB5-L-SD, NOXEOMPVFCB5-L-AVE, NOXEOMPVFCB5-L-SD, NOXTPMPEOEB5-L-AVE, NOXTPMPEOEB5-L-SD, NOXTPMPDTB5-L-AVE, NOXTPMPDTB5-L-SD, NOXTPMPRTB5-L-AVE, NOXTPMPRTB5-L-SD, NOXTPMPVFCB5-L-AVE, NOXTPMPVFCB5-L-SD, NOXEOEB6-L-AVE, NOXEOEB6-L-SD, NOXDTEB6-L-AVE, NOXDTEB6-L-SD, NOXRTB6-L-AVE, NOXRTB6-L-SD, NOXVFCB6-L-AVE, NOXVFCB6-L-SD, NOXEOMPEOEB6-L-AVE, NOXEOMPEOEB6-L-SD, NOXEOMPDTB6-L-AVE, NOXEOMPDTB6-L-SD, NOXEOMPRTB6-L-AVE, NOXEOMPRTB6-L-SD, NOXEOMPVFCB6-L-AVE, NOXEOMPVFCB6-L-SD, NOXTPMPEOEB6-L-AVE, NOXTPMPEOEB6-L-SD, NOXTPMPDTB6-L-AVE, NOXTPMPDTB6-L-SD, NOXTPMPRTB6-L-AVE, NOXTPMPRTB6-L-SD, NOXTPMPVFCB6-L-AVE, NOXTPMPVFCB6-L-SD, NOXEOEB7-L-AVE, NOXEOEB7-L-SD, NOXDTEB7-L-AVE, NOXDTEB7-L-SD, NOXRTB7-L-AVE, NOXRTB7-L-SD, NOXVFCB7-L-AVE, NOXVFCB7-L-SD, NOXEOMPEOEB7-L-AVE, NOXEOMPEOEB7-L-SD, NOXEOMPDTB7-L-AVE, NOXEOMPDTB7-L-SD, NOXEOMPRTB7-L-AVE, NOXEOMPRTB7-L-SD, NOXEOMPVFCB7-L-AVE, NOXEOMPVFCB7-L-SD, NOXTPMPEOEB7-L-AVE, NOXTPMPEOEB7-L-SD, NOXTPMPDTB7-L-AVE, NOXTPMPDTB7-L-SD, NOXTPMPRTB7-L-AVE, NOXTPMPRTB7-L-SD, NOXTPMPVFCB7-L-AVE, NOXTPMPVFCB7-L-SD,

NOXEOEB8-L-AVE, NOXEOEB8-L-SD, NOXDTB8-L-AVE, NOXDTB8-L-SD, NOXRTB8-L-AVE, NOXRTB8-L-SD, NOXVFCB8-L-AVE, NOXVFCB8-L-SD, NOXEOMPEOEB8-L-AVE, NOXEOMPEOEB8-L-SD, NOXEOMPDTB8-L-AVE, NOXEOMPDTB8-L-SD, NOXEOMPRTB8-L-AVE, NOXEOMPRTB8-L-SD, NOXEOMPVFCB8-L-AVE, NOXEOMPVFCB8-L-SD, NOXTPMPEOEB8-L-AVE, NOXTPMPEOEB8-L-SD, NOXTPMPDTB8-L-AVE, NOXTPMPDTB8-L-SD, NOXTPMPRTB8-L-AVE, NOXTPMPRTB8-L-SD, NOXTPMPVFCB8-L-AVE, NOXTPMPVFCB8-L-SD, NOXEOEB9-L-AVE, NOXEOEB9-L-SD, NOXDTB9-L-AVE, NOXDTB9-L-SD, NOXRTB9-L-AVE, NOXRTB9-L-SD, NOXVFCB9-L-AVE, NOXVFCB9-L-SD, NOXEOMPEOEB9-L-AVE, NOXEOMPEOEB9-L-SD, NOXEOMPDTB9-L-AVE, NOXEOMPDTB9-L-SD, NOXEOMPRTB9-L-AVE, NOXEOMPRTB9-L-SD, NOXEOMPVFCB9-L-AVE, NOXEOMPVFCB9-L-SD, NOXTPMPEOEB9-L-AVE, NOXTPMPEOEB9-L-SD, NOXTPMPDTB9-L-AVE, NOXTPMPDTB9-L-SD, NOXTPMPRTB9-L-AVE, NOXTPMPRTB9-L-SD, NOXTPMPVFCB9-L-AVE, NOXTPMPVFCB9-L-SD, NOXEOEB10-L-AVE, NOXEOEB10-L-SD, NOXDTB10-L-AVE, NOXDTB10-L-SD, NOXRTB10-L-AVE, NOXRTB10-L-SD, NOXVFCB10-L-AVE, NOXVFCB10-L-SD, NOXEOMPEOEB10-L-AVE, NOXEOMPEOEB10-L-SD, NOXEOMPDTB10-L-AVE, NOXEOMPDTB10-L-SD, NOXEOMPRTB10-L-AVE, NOXEOMPRTB10-L-SD, NOXEOMPVFCB10-L-AVE, NOXEOMPVFCB10-L-SD, NOXTPMPEOEB10-L-AVE, NOXTPMPEOEB10-L-SD, NOXTPMPDTB10-L-AVE, NOXTPMPDTB10-L-SD, NOXTPMPRTB10-L-AVE, NOXTPMPRTB10-L-SD, NOXTPMPVFCB10-L-AVE, NOXTPMPVFCB10-L-SD, NOXEOEB11-L-AVE, NOXEOEB11-L-SD, NOXDTB11-L-AVE, NOXDTB11-L-SD, NOXRTB11-L-AVE, NOXRTB11-L-SD, NOXVFCB11-L-AVE, NOXVFCB11-L-SD, NOXEOMPEOEB11-L-AVE, NOXEOMPEOEB11-L-SD, NOXEOMPDTB11-L-AVE, NOXEOMPDTB11-L-SD, NOXEOMPRTB11-L-AVE, NOXEOMPRTB11-L-SD, NOXEOMPVFCB11-L-AVE, NOXEOMPVFCB11-L-SD, NOXTPMPEOEB11-L-AVE, NOXTPMPEOEB11-L-SD, NOXTPMPDTB11-L-AVE, NOXTPMPDTB11-L-SD, NOXTPMPRTB11-L-AVE, NOXTPMPRTB11-L-SD, NOXTPMPVFCB11-L-AVE, NOXTPMPVFCB11-L-SD, NOXEOEB12-L-AVE, NOXEOEB12-L-SD, NOXDTB12-L-AVE, NOXDTB12-L-SD, NOXRTB12-L-AVE, NOXRTB12-L-SD, NOXVFCB12-L-AVE, NOXVFCB12-L-SD, NOXEOMPEOEB12-L-AVE, NOXEOMPEOEB12-L-SD, NOXEOMPDTB12-L-AVE, NOXEOMPDTB12-L-SD, NOXEOMPRTB12-L-AVE, NOXEOMPRTB12-L-SD, NOXEOMPVFCB12-L-AVE, NOXEOMPVFCB12-L-SD, NOXTPMPEOEB12-L-AVE, NOXTPMPEOEB12-L-SD, NOXTPMPDTB12-L-AVE, NOXTPMPDTB12-L-SD, NOXTPMPRTB12-L-AVE, NOXTPMPRTB12-L-SD, NOXTPMPVFCB12-L-AVE, NOXTPMPVFCB12-L-SD, NOXEOEB13-L-AVE, NOXEOEB13-L-SD, NOXDTB13-L-AVE, NOXDTB13-L-SD, NOXRTB13-L-AVE, NOXRTB13-L-SD, NOXVFCB13-L-AVE, NOXVFCB13-L-SD, NOXEOMPEOEB13-L-AVE, NOXEOMPEOEB13-L-SD, NOXEOMPDTB13-L-AVE, NOXEOMPDTB13-L-SD, NOXEOMPRTB13-L-AVE, NOXEOMPRTB13-L-SD, NOXEOMPVFCB13-L-AVE, NOXEOMPVFCB13-L-SD, NOXTPMPEOEB13-L-AVE, NOXTPMPEOEB13-L-SD, NOXTPMPDTB13-L-AVE, NOXTPMPDTB13-L-SD,

NOXTPMPERTB13-L-AVE, NOXTPMPERTB13-L-SD, NOXTPMPVFCB13-L-AVE,
NOXTPMPVFCB13-L-SD, NOXEOEB14-L-AVE, NOXEOEB14-L-SD, NOXDTEB14-L-AVE,
NOXDTEB14-L-SD, NOXRTB14-L-AVE, NOXRTB14-L-SD, NOXVFCB14-L-AVE,
NOXVFCB14-L-SD, NOXEOMPEOEB14-L-AVE, NOXEOMPEOEB14-L-SD,
NOXEOMPDTB14-L-AVE, NOXEOMPDTB14-L-SD, NOXEOMPRTB14-L-AVE,
NOXEOMPRTB14-L-SD, NOXEOMPVFCB14-L-AVE, NOXEOMPVFCB14-L-SD,
NOXTPMPEOEB14-L-AVE, NOXTPMPEOEB14-L-SD, NOXTPMPDTB14-L-AVE,
NOXTPMPDTB14-L-SD, NOXTPMPERTB14-L-AVE, NOXTPMPERTB14-L-SD,
NOXTPMPVFCB14-L-AVE, NOXTPMPVFCB14-L-SD, NOXEOEB15-L-AVE,
NOXEOEB15-L-SD, NOXDTEB15-L-AVE, NOXDTEB15-L-SD, NOXRTB15-L-AVE,
NOXRTB15-L-SD, NOXVFCB15-L-AVE, NOXVFCB15-L-SD, NOXEOMPEOEB15-L-AVE,
NOXEOMPEOEB15-L-SD, NOXEOMPDTB15-L-AVE, NOXEOMPDTB15-L-SD,
NOXEOMPRTB15-L-AVE, NOXEOMPRTB15-L-SD, NOXEOMPVFCB15-L-AVE,
NOXEOMPVFCB15-L-SD, NOXTPMPEOEB15-L-AVE, NOXTPMPEOEB15-L-SD,
NOXTPMPDTB15-L-AVE, NOXTPMPDTB15-L-SD, NOXTPMPERTB15-L-AVE,
NOXTPMPERTB15-L-SD, NOXTPMPVFCB15-L-AVE, NOXTPMPVFCB15-L-SD,
NOXEOEB16-L-AVE, NOXEOEB16-L-SD, NOXDTEB16-L-AVE, NOXDTEB16-L-SD,
NOXRTB16-L-AVE, NOXRTB16-L-SD, NOXVFCB16-L-AVE, NOXVFCB16-L-SD,
NOXEOMPEOEB16-L-AVE, NOXEOMPEOEB16-L-SD, NOXEOMPDTB16-L-AVE,
NOXEOMPDTB16-L-SD, NOXEOMPRTB16-L-AVE, NOXEOMPRTB16-L-SD,
NOXEOMPVFCB16-L-AVE, NOXEOMPVFCB16-L-SD, NOXTPMPEOEB16-L-AVE,
NOXTPMPEOEB16-L-SD, NOXTPMPDTB16-L-AVE, NOXTPMPDTB16-L-SD,
NOXTPMPERTB16-L-AVE, NOXTPMPERTB16-L-SD, NOXTPMPVFCB16-L-AVE,
NOXTPMPVFCB16-L-SD, NOXEOEB1-LEA-AVE, NOXEOEB1-LEA-SD, NOXDTEB1-LEA-
AVE, NOXDTEB1-LEA-SD, NOXRTB1-LEA-AVE, NOXRTB1-LEA-SD, NOXVFCB1-LEA-
AVE, NOXVFCB1-LEA-SD, NOXEOMPEOEB1-LEA-AVE, NOXEOMPEOEB1-LEA-SD,
NOXEOMPDTB1-LEA-AVE, NOXEOMPDTB1-LEA-SD, NOXEOMPRTB1-LEA-AVE,
NOXEOMPRTB1-LEA-SD, NOXEOMPVFCB1-LEA-AVE, NOXEOMPVFCB1-LEA-SD,
NOXTPMPEOEB1-LEA-AVE, NOXTPMPEOEB1-LEA-SD, NOXTPMPDTB1-LEA-AVE,
NOXTPMPDTB1-LEA-SD, NOXTPMPERTB1-LEA-AVE, NOXTPMPERTB1-LEA-SD,
NOXTPMPVFCB1-LEA-AVE, NOXTPMPVFCB1-LEA-SD, NOXEOEB2-LEA-AVE,
NOXEOEB2-LEA-SD, NOXDTEB2-LEA-AVE, NOXDTEB2-LEA-SD, NOXRTB2-LEA-AVE,
NOXRTB2-LEA-SD, NOXVFCB2-LEA-AVE, NOXVFCB2-LEA-SD, NOXEOMPEOEB2-
LEA-AVE, NOXEOMPEOEB2-LEA-SD, NOXEOMPDTB2-LEA-AVE, NOXEOMPDTB2-
LEA-SD, NOXEOMPRTB2-LEA-AVE, NOXEOMPRTB2-LEA-SD, NOXEOMPVFCB2-
LEA-AVE, NOXEOMPVFCB2-LEA-SD, NOXTPMPEOEB2-LEA-AVE, NOXTPMPEOEB2-
LEA-SD, NOXTPMPDTB2-LEA-AVE, NOXTPMPDTB2-LEA-SD, NOXTPMPERTB2-LEA-
AVE, NOXTPMPERTB2-LEA-SD, NOXTPMPVFCB2-LEA-AVE, NOXTPMPVFCB2-LEA-
SD, NOXEOEB3-LEA-AVE, NOXEOEB3-LEA-SD, NOXDTEB3-LEA-AVE, NOXDTEB3-LEA-
SD, NOXRTB3-LEA-AVE, NOXRTB3-LEA-SD, NOXVFCB3-LEA-AVE, NOXVFCB3-LEA-
SD, NOXEOMPEOEB3-LEA-AVE, NOXEOMPEOEB3-LEA-SD, NOXEOMPDTB3-LEA-
AVE, NOXEOMPDTB3-LEA-SD, NOXEOMPRTB3-LEA-AVE, NOXEOMPRTB3-LEA-

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