

# **Mobile Source Observation Data**

## **User Guide and Reference**

# **Mobile Source Observation Data**

## **User Guide and Reference**

Assessment and Standards Division  
Office of Transportation and Air Quality  
U.S. Environmental Protection Agency

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## **I. Overview**

### Background and Purpose

The Mobile Source Observation Database (MSOD) is a relational database being developed by the Assessment and Standards Division (ASD) of the United States Environmental Protection Agency (U.S. EPA or Agency) Office of Transportation and Air Quality (OTAQ, formerly the Office of Mobile Sources). The database supercedes a previous database that was called "Mobile Source Emission Factor Database." Currently, the database stores general purpose emission factor data collected since 1982 and other activity and emission test programs that was gathered by U.S. EPA and from other testing facilities that were designed for more specific purposes. The data contained in the database was not gathered on a purely "random" sample and for different research issues but the data is intended to be representative of in-use vehicle emissions in the United States.

Considerable knowledge of vehicle emission testing and of relational database design and query methods is required to make effective use of this database. It is not intended for the casual or novice user. The database has been designed and documented using entity-relationship data modeling methods.

The database itself is implemented as an Oracle database containing a set of approximately 60 tables, supplemented by a larger number of small "translation" or "category" tables which define and explain the legal values for some of its individual data items. All tables will be exported upon request in standard database format (\*.DBF) which is usable by a variety of software and users. While ASD is interested in comments and questions regarding the database, it can afford to provide only very limited support beyond this Guide to external users.

EPA has made considerable effort to assure the validity of the data in this database through the development and use of quality assurance and control procedures. EPA is not responsible for the validity of conclusions reached by others using this data. New records are being added continuously to the data sample as they complete their review. EPA cannot guarantee that all current, relevant data has been included in the database. Because additions and changes are being made to the database on a continuous basis, it is recommended that those using it regularly may wish to request an updated copy every year or so.

#### **a. Mobile Source Observation Database (MSOD)**

### Design Features

This new relational design enables storage of any observation of a mobile source, which can include emission tests (laboratory and in-use "field"), activity measurements, fuel, engine and vehicle characteristics. Observations are results that were derived from (laboratory or in-use "field") testing a mobile source. A "mobile source" is a term used to describe a wide variety of vehicles, engines, and equipment that generate air pollution and that move, or can be moved, from place to place. Mobile Sources can be separated into two main categories: "On-Road" and "Non-Road." "On-Road" (also called "on-highway") sources include vehicles used on roads for transportation of passengers or freight. "Non-road" (also called "nonroad") sources include vehicles, engines, and equipment used for construction, agriculture, transportation, recreation, and many other purposes. These two broad categories, on-road and nonroad sources can be

further segregated by size, weight, use, and/or horsepower. MSOD was designed with the following features:

- Design leads to client server-based database with an economy of tables and fields with most data stored in only one place.
- Low cost to implement and maintain database design
- Easy to adapt for new data types and design resides within EPA
- Modern database design allows for it to be portable and compatible with other modern tools.
- Designed for broad scope to contain both vehicle and engine data (laboratory or field testing including second-by-second data)
- Tables are easily linked together
- Easy to understand by using meaningful field names, documenting the legal values and definitions that are explained in the database
- Contains “Meta” data on who conducted the test, statements of work, etc
- Contains information on driving schedules, diurnal temperature evaporative test cycles, etc.
- Contains information about fuels on either a generic (batch) or specific fuel analysis.

### What are Results?

Observing mobile sources (vehicles and engines) will give different kinds of results. A result can be grouped into specific areas called “entities” that contain “fields” or “attributes” with similar characteristics might be observed. Some different kinds of results or entities are listed below:

- Procurement
- Inspection
- Owner’s Report
- Repair
- Tailpipe Emission Test
- Running Loss Emission Test
- Evaporative Emission Test
- In-Use or “Real World” Emission Test
- Engine Power MAP
- Engine Dynamometer Emission Test
- Tank Fuel Measurement
- Fuel Type Information
- Driving Schedules
- Etc.

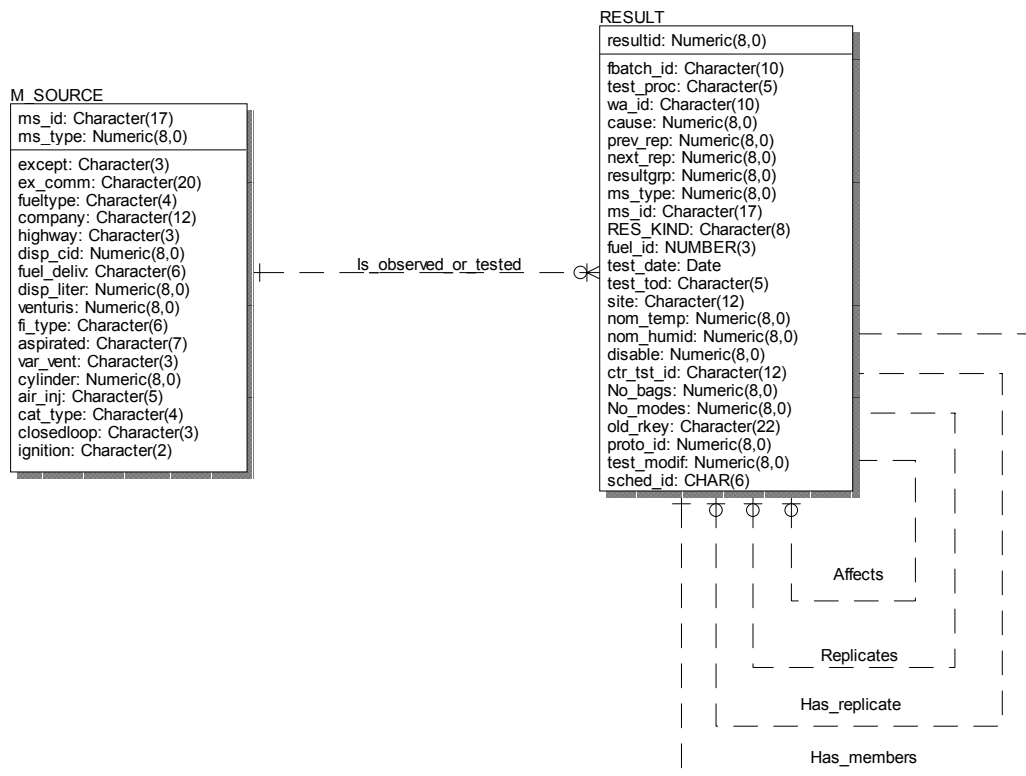
Some of the result tables can be large and complex. These tables have been indexed to improve their performance. All result tables have had their fields either coded or categorized (fields that have translation tables) so that have their meaning or description are known.

## What is the CAUSE Relationship between RESULT?

A “cause” relationship between certain “results” represents the fact that some “results” affect subsequent “results.” Currently this occurs only in the PROCURE and REPAIR type RESULT tables. The CAUSE is a foreign key (recursive relationship) back into RESULT table. It identifies the most immediately preceding RESULT instance (e.g. a PROCURE or REPAIR on this mobile source instance) that might affect the outcome of the present one. This feature allows for a query into the database to see if different procurements of the same mobile source have intervening repairs or previous testing conditions plus others that may not be comparable for some purpose. For example, you can use the CAUSE attribute to distinguish post-repair observations from pre-repair observations. A CAUSE = 0 means that there are no related results or “none.”

### **Mobile Source Observation Database**

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### What is a “Replicate” RESULT?

A replicate RESULT represents a repeated observation of the same thing and is often performed to investigate the repeatability of measurements. Replicates are stored in the MSOD database and are found in the RESULT table under PREV\_REP and NEXT\_REP fields. These fields link RESULTS together in a forward chain (NEXT\_REP) and backward (PREV\_REP). The value “0” indicates the end of the PREV\_REP and NEXT\_REP chain. To eliminate multiple replicates from query outcomes, the user will need to specify that PREV\_REP = 0 or NEXT\_REP = 0 as a query selection criteria.

### What is a “Composite” RESULT?

The MSOD database structure allows a group of RESULTS to be considered a RESULT in its own right and are called “Composite RESULTS” or “RESULT Group.” An example use of this feature is that the component portions of the Supplemental Federal Test Procedure (SFTP), which consists of multiple individual tests that are weighted together to give one Composite RESULT. The RESULTGRP field in the RESULT table indicates or joins the individual RESULTS to the Composite RESULT. A RESULTGRP = 0 indicates that the RESULT is not part of the Composite RESULT.

### Understanding Translation Tables or Legal Value Lists for Categorized Fields

The database has been documented in a platform-independent fashion that allows for greater flexibility in its use on different database platforms and helps implement data quality by defining all legal values of all categorized fields. Every categorized field, which includes most character-type fields in the database, has a “translation table” not shown in the entity-relationship diagrams. These “translation tables” contain:

- The table name is the same as the name of the field, truncated if necessary to meet a eight-character limitation.
- The first column in the table is the same as name in field.
- The second column in the table is typically the field name number “Fieldname\_N” which expresses the category as a number so that it can be used in statistical programs (e.g. SPSS or SAS).
- The third column in the table is typically the field name description “Fieldname\_D” which defines the category value.

### Representation of Missing or “Null” Data

The current version of MSOD was upgraded to take advantage of “true” NULL for each field in each table. Users should attach no meaning to data values that contain “Null.” The value simply means that the data for this field is not present in the record and can occur for many reasons.

### What are MEASTYPEs?

The database design contains areas or tables that allow for the storage of data that are only gathered occasionally and are not considered of central importance. These MEASTYPEs are referred to as “Non-Core Measurements.” By permitting, MEASTYPEs in the database structure this allows for the following aspects: it avoids having to create additional columns for data items that are only occasionally needed and it makes it easy to extend the database design to accommodate new items. Tables that contain names like “xxxMEAS” and VEH\_MISC are examples containing such data.

### b. MSOD Input Structure

Lab and field data must be formatted in specified data entry tables before the data can be quality assured and loaded into MSOD. The conformity of the data to this format allows pre-programmed computer software to check the data for its conformity to MSOD data types and categories for attributes (fields), range checking of numeric data, and the assurance of parent child referential integrity. The input structures in general are relational data bases based on result kinds found in the database and reflect the entities and attributes associated with them in MSOD. Input data tables in general follow a naming convention that close to the table name reflect its result kind’s entities in MSOD, but ending with “\_IN.” The tables are in a \*.DBF database structure that allows for true NULLs. Most PC based database software (e.g. Microsoft Access, DBASE, Visual FoxPro and Lotus Approach) are capable of reading and writing to this format. All tables, fields, categories and attributes have legal naming convention and definitions including measurement units that are directly from the MSOD design. Section III gives the user a graphical picture plus table and field definitions on the most current input table designs. An electronic copy of the input structures can be requested, please see section I(e) below for further information.

### c. Quality Control and Quality Assurance Procedures

OTAQ’s Data Acquisition and Management Team (DAMT) has designed two levels of data checking software available to interested parties: VALDATA and EFLOAD. The VALDATA is an application for checking input data received from either contractors, independent testing program operators or from internal EPA test programs and replaces two FoxPro 2.6 applications, QCSPECS.PRG and ORPHANID.PRG that were previously used for this purpose. The EFLOAD data checking software is an application for loading input test data sets into EPA’s MSOD Oracle database and replaces the current EF00Load and EF99Load programs. Its input are test data sets released by the Work Assignment Manager (WAM) after having been successfully processed by the VALDATA program. EFLOAD’s output are data sets that have been successfully loaded into the MSOD Oracle database.

### VALDATA Software

All test data is required to be in the input table structure as outlined in section I(b) and section III before using either of these data checking software. The VALDATA software checking program is the first level of quality controlling and quality assuring the data. This program has been designed to be used independently of MSOD and therefore can be deployed



remotely. It is intended to be a data checking tool for principal investigators near or at the testing site. EPA's intent is that the data gathered in the field be checked immediately after the completion of a specific mobile source's emission testing or activity gathering activity. The goal is assure data quality before releasing the mobile source from the testing or sampling program. . If any issues are raised from VALDATA, or from other data checking software, the vehicle or equipment that the test was conducted on is still available for further inquiry or testing before it is put back into normal operation or service.

The VALDATA program checks the data structure and content of the input tables for conformity to the data set specifications, as they are defined by the structure of the INFILES and the content of QC\_SPECS.DBF. QC\_SPECS.DBF is a control table maintained by EPA for the purpose of testing the content of the input data. The QC\_SPECS.DBF is a table used to determine the suitability of field level data within all of the individual input tables with some cross level checking of test and vehicle weights. Some examples of fixes to the input data tables that are normally found from data processed by VALDATA are: 1) work assignment (WA\_ID) names misspelled; 2) fields requiring or not requiring "CAPITAL" letters; 3) fields containing incorrect NULL value indicator was used; 4) use of non-defined field names or 5) a data field may exceed an upper or lower bounds for table data (records). In some of these cases, it might require a change in the QC\_SPEC.DBF by EPA to allow the test results in question to pass data table review. Some data inconsistencies may simply need to be accepted early on in the test program until enough results have been accumulated that an informed decision can be made resolving the inconsistency. All errors are written to an error log, XERRLOG.DBF, which is maintained in the user's Master Data directory. Input data satisfies all the format and context checks provided by the VALDATA program are "RELEASED" by the user and become eligible for loading into the EFLOAD program database for further processing and conversion for loading into the MSOD Oracle database. EPA also runs other data checking programs that include looking for and identifying "spikes" and "plateaus" or time alignment of emission and activity results.

### EFLOAD Software

EFLOAD is an application for loading Visual FoxPro input test data sets into the MSOD Oracle database. It replaces the current EF00Load and EF99Load programs. Its input are Visual Fox Pro test data sets released by the Work Assignment Manager (WAM) or test program coordinator after having been successfully processed by the VALDATA program. EFLOAD's output are data sets successfully loaded into the MSOD Oracle database. EFLOAD rigorously rests the input data sets to ensure that the data structures, primary and foreign keys, and NULL constraints match those of the Oracle MSOD tables. This requires access to the MSOD Oracle database in order to perform this function and is limited to a few select authorized EPA personnel. In addition, it provides all the functionality of the past used EF00Load and EF99Load programs including orphan checking, elimination of internal and transactional duplicates, and construction of all relational links required by the current business rules within the Oracle database.

d. For Further Information:

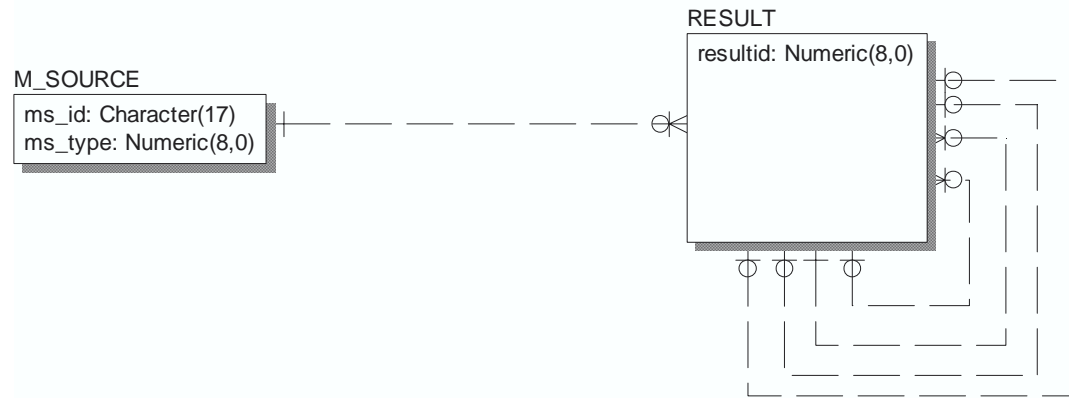
If you would like a copy of MSOD, have any questions or comments about the design, linking data fields, input structures, or quality control and quality assurance procedures, you can submit your questions or comments by e-mail or contact:

Carl Fulper  
US Environmental Protection Agency  
Office of Transportation and Air Quality  
National Vehicle and Fuels Emission Laboratory  
2000 Traverwood Drive  
Ann Arbor, MI 48105  
(734) 214-4400  
[fulper.carlr@epa.gov](mailto:fulper.carlr@epa.gov)

## **II. Top-Level Design Information**

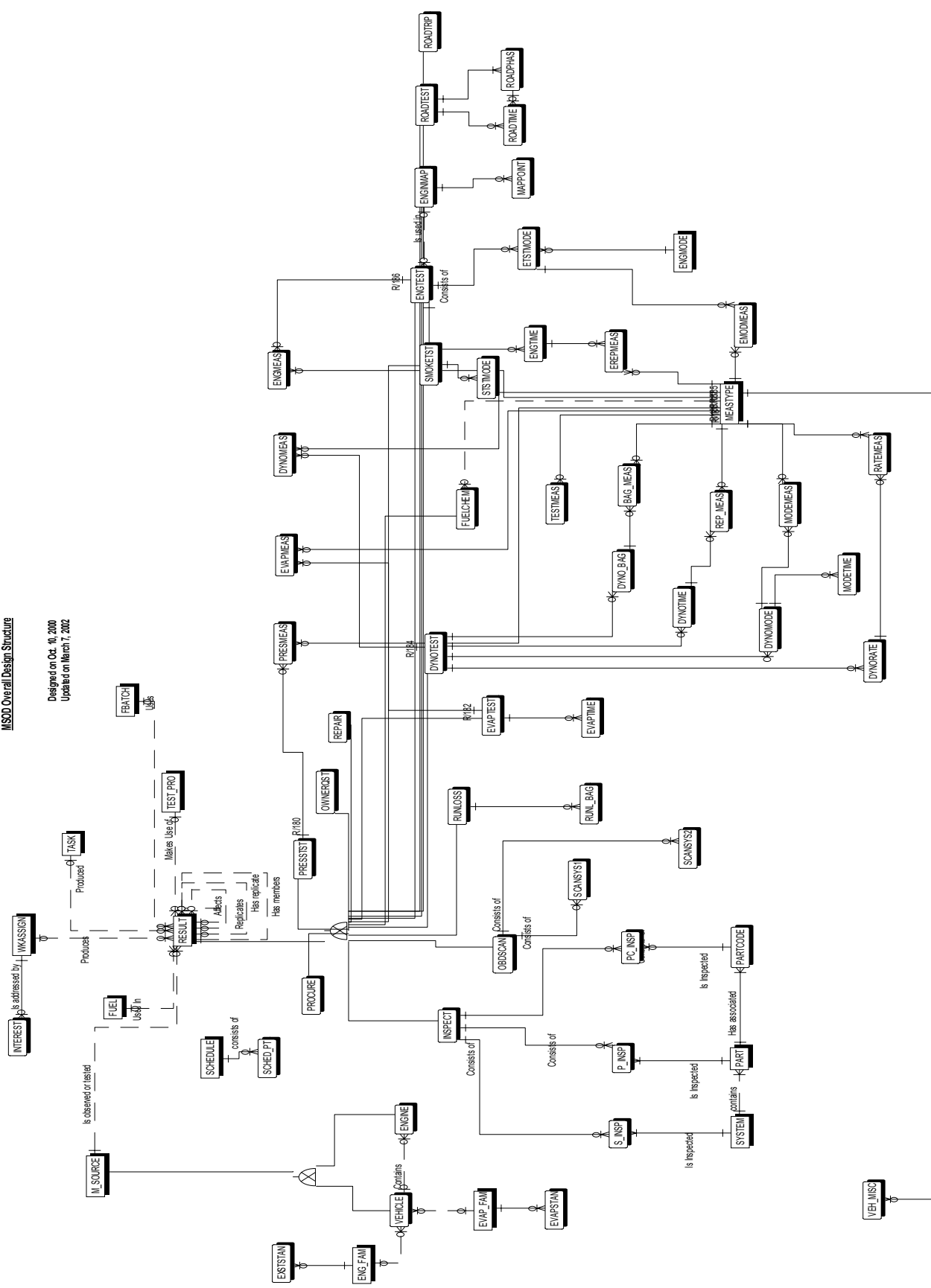
## Mobile Source Observation Database

October 10, 2000,  
Last Update March 7, 2002



## MSOD Overall Design Structure

Designed on Oct. 10, 2000  
Updated on March 7, 2002

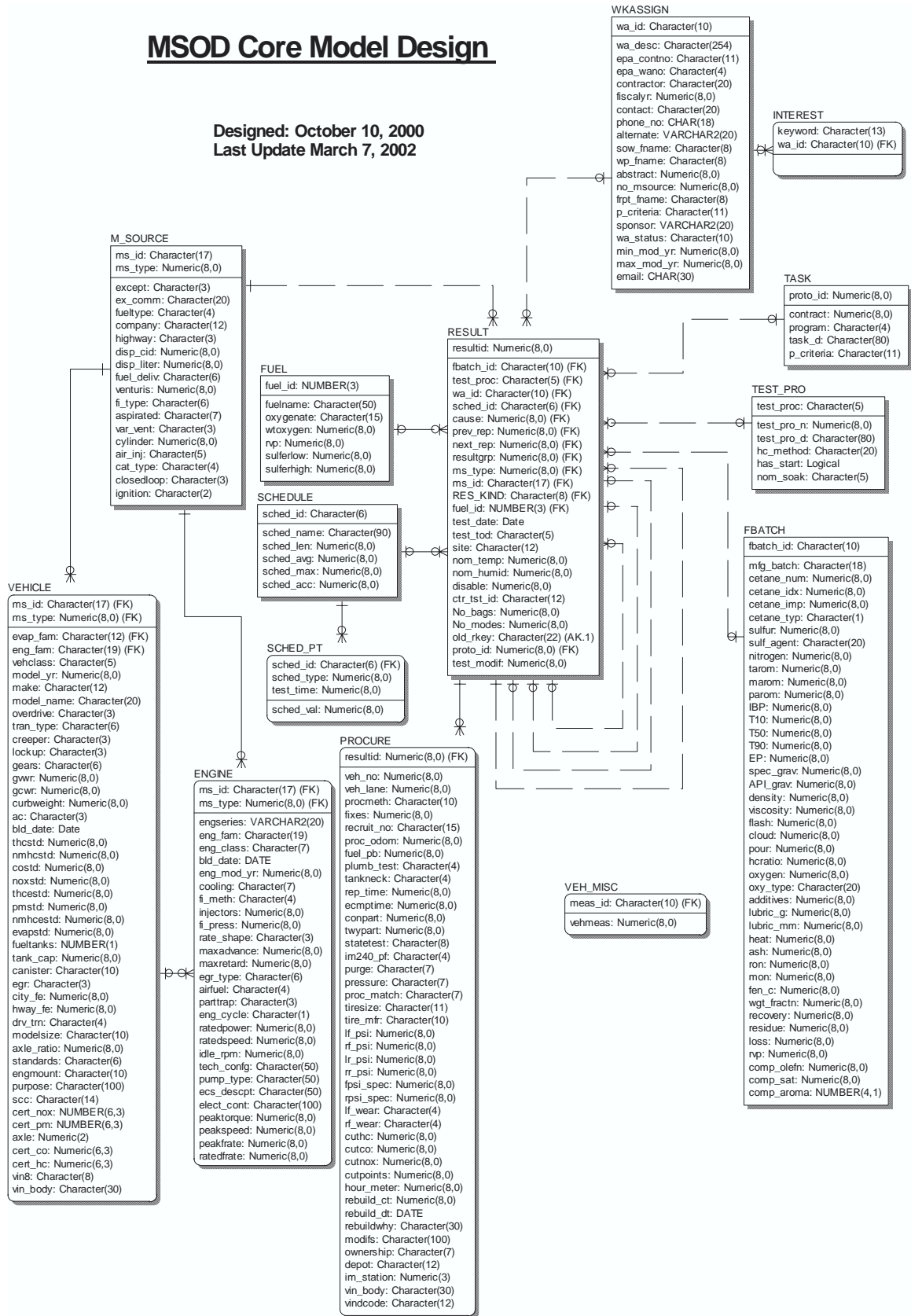


### **III. Top-Level Design Information**

- a. Major Entity – Relationship Diagrams
- b. Entity and Field Definitions
- c. Category and Field Definitions

# MSOD Core Model Design

Designed: October 10, 2000  
Last Update March 7, 2002



## Meta Data Structure

### Mobile Source Observation Database

October 10, 2000  
Last Updated on  
March 7, 2002

#### M\_SOURCE

ms_id: Character(17)
ms_type: Numeric(8,0)
except: Character(3)
ex_comm: Character(20)
fueltype: Character(4)
company: Character(12)
highway: Character(3)
disp_cid: Numeric(8,0)
disp_liter: Numeric(8,0)
fuel_deliv: Character(6)
venturis: Numeric(8,0)
fi_type: Character(6)
aspirated: Character(7)
var_vent: Character(3)
cylinder: Numeric(8,0)
air_inj: Character(5)
cat_type: Character(4)
closedloop: Character(3)
ignition: Character(2)

#### RESULT

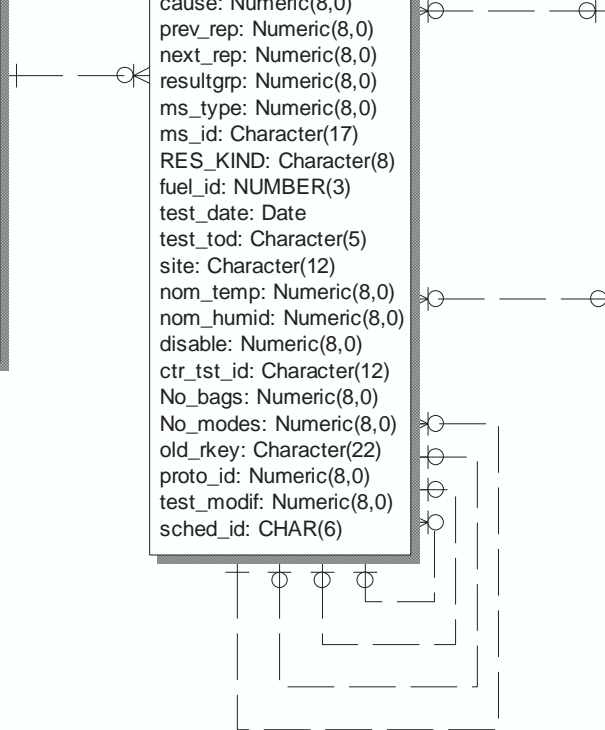
resultid: Numeric(8,0)
fbatch_id: Character(10)
test_proc: Character(5)
wa_id: Character(10)
cause: Numeric(8,0)
prev_rep: Numeric(8,0)
next_rep: Numeric(8,0)
resultgrp: Numeric(8,0)
ms_type: Numeric(8,0)
ms_id: Character(17)
RES_KIND: Character(8)
fuel_id: NUMBER(3)
test_date: Date
test_tod: Character(5)
site: Character(12)
nom_temp: Numeric(8,0)
nom_humid: Numeric(8,0)
disable: Numeric(8,0)
ctr_tst_id: Character(12)
No_bags: Numeric(8,0)
No_modes: Numeric(8,0)
old_rkey: Character(22)
proto_id: Numeric(8,0)
test_modif: Numeric(8,0)
sched_id: CHAR(6)

#### WKASSIGN

wa_id: Character(10)
wa_desc: Character(254)
epa_contno: Character(11)
epa_wano: Character(4)
contractor: Character(20)
fiscalyr: Numeric(8,0)
contact: Character(20)
phone_no: CHAR(18)
alternate: VARCHAR2(20)
sow_fname: Character(8)
wp_fname: Character(8)
abstract: Numeric(8,0)
no_msource: Numeric(8,0)
frpt_fname: Character(8)
p_criteria: Character(11)
sponsor: VARCHAR2(20)
wa_status: Character(10)
min_mod_yr: Numeric(8,0)
max_mod_yr: Numeric(8,0)
email: CHAR(30)

#### TASK

proto_id: Numeric(8,0)
contract: Numeric(8,0)
program: Character(4)
task_d: Character(80)
p_criteria: Character(11)





## MSOD Vehicle Standards

October 10, 2000

Last Update March 7, 2002

### VEHICLE

ms_id: Character(17)
ms_type: Numeric(8,0)
evap_fam: Character(12)
eng_fam: Character(19)
vehclass: Character(5)
model_yr: Numeric(8,0)
make: Character(12)
model_name: Character(20)
overdrive: Character(3)
tran_type: Character(6)
creeper: Character(3)
lockup: Character(3)
gears: Character(6)
gwr: Numeric(8,0)
gcwr: Numeric(8,0)
curbweight: Numeric(8,0)
ac: Character(3)
bld_date: Date
thcstd: Numeric(8,0)
nmhcsd: Numeric(8,0)
costd: Numeric(8,0)
noxstd: Numeric(8,0)
thcstd: Numeric(8,0)
pmstd: Numeric(8,0)
nmhcsd: Numeric(8,0)
evapstd: Numeric(8,0)
fueltanks: NUMBER(1)
tank_cap: Numeric(8,0)
canister: Character(10)
egr: Character(3)
city_fe: Numeric(8,0)
hway_fe: Numeric(8,0)
drv_trn: Character(4)
modelsize: Character(10)
axle_ratio: Numeric(8,0)
standards: Character(6)
engmount: Character(10)
purpose: Character(100)
scc: Character(14)
cert_nox: NUMBER(6,3)
cert_pm: NUMBER(6,3)
axle: Numeric(2)
cert_co: Numeric(6,3)
cert_hc: Numeric(6,3)
vin8: Character(8)
vin_body: Character(30)

### ENG\_FAM

eng_fam: Character(19)
------------------------

### EXSTSTAN

eng_fam: Character(19)
cert_inuse: Character(1)
sales_area: Character(2)
tier: Character(4)
usefullife: Character(3)
esfueltype: Character(3)
exst_emiss: Character(16)
standard: Numeric(8,0)

### EVAP\_FAM

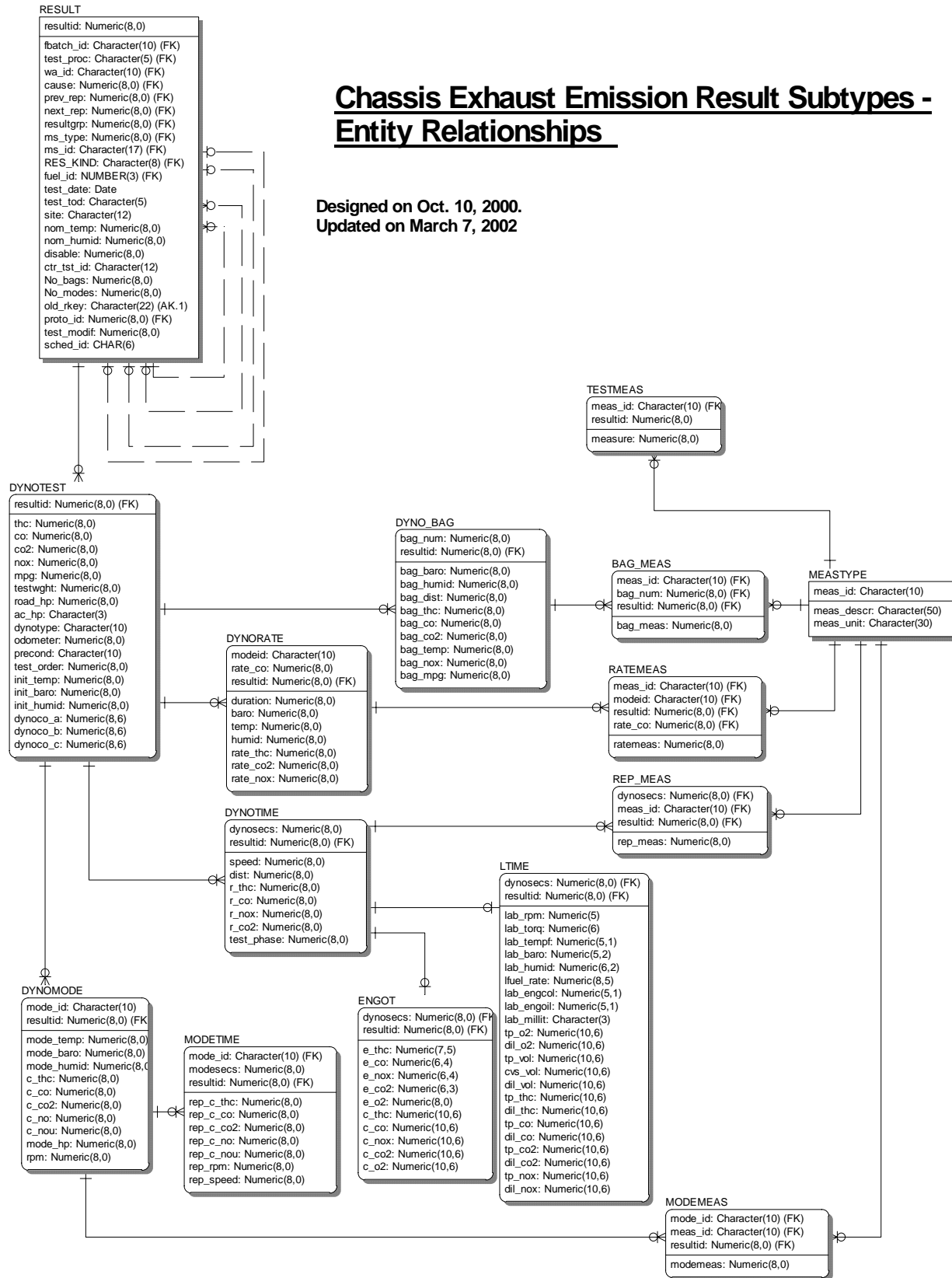
evap_fam: Character(12)
-------------------------

### EVAPSTAN

evap_fam: Character(12)
sales_area: Character(2)
tier: Character(4)
usefullife: Character(3)
esfueltype: Character(3)
evap_emiss: Character(16)
standard: Numeric(8,0)

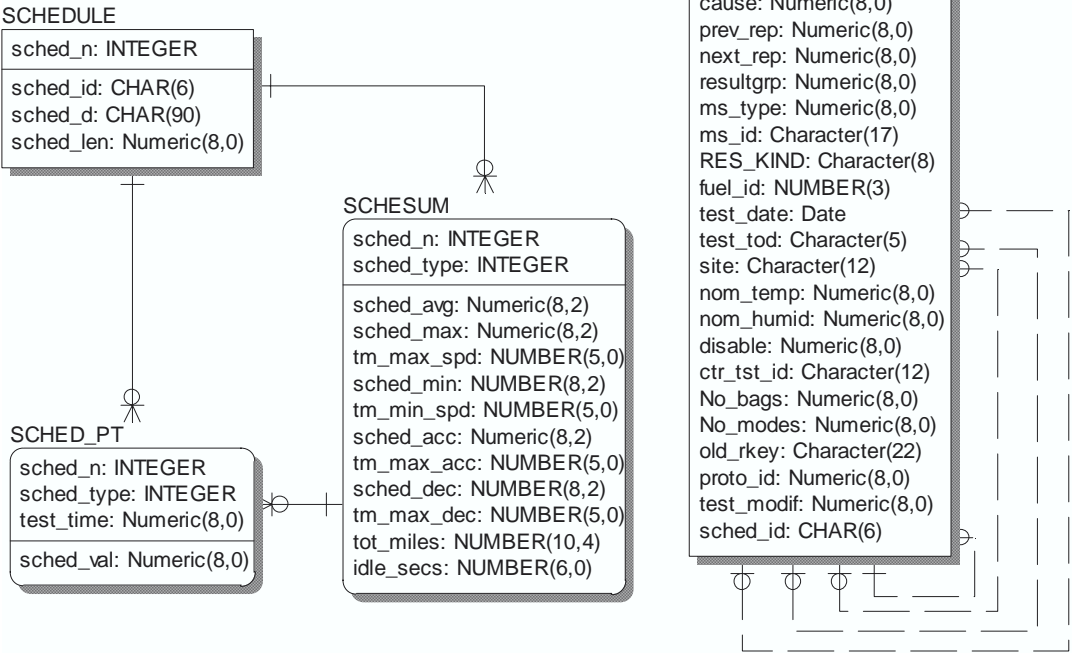
# Chassis Exhaust Emission Result Subtypes - Entity Relationships

Designed on Oct. 10, 2000.  
Updated on March 7, 2002



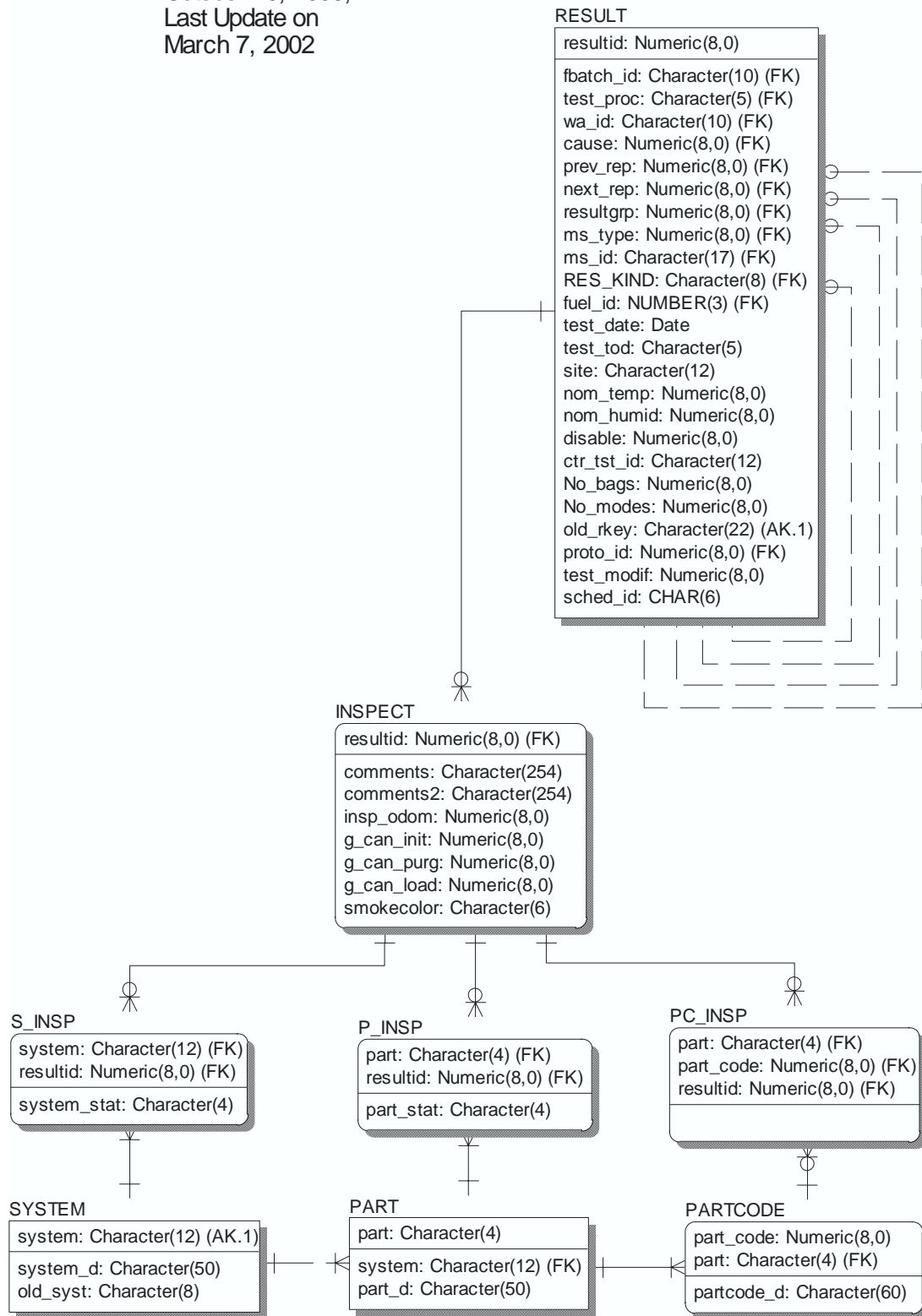
**MSOD Schedule Data Structure**

Modified schedule design 10/14/2003



## MSOD Inspection Data Structure

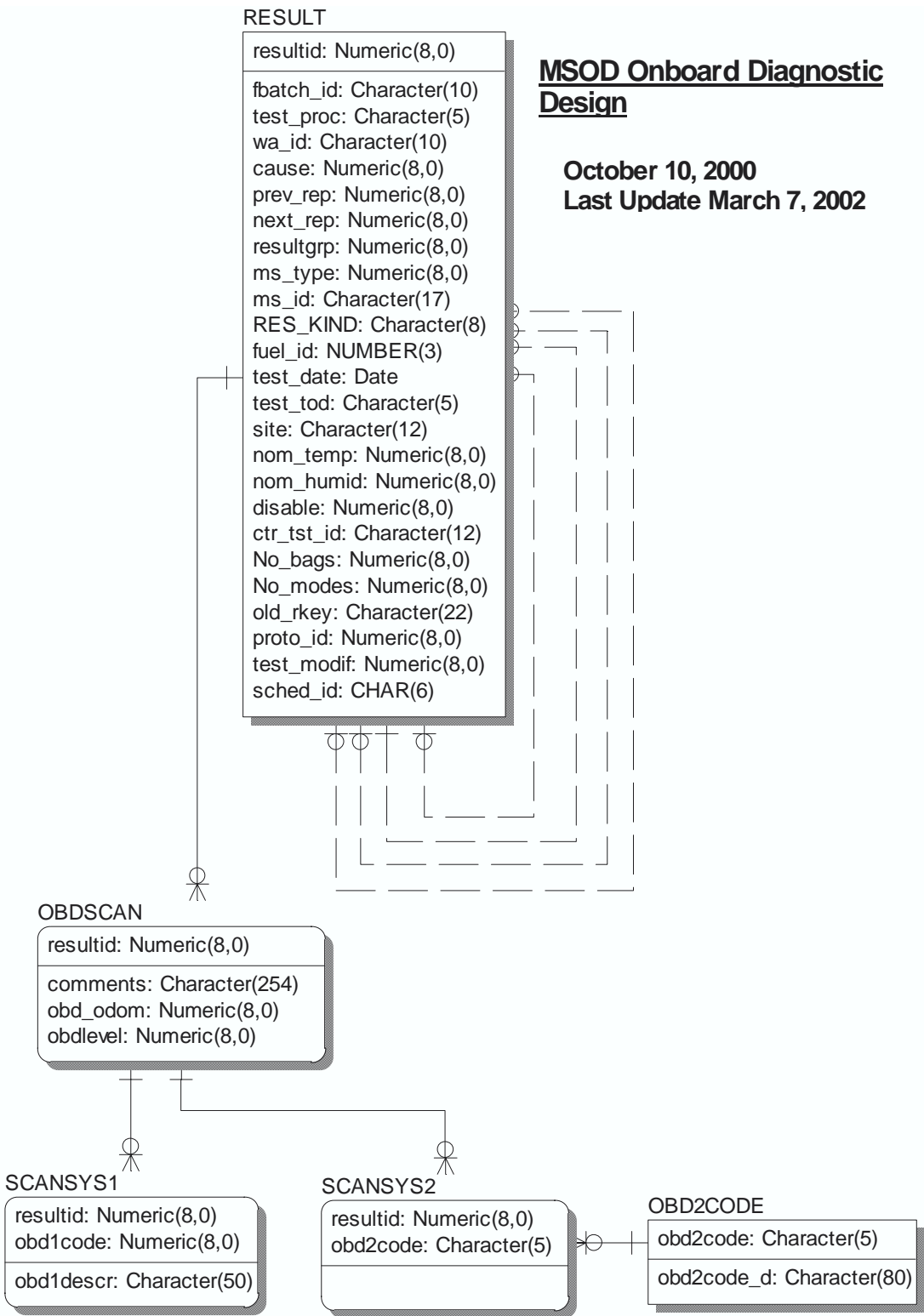
October 10, 2000,  
Last Update on  
March 7, 2002



**MSOD Onboard Diagnostic Design**

**October 10, 2000**

**Last Update March 7, 2002**

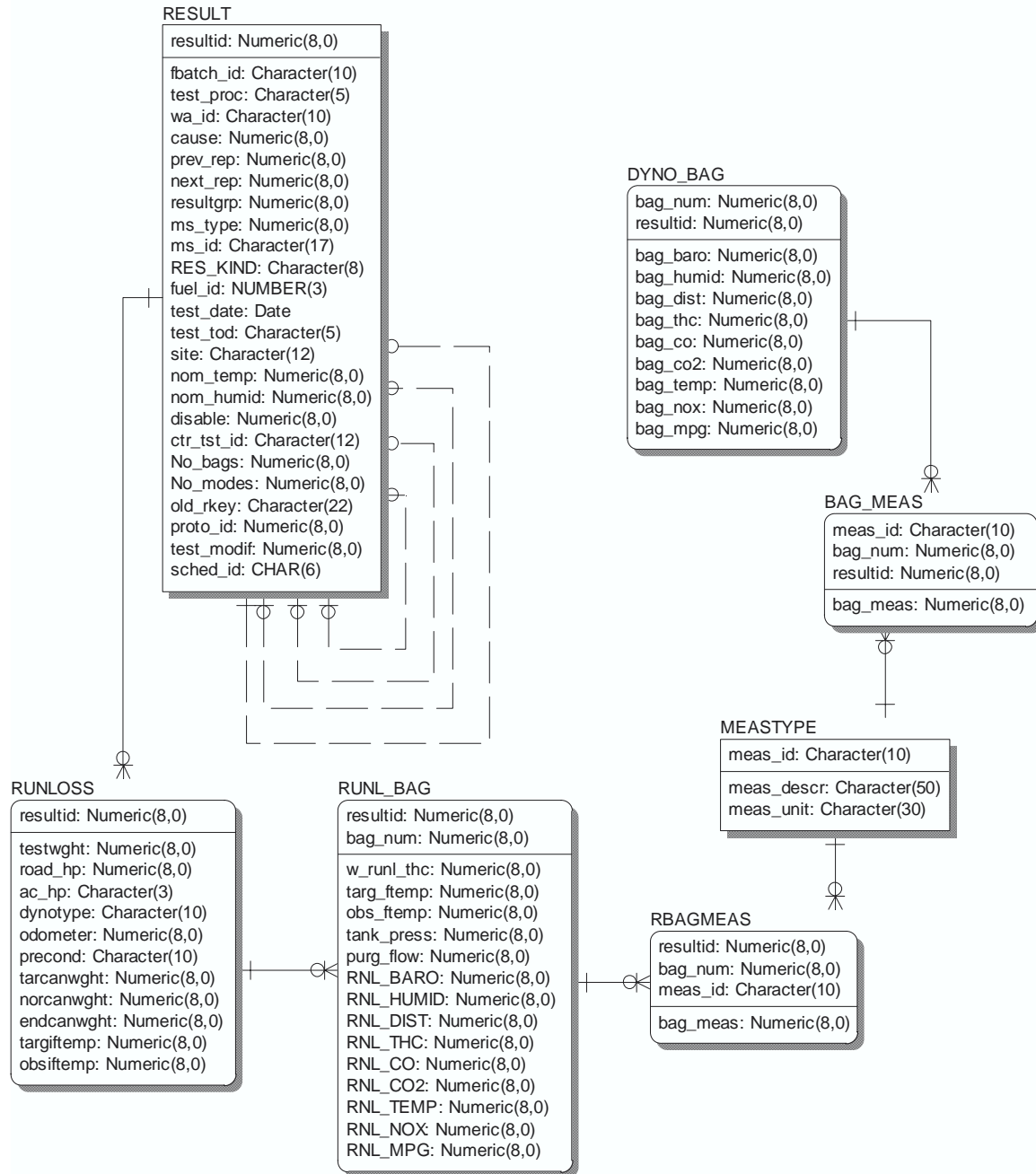


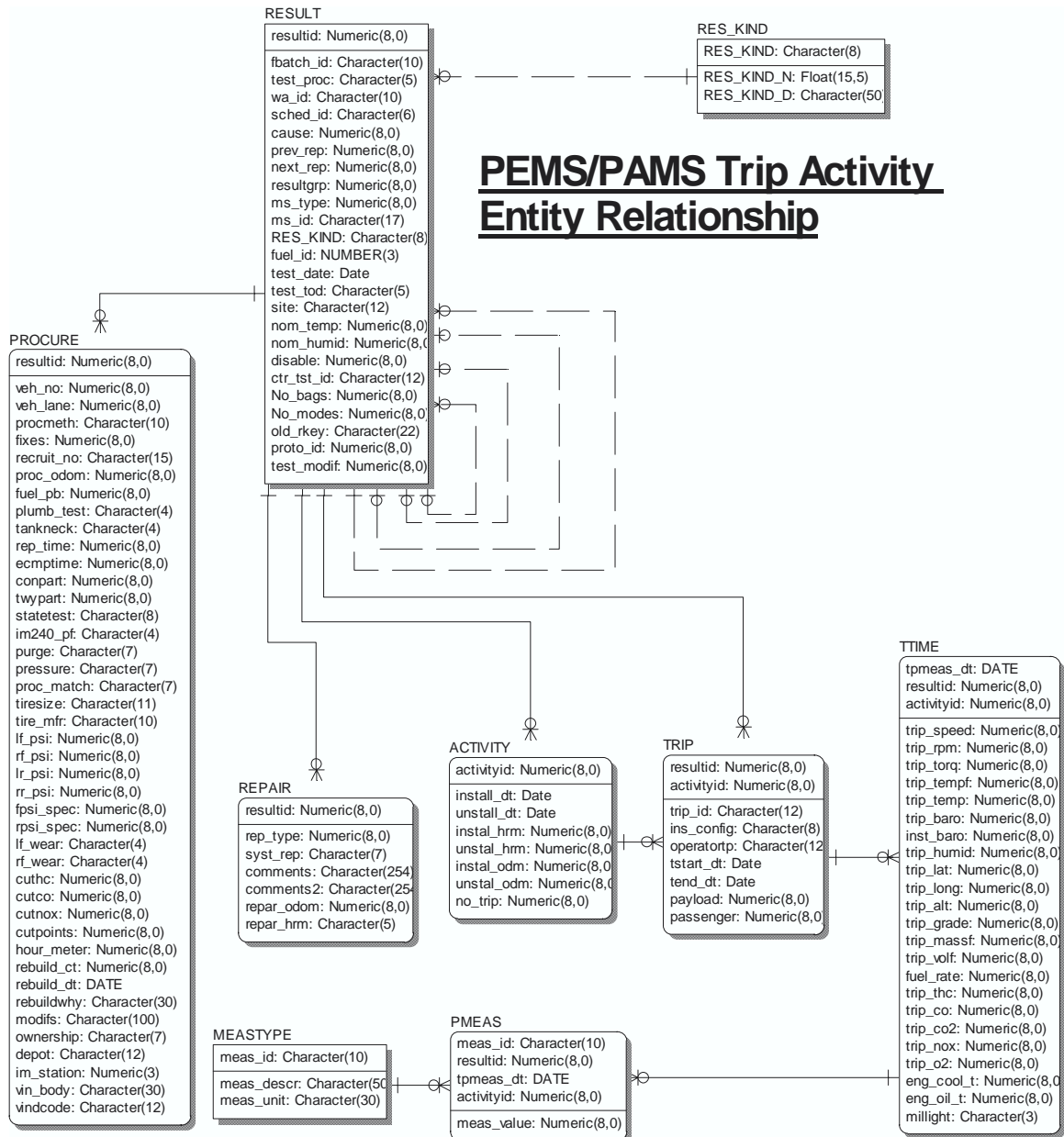
## MSOD Running Loss Design

October 10, 2000

Last Update on

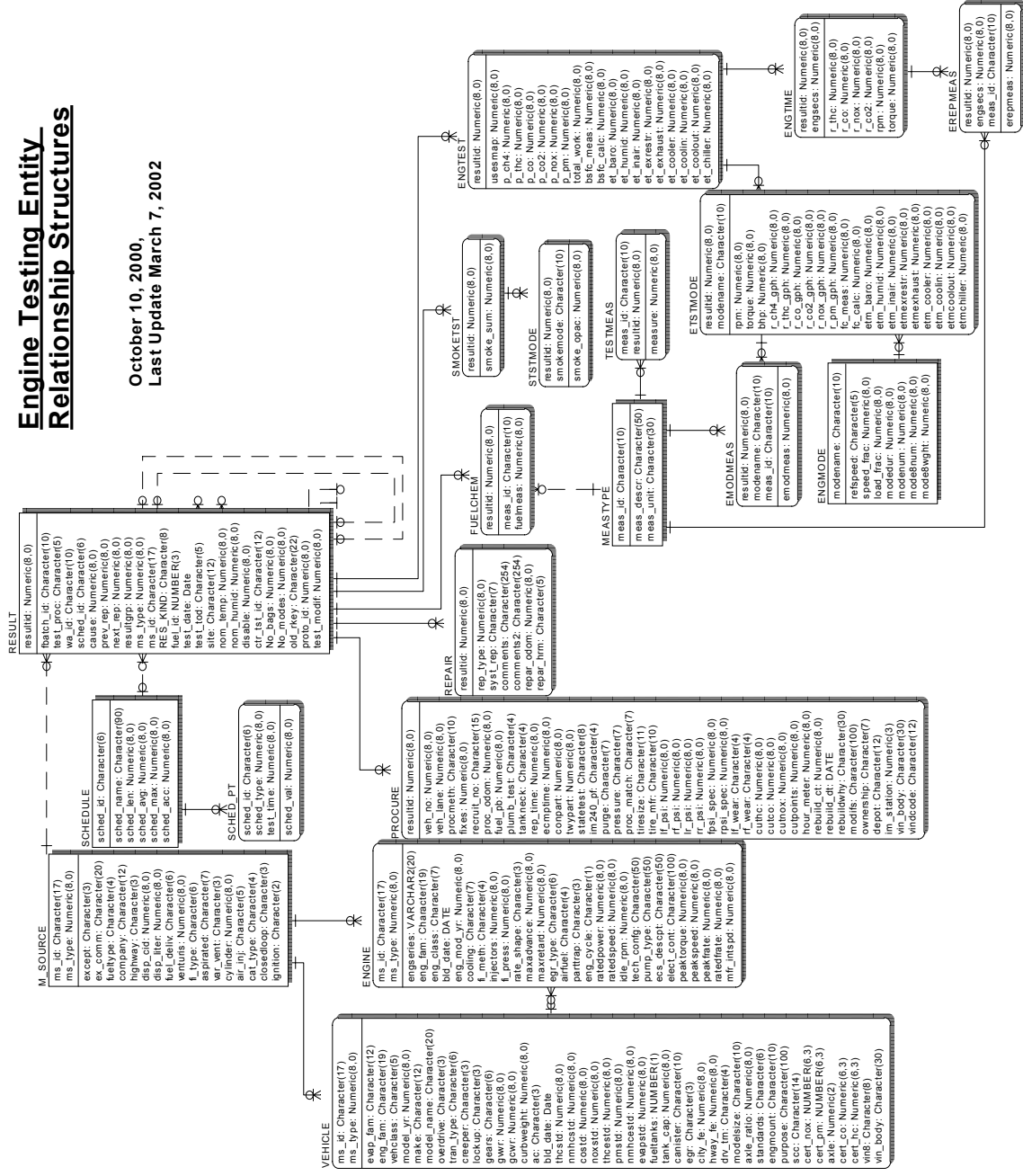
March 7, 2002





# Engine Testing Entity Relationship Structures

October 10, 2000,  
Last Update March 7, 2002





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# **MSOD Major Entity Name & Definition Report**

Entity Name	Entity Definition
ACTIVITY	An activity covered by an PEMS/PAMS vehicle. This result subtype is identified in RESULT by RES_KIND = "ACTIVITY".
BAG_MEAS	Used to store a MEASTYPE measurement at the test bag level.
DYNO_BAG	One bag set of a DYNOTEST or RUNLOSS test. (A bag set usually results from two physical bags: one sample and one background, with the background measurements subtracted from the sample measurements to yield the bag set measurements).  For DYNOTESTs having a single bag set the bag results are stored here, in addition to being the summary results for the test as a whole.
DYNOMEAS	Used to store a MEASTYPE measurement at the summary test level.
DYNOMODE	One "mode" of a possibly multi-mode DYNOTEST whose results are expressed in mass units. The set modes is defined at any point in time by the translation table for the MODE_ID attribute.  Examples of a "mode" include IDLE, IDLE with engine running at 2500 rpm, etc.
DYNORATE	One "mode" of a possibly multi-mode DYNOTEST whose results are expressed in mass/time units. The set of possible modes is defined at any point in time by the translation table for the MODE_ID attribute.  Examples of a "mode" include IDLE, IDLE with engine running at 2500 rpm, etc.
DYNOTEST	This result subtype stores the results of a vehicle chassis exhaust emission tests or in some cases a group of tests. This table stores information pertaining to the test, or test group as a whole.  Note: The emission summary result fields in this entity are used only to summarize the results of bagged exhaust emission tests.  This result subtype is identified in RESULT by RES_KIND = "DYNOTEST".  The entity name DYNOTEST reflects the fact that a chassis dynamometer is used in most of these tests. The subtype includes exhaust emission tests for which a dynamometer could be used, but is not required, such as idle emission measurements. This subtype does not include "running loss" tests, which are performed on a chassis dynamometer, but which measure both exhaust and evaporative emissions.
DYNOTIME	A point in time during a DYNOTEST.
EMODMEAS	Used to store a MEASTYPE measurement at the engine test mode level.
ENG_FAM	Exhaust Engine Family. These engine families result from the Vehicle Emission Certification process.
ENGINE	An engine or motor used to power an M_SOURCE, exclusive of other components of the M_SOURCE such as its structural frame, wheels, etc.  Additional Notes:  1. Since MS_TYPE = 2 for all instances of this entity the MS_TYPE field is not physically implemented in this table.  2. MS_ID will likely be the engine serial number for instances of this entity, though if some small engines do not bear unique serial numbers then another solution will have to be found for them.  Sample Queries: To access ENGINE fields in conjunction with their RESULT information the following join condition would typically be used:  WHERE RESULT.MS_TYPE = 2 AND RESULT.MS_ID = ENGINE.MS_ID
ENGINMAP	This result subtype stores an engine "MAP". Maximum available power or torque as a function of RPM.  This result subtype is identified in RESULT by RES_KIND = "ENGINMAP".
ENGMEAS	Used to store a MEASTYPE measurement at the summary test level.
ENGMODE	Steady-state mode used in engine testing on an engine dynamometer. Characterized by a speed, expressed as a percentage of one of several maximum speeds (rated, idle, or governed central speed, etc), and a load, expressed as a percentage of the mapped torque at that speed.
ENGOT	A point in time during a DYNOTEST when measuring engine out emissions.

Entity Name	Entity Definition
ENGTEST	This result subtype stores the results of an engine test performed on an engine dynamometer, exclusive of smoke opacity measurement. This subtype is identified by RES_KIND = "ENGTEST".
ENGTIME	A point in time within an ENGTEST.
EREPMEAS	A non-core measurement associated with a point in time in an engine test (i.e. an ENGTIME).
ETSTMODE	The results of one steady-state mode of an engine dynamometer test. (Only used to store steady-state results.)
EVAP_FAM	Evaporative Engine Family. These families are a product of the vehicle emission certification process.
EVAPMEAS	Used to store a MEASTYPE measurement at the summary test level.
EVAPSTAN	<p>Evaporative Emission Standard. Used to store standards applicable to late model (1994 and later) vehicles. (Earlier standard information was simpler and is stored within the Vehicle Table itself.)</p> <p>The design of this table is very much influenced by the need to obtain this information from EPA's Certification and Fuel Economy Information System (CFEIS ), for this reason this should be considered a "foreign" design whose attributes are not well integrated with the MSOD.</p>
EVAPTEST	<p>This result subtype stores the results of an evaporative emission test. This table stores information pertaining to the test as a whole.</p> <p>This result subtype is identified in RESULT by RES_KIND = "EVAPTEST".</p> <p>This subtype does not include "running loss" tests, which are performed on a chassis dynamometer and which measure both exhaust and evaporative emissions.</p>
EVAPTIME	One point in time during an evaporative emission test.
EXSTSTAN	<p>Exhaust Emission Standard. Used to store standards applicable to late model (1994 and later) vehicles. (Earlier standard information was simpler and is stored within the Vehicle Table itself.)</p> <p>The design of this table is very much influenced by the need to obtain this information from EPA's Certification and Fuel Economy Information System (CFEIS ). For this reason this table design should be considered a "foreign" design whose attributes are not well integrated with the MSOD.</p>
FBATCH	<p>A particular batch of fuel that can be used to power mobile sources during emission tests.</p> <p>Unlike a FUEL, which is a general kind of fuel, instances of this entity represent a physical batch of fuel that has measured properties.</p>
FUEL	<p>A kind of fuel used to power a mobile source during a particular test.</p> <p>Example instances:</p> <p>Diesel Fuel, Indolene, Tank fuel (whatever was present in the fuel tank when the vehicle was obtained), etc.</p> <p>While some kinds of fuel may be purchased or blended to nominal specifications for octane, volatility, alcohol content etc., e.g. "clean air act baseline fuel", instances of this entity are always a conceptual "kind" of fuel and not a physical batch of fuel.</p>
FUELCHEM	This result subtype stores the results of an analysis of the fuel being used in the mobile source. This result subtype is identified in RESULT by RES_KIND = "FUELCHEM".
INSPECT	<p>This result subtype is identified in RESULT by RES_KIND = "INSPECT".</p> <p>This result subtype is used to store the results of the emission component inspection often referred to as the M1 maintenance inspection, or just M1 maintenance. This top level subtype entity is used to store information about the inspection as a whole.</p> <p>This result subtype can also be used to store observational comments pertaining to a Mobile Source, even when no parts or systems are actually inspected.</p>
INTEREST	A broad area of interest within the field of Mobile Sources, in association with a WKASSIGNment which addresses that interest.
KIND_OF_RESULT	<p>This area contains information organized by particular kinds of RESULTS. We often refer to these as RESULT subtypes. Every process which records information about or which modifies a mobile source of air pollution such as a VEHICLE or ENGINE is considered to be some kind of a RESULT.</p> <p>So kinds of results include subtypes like PROCUREments which are not normally considered test results. This is because information such as the procurement date and the odometer reading of the vehicle, etc. is recorded</p>

Entity Name	Entity Definition
	<p>when the vehicle is obtained.</p> <p>Each row in the RESULT table includes the res_kind field, which identifies what kind of a RESULT it is.</p>
LTIME	LTIME_IN is to store measurements used to calculate the mass per unit time measurements found in the input table TIME_IN during a lab test.
M_SOURCE	<p>A physical object which can move, and which produces outdoor air pollution. Historically interest has been in passenger cars and trucks designed to be driven on roadways, and the internal combustion engines used to power such vehicles. Future data will pertain to other types of mobile sources such as off-road vehicles, boats, farm and construction equipment, etc., and the engines used to power such equipment.</p> <p>Additional Notes:</p> <ol style="list-style-type: none"> <li>1. EPA and the principal air- pollution-regulating statutes make a fundamental distinction between mobile and stationary sources of air pollution such as factories and power plants.</li> <li>2. This entity is broken down into subtype entities based on MS_TYPE. Fields common to all or most types of mobile sources will be stored in this table. Fields particular to certain types of mobile sources will be stored in subtype tables.</li> </ol> <p>Sample Queries: To access M_SOURCE fields in conjunction with their RESULT information the following join condition would typically be used:</p> <p>WHERE RESULT.MS_TYPE = M_SOURCE.MS_TYPE AND RESULT.MS_ID = M_SOURCE.MS_ID</p> <p>Example Instances:</p> <p>Passenger cars, trucks, busses, farm tractors, locomotives, ships, airplanes, portable generators, and power lawnmowers are all M_SOURCES.</p> <p>A trailer is not (does not produce air pollution). A gasoline service station is not (can not move). A transportation activity such as "shipping" is not (not an object). A class of mobile sources such as "LDTs" (light duty trucks), about which we might collect for example population, activity, or usage data, is likewise not an M_SOURCE.</p>
MEASTYPE	<p>A type of numeric, "non-core", emission-related measurement. e.g. methane emissions in grams per mile, not usually performed.</p> <p>Note: This table does not store a result measurement, but information about a kind of measurement.</p>
MODEMEAS	Used to store a MEASTYPE measurement at the test mode level.
MODETIME	A point in time within a DYNOMODE.
MSO_ENG	<p>An engine or motor used to power a mobile source of air pollution (such as a VEHICLE), exclusive of other components such as its structural frame, wheels, etc.</p> <p>Note for advanced users: This table is actually the inner join of the database tables M_SOURCE and ENGINE. The join is performed both to enhance query performance and to simplify query formulation by hiding the existence of the separate M_SOURCE table from the user.</p>
MSO_VEH	<p>A motor vehicle (including cars, trucks, motorcycles, and off road vehicles) inclusive of its engine and chassis, having a unique vehicle identification number (VIN).</p> <p>Note for advanced users: This table is actually the inner join of the database tables M_SOURCE and VEHICLE. The join is performed both to enhance query performance and to simplify query formulation by hiding the existence of the separate M_SOURCE table from the user.</p>
OBD2CODE	OBD2 scan code. Contains information about the code itself. e.g. its meaning.
OBDSCAN	<p>This result subtype is used to store summary level information pertaining to a scan of a vehicle's on board diagnostic system. While both level 1 and level 2 on board diagnostic systems scans are supported by this data structure, data collected on level 1 systems prior to 1999 are stored as part of the vehicle inspection data.</p> <p>This result subtype is identified in RESULT by RES_KIND = "OBDSCAN".</p> <p>This table is used to store information pertaining to the scan as a whole.</p>
OWNERQST	This result subtype stores information from the Owner's questionnaire, and, where collected, summary information from the fuel economy postcard survey.

Entity Name	Entity Definition
	This result subtype is identified in RESULT by RES_KIND = "OWNERQST".
P_INSP	Emission component part inspection.
PART	Emission Component Part e.g. E101, etc. Other values represent the MIL light, OBD1, codes, etc.
PARTCODE	Numeric value representing a status or failure of an emission component system part.
PC_INSP	Emission component part code inspection.
PMEAS	Used to store a MEATYPE measurement for PEMS/PAMS devices on vehicles.
PRESMEAS	Used to store a MEATYPE measurement at the summary test level.
PRESSTST	<p>This Result Subtype stores the outcome of an evaporative system pressure check. In cases where an attempt was made to perform a pressure check, but it could not be performed, the reason for this is stored.</p> <p>This result subtype is identified in RESULT by RES_KIND = "PRESSTST".</p>
PROCURE	<p>The obtaining of an M_SOURCE for testing. Usually a series of tests is performed during the M_SOURCE's stay at a test facility.</p> <p>This result subtype is identified in RESULT by RES_KIND = "PROCURE".</p> <p>Historically OTAQ's emission factor testing program can be considered to have always "procured" a vehicle or engine prior to testing it, but it is not a logical requirement of the database that a PROCURE instance exist for every RESULT if no information of this nature is collected. e.g. Vehicles observed driving on the road would not have to be "procured".</p>
QUEST_WA	<p>Since research questions (QUESTION) and work assignments (WKASSIGN) have a many-to-many relationship this entity is needed to "associate" them.</p> <p>Technically this entity represents one work assignment's contribution to answering one research question.</p>
QUESTION	A research question on which RESULTS are intended to address.
RATEMEAS	Used to store a rate MEATYPE measurement at the test mode level.
RBAGMEAS	Used to store a running loss MEATYPE measurement at the bag level.
REP_MEAS	Used to store a MEATYPE measurement at the test time point level.
REPAIR	<p>A repair is a procedure performed on a Mobile_Source intended to improve its performance, which is assumed to affect all subsequent RESULTS on that Mobile Source.</p> <p>This result subtype is identified in RESULT by RES_KIND = "REPAIR".</p>
RES_KIND	This table is used to aggregate RESULT instances into a few different subtypes.
RESULT	<p>Any observation, measurement, or modification to an M_SOURCE including:</p> <ol style="list-style-type: none"> <li>1) Information pertinent to the procurement of the M_SOURCE.</li> <li>2) An outcome of any test procedure performed on an M_SOURCE, such as an exhaust emissions test or an evaporative emissions test.</li> <li>3) Observations of the M_SOURCE, e.g. a questionnaire about the M_SOURCE submitted by the owner.</li> <li>4) Repairs or modifications made to the M_SOURCE which could effect future measurements.</li> </ol> <p>Additional Notes:</p> <ol style="list-style-type: none"> <li>1. This entity is broken down into an incomplete collection of dependent subtype entities based on its RES_KIND field. Additional result subtypes will be added as are needed.</li> </ol>
ROADPHAS	A portion of a road test. This portion must correspond to a single, contiguous period of time within the time period of the complete test.

Entity Name	Entity Definition
ROADTEST	<p>This result subtype stores the results of a vehicle exhaust emission test performed during on-road driving. This table stores information pertaining to the test as a whole.</p> <p>This result subtype is identified in RESULT by RES_KIND = "ROADTEST".</p> <p>The entity name ROADTEST reflects the fact that the vehicle has been equipped with on board exhaust emission measurement instrumentation and that the emission measurements can therefore be made during actual use rather than in a laboratory.</p>
ROADTIME	A point in time during a ROADTEST.
ROADTRIP	<p>A trip traveled by an on-road vehicle.</p> <p>This result subtype is identified in RESULT by RES_KIND = "ROADTRIP".</p> <p>This result subtype is similar to a ROADTEST. The primary purpose of a ROADTEST is to measure exhaust emissions. The purpose of a ROADTRIP is to measure other aspects of the vehicle's usage or activity.</p>
RUNL_BAG	The evaporative emissions for a portion of a "running loss" test, identified by "bag number" within the test.
RUNLOSS	<p>This result subtype stores the results of a vehicle chassis running loss emission test. Like DYNOTESTs, these are performed on a chassis dynamometer and exhaust emission measurements are taken. Unlike DYNOTESTs, however:</p> <ol style="list-style-type: none"> <li>1. Evaporative running losses are measured during portions of the test.</li> <li>2. An attempt is made to heat or cool the vehicle's fuel tank as necessary to simulate the temperature pattern it would experience in on-road driving.</li> </ol> <p>This result subtype is identified in RESULT by RES_KIND = "RUNLOSS".</p> <p>This table is used to store results which pertain to the test as a whole; no attempt is usually made to summarize the emission results, exhaust or evaporative, for the test as a whole.</p>
S_INSP	Emission component system inspection.
SCANSYS1	An Individual scan code resulting from a scan of a level 1 on board diagnostic system.
SCANSYS2	An Individual scan code resulting from a scan of a level 2 on board diagnostic system.
SCHED_PT	<p>A time point in a SCHEDULE.</p> <p>Sample Queries: To use this table in conjunction with the SCHEDULE table the following join condition would be used.</p> <p>. where sched_pt.sched_id = schedule.sched_id</p> <p>Example Instances: 1) For schedule cdh226, the speed should be 23.5 mph at 20 seconds 2) for schedule rtd2, the temperature should be 83.9 F at 90 minutes.</p>
SCHEDULE	<p>Functional relation which gives values for one or more controlling test parameters, such as the speed a vehicle should be traveling, the temperature that a SHED should maintain, or the torque and rpm of an engine throughout the time of a test procedure.</p> <p>Schedules are often also referred to as "cycles" though the Schedule term is considered preferable since there is nothing circular, regular or repeating about most test schedules.</p> <p>Additional notes: Only items pertaining to the schedule as a whole belong in this table. e.g. descriptions, average or maximum values of the entire schedule.</p> <p>Sample Queries: To use this table in conjunction with the RESULT entity the following join condition would be used</p> <p>where schedule.sched_id = result.sched_id</p> <p>Example Instances:</p> <ol style="list-style-type: none"> <li>(1) EPA Urban Dynamometer Driving Schedule for Light-Duty Vehicles and Light-Duty Trucks.</li> <li>(2) EPA Engine Dynamometer Schedules for Heavy-Duty Otto-Cycle engines.</li> </ol>

Entity Name	Entity Definition
	(3) Temperature schedules for evaporative emission tests.
SCHESUM	These are the summary information pertaining to each schedule or "cycle" For example: Total length of the schedule, maximum, minimum or average speed of the schedule or highest acceleration in schedule.
SMOKETST	This result subtype stores the results of a smoke opacity test. This subtype is identified by RES_KIND = "SMOKETST".
STANDARD	<p>This area deals with the emissions standards applicable to vehicles.</p> <p>Prior to the 1995 model year, this database considers that a single set of emission standards apply to each vehicle. This standards information is contained within the VEHICLE table itself, using the fields evapstd, noxstd, thestd, pmstd, etc.</p> <p>Beginning with the 1995 model year in the United States the situation became more complicated with more sets of standards applying to each vehicle. Within this area the EXSTSTAN table contains the exhaust emission standards applicable to a vehicle, while the EVAPSTAN table contains the evaporative emission standards applicable to a vehicle.</p>
STSTMODE	One mode of a smoke test procedure.
SYSTEM	Emission Component System e.g. "Induction", etc. "OBD", etc.
TASK	<p>Work effort in which produced the RESULT as classified historically. Usually corresponded to a contract task or analogous internal effort.</p> <p>Note: The WKASSIGN entity was intended to subsume this TASK entity. Until WKASSIGN is fully populated, however, this TASK entity will be used to store more sparse information which is available from the "old database" about the work efforts which produced the older RESULTS.</p>
TEST_PRO	<p>Test procedure used to produce a RESULT.</p> <p>An example would be the Federal Test Procedure (FTP), though most other test procedures are not as completely defined.</p> <p>Note1: Historically this concept was termed "Test_Type" by AMD. Instances of this entity are an evolution of the domain of the former Test_Type field, though in some cases multiple Test_Type values have been combined into a single Test Procedure instance and visa versa.</p> <p>Note2: Conceptually Test Procedure is a different idea from Test Schedule. For example if two test procedures differ only in the Schedule used then ideally they should be considered the same Test Procedure. In practice, however, this has not been fully implemented because of the strong identity of some Test Procedures with Test Schedules and the lack of identification of true test "Procedures". Some grouping of Schedules into Test Procedures has been achieved, however, where identifiable groups of Schedules are involved, such as the "Facility" driving schedules for exhaust emission tests, or EPA's set of "Speed Correction" cycles.</p>
TEST_PROJECT	<p>This area contains information about the test programs or projects that conducted the emission testing which produced the individual results stored in this database. We sometimes refer to this as the test "metadata". For many reasons it is important to consider the characteristics of individual test programs when using the data because only here are details described as to how vehicles were recruited and the test program conducted.</p> <p>Within this area, the WKASSIGN (Work Assignment) table contains information about test data loaded more recently. It generally includes the contract and work assignment numbers if the work was performed under contract to EPA, and pointers to the statement of work, work plans, or final reports.</p> <p>For older data imported into this database from EPA's older Emissions Factor (EF) database, less information is generally available. What is available for this older data is contained in the TASK table.</p> <p>The proto_id field in the RESULT table identifies any TASK associated with a RESULT. The wa_id field in the RESULT table identifies any WKASSIGN associated with a RESULT.</p>
TESTMEAS	Used to store a MEASTYPE measurement at the summary test level.
TIMEMEAS	Used to store a MEASTYPE measurement pertaining to a particular time in a test.
TRIP	<p>A trip traveled by a vehicle using a PEMS/PAMS device.</p> <p>This result subtype is identified in RESULT by RES_KIND = "TRIP".</p>
TTIME	Used to store second-by-second data recorded by a PEMS/PAMS device.
VEH_MISC	Used to store a MEASTYPE measurement about a vehicle.

Entity Name	Entity Definition
VEHICLE	<p>A motor vehicle, inclusive of its engine and chassis, having a unique (within this entity) vehicle identification number (VIN).</p> <p>Additional Notes:</p> <ol style="list-style-type: none"> <li>1. It may be necessary at some point to distinguish between light duty and heavy duty vehicles. If made such a distinction would probably be based on the vehicle certification regulations at CFR 40 Part 86 section 082-2. Most fundamentally if this distinction were made a light duty vehicle instance, if certified for compliance with air emission regulations, would be certified as an entire vehicle or "chassis", whereas a heavy duty vehicle instance, would have its engine certified.</li> <li>2. Since MS_TYPE = 1 for all instances of this entity the MS_TYPE field is not physically implemented in this table.</li> <li>3. MS_ID is the Vehicle's Identification Number (VIN) for instances of this entity.</li> </ol> <p>Sample Queries: To access VEHICLE fields in conjunction with their RESULT information the following join condition would typically be used:</p> <p>WHERE RESULT.MS_TYPE = 1 AND RESULT.MS_ID = VEHICLE.MS_ID</p> <p>Example Instances:</p> <p>This entity includes motorcycles and off road vehicles.</p>
WKASSIGN	<p>A work assignment, whether contracted or performed in_house, which produces RESULTS. Often also referred to as a "test program".</p> <p>These efforts have often been performed by vehicle testing contractors under work assignment contracts. This entity represents a broader view of this fundamental construct.</p>



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# MSOD Entity Attribute Definition Report

<b>"ACTIVITY" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
activityid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
install_dt	Data and time the unit, e.g., PEMS or PAMS, was installed onto the vehicle.	No	No
uninstall_dt	Data and time the unit, e.g., PEMS or PAMS, was uninstalled from the vehicle.	No	No
instal_hrm	Hour meter reading at the time the unit, e.g., PEMS or PAMS, was installed.	No	No
uninstal_hrm	Hour meter reading at the time the unit, e.g., PEMS or PAMS, was uninstalled.	No	No
instal_odm	Odometer reading at the time the unit, e.g., PEMS or PAMS, was installed.	No	No
uninstal_odm	Odometer reading at the time the unit, e.g., PEMS or PAMS, was uninstalled.	No	No
no_trip	Number of trips taken as defined by the period of time that a engine has been "key on" to "key off".	No	No

<b>"air_inj" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
AIR_INJ	The ID of air injection types.	Yes	No
AIR_INJ_N	The numeric ID of air injection types.	No	No
AIR_INJ_D	The description of air injection types.	No	No

<b>"airfuel" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
AIRFUEL	The ID of air fuel mixture methods.	Yes	No
AIRFUEL_N	The numeric ID of air fuel mixture methods.	No	No
AIRFUEL_D	The description of air fuel mixture methods.	No	No

<b>"aspirate" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
ASPIRATED	The ID of Aspiration types.	Yes	No
ASPIRATE_N	The numeric ID of Aspiration types.	No	No
ASPIRATE_D	The description of Aspiration types.	No	No

<b>"BAG_MEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
bag_num	Bag number.	Yes	Yes
bag_meas	Bag-level measurement.	No	No

<b>"canister" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
CANISTER	The legal ID names of canister types.	Yes	No
CANISTER_N	The numeric ID of canister types.	No	No
CANISTER_D	The description of canister types.	No	No

<b>"carbfuel" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
CARB_V	The carburetor and number of value per cylinder	Yes	No
FUEL_INJ	The type of fuel injector system.	Yes	No
FUEL_DELIV	The type of fuel delivery system.	No	No
VENTURIS	The number of venturis per cylinder	No	No
FI_TYPE	The location of the fuel injector	No	No

<b>"cat_type" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
CAT_TYPE	The legal ID names of catalyst types.	Yes	No
CAT_TYPE_N	The numeric ID of catalyst types.	No	No
CAT_TYPE_D	The description of catalyst types.	No	No

<b>"cetane_t" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
CETANE_TYP	The legal ID names of cetane additive for diesel fuels	Yes	No
CETANE_T_N	The numeric ID of cetane additive for diesel fuels	No	No
CETANE_T_D	The description of cetane additive for diesel fuels	No	No

<b>"company " Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
COMPANY	The legal ID name of the company.	Yes	No
COMPANY_N	The numeric ID of the company from CEFIS	No	No
COMPANY_D	The description of the company.	No	No
MFG_N	The old numeric ID of the manufacturer.	No	No
CO_VIN		No	No
CO_ENGFAM		No	No
CO_EVAPFAM		No	No

<b>"cooling" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
COOLING	The type of cooling mechanism used by the engine.	Yes	No
COOLING_N	The numeric ID of the cooling mechanism type.	No	No
COOLING_D	The detailed description of the cooling mechanism used by the engine.	No	No

<b>"cutpoint" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
CUTPOINTS	The numeric ID on a set of cutpoints used in a IM240 emission program.	Yes	No
CUTPOINT_D	The detailed description of the "cutpoints" emission values which data was gathered in a IM240 emission test program.	No	No

<b>"DISABLE" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
DISABLE	The numeric ID of a type of “disablement” which indicates any special conditions performed on a mobile source for a particular test was conducted.	Yes	No
DISABLE_N	The numeric ID of a type of “disablement” which indicates any special conditions performed on a mobile source for a particular test was conducted.	No	No
DISABLE_D	The detailed description of the disablement type.	No	No

<b>"drv_trn" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
DRV_TRN	The abbreviated representation of the drive train type.	Yes	No
DRV_TRN_N	The numeric ID of the drive train type.	No	No
DRV_TRN_D	The detailed description of the drive train type.	No	No

<b>"drv_type" Category Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
DRV_TYPE	The abbreviated representation of the type of driving performed on the vehicle as indicated on the fuel economy postcard survey. Characterized driving during the period of fuel purchases as to degree of city versus highway driving.	Yes	No
DRV_TYPE_N	The numeric ID of the type of driving performed on the vehicle.	No	No
DRV_TYPE_D	The detailed description of the type of driving performed on the vehicle.	No	No

<b>"DYNO BAG" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
bag_num	Bag number.	Yes	No
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
bag_baro	Barometric pressure. Expressed in inches of mercury.	No	No
bag_humid	Humidity. Expressed in grains of water per pound of dry air.	No	No
bag_dist	Distance traveled. Expressed in miles.	No	No
bag_thc	Total hydrocarbon emissions. Expressed in grams per mile.	No	No
bag_co	Carbon monoxide emissions. Expressed in grams per mile.	No	No
bag_co2	Carbon dioxide emissions. Expressed in grams per mile.	No	No
bag_temp	Temperature. Expressed in degrees Fahrenheit.	No	No
bag_nox	Emissions of oxides of nitrogen. Expressed in grams per mile.	No	No
bag_mpg	Fuel economy. Expressed in miles per gallon.	No	No

<b>"DYNOMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
Resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
measure	Test level measurement.	No	No

<b>"DYNOMODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
mode_id	Mode identification. Legal values defined by MODE_ID translation table.	Yes	No
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
mode_temp	Measured ambient temperature during this test mode. Expressed in degrees Fahrenheit.	No	No
mode_baro	Barometric pressure measured during test mode. Expressed in inches of mercury.	No	No
mode_humid	Humidity measured during test mode. Expressed in grains of water per pound of dry air.	No	No
c_thc	Total hydrocarbon concentration. Expressed in parts per million.	No	No
c_co	Carbon monoxide concentration. Expressed in percent.	No	No
c_co2	Carbon dioxide concentration. Expressed in percent.	No	No
c_no	NO concentration. Expressed in parts per million. Corrected for humidity via humidity correction factor.	No	No
c_nou	NO concentration. Expressed in parts per million. Not corrected for humidity.	No	No
mode_hp	Load horsepower.	No	No
rpm	Measured Engine RPM.	No	No

<b>"DYNORATE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
modeid	Mode identification. Legal values defined by MODE_ID translation table.	Yes	No
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
duration	Length of test mode in seconds	No	No
baro	Barometric pressure during mode. Expressed in inches of mercury.	No	No
temp	Ambient temperature during mode. Expressed in degrees Fahrenheit.	No	No
humid	Absolute humidity. Expressed in grains of water per pound of dry air.	No	No
rate_thc	Total hydrocarbon emissions during mode. Expressed in grams per hour.	No	No
rate_co	Total carbon monoxide emissions during mode. Expressed in grams per hour.	No	No
rate_co2	Total carbon dioxide emissions during mode. Expressed in grams per hour.	No	No
rate_nox	Total oxides of nitrogen emissions during mode. Expressed in grams per hour.	No	No

<b>"DYNOTEST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
thc	Total hydrocarbon emissions. Expressed in grams per mile. (Composite bag result for the entire test)	No	No
co	Carbon monoxide emissions. Expressed in grams per mile. (Composite bag result for the entire test)	No	No
co2	Carbon dioxide emissions. Expressed in grams per mile. (Composite bag result for the entire test)	No	No
nox	Oxides of nitrogen emissions. Expressed in grams per mile. (Composite bag result for the entire test)	No	No
mpg	Fuel economy. Expressed in miles per gallon. (Composite bag result for the entire test)	No	No
testwght	Dynamometer inertia weight setting used for this test. Expressed in pounds.	No	No
road_hp	Dynamometer road load horsepower setting used for this test.	No	No
ac_hp	Did dynamometer road load setting for this test include air conditioning load factor? YES, NO, or NUL.	No	No
dynotype	Type of dynamometer used. Legal values defined by DYNOTYPE translation table.	No	No
odometer	Approximate odometer reading of vehicle at beginning of test. Expressed in miles.	No	No
precond	Type of preconditioning performed on the vehicle prior to the test. Legal values defined by PRECOND translation table.	No	No
test_order	A specialized field used to date only for facility cycle testing. Indicates the numerical position of individual tests in a sequence of tests run. Value of zero represents NULL.	No	No
init_temp	Initial test temperature in degrees F. For bag tests this will often have the null value of 0, since it is reported at the bag level.	No	No
init_baro	Barometric pressure measured at the beginning of the test. Expressed in inches of mercury. This will often have the null value of 0 since it was usually reported at the bag level.	No	No
init_humid	Absolute humidity measured at beginning of test. Expressed in grains of water per pound of dry air. Often assumes null value of zero in this table, since it is often reported at the bag level.	No	No
dynoco_a	The "a" term. Dynamometer road load power absorption coefficient in pounds force.	No	No
dynoco_b	The "b" term. Dynamometer road load power absorption coefficient in (pounds force)/(miles per hour).	No	No
dynoco_c	The "c" term. Dynamometer road load power absorption coefficient in (pounds force)/(miles per hour)^2.	No	No

<b>"DYNOTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test has dynosecs = 0.	Yes	No
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
speed	Measured speed in miles per hour.	No	No
dist	Distance traveled in miles, cumulative from beginning of test phase.	No	No
r_thc	Total hydrocarbon emissions measurement. Expressed in grams per second.	No	No
r_co	Carbon monoxide emissions measurement. Expressed in grams per second.	No	No
r_nox	Oxides of nitrogen emissions measurement. Expressed in grams per sec.	No	No
r_co2	Carbon dioxide emissions measurement. Expressed in grams per second.	No	No
test_phase	Phase of the test to which this measurement belongs. This might be used for example to divide a repeated measurement test into time periods corresponding to bag samples, even though no bag samples were taken.	No	No

<b>"DYNOTYPE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
DYNOTYPE	The abbreviated name of a type of dynamometer used to test a vehicle.	Yes	No
DYNOTYPE_N	The numeric ID used to identify a type of dynamometer.	No	No
DYNOTYPE_D	The detailed description of the dynamometer type.	No	No

<b>"egr_type" Entity</b>			
Name	Definition	Required	Foreign Key
EGR_TYPE	The abbreviated name of a type of exhaust gas recirculation (EGR).	Yes	No
EGR_TYPE_N	The numeric ID used to identify a type of exhaust gas recirculation (EGR).	No	No
EGR_TYPE_D	The detailed description of a EGR type.	No	No

<b>"EMODMEAS" Entity</b>			
Name	Definition	Required	Foreign Key
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
modename	Name of engine test mode. Based on its reference speed, speed fraction, and load fraction. Legal values defined by ENGMODE translation table	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
emodmeas	Engine test mode level measurement of this MEAS_ID	No	No

<b>"eng_clas" Entity</b>			
Name	Definition	Required	Foreign Key
ENG_CLASS	The abbreviated name of a type of engine class in Horsepower (Hp).	Yes	No
ENG_CLAS_N	The numeric ID used to identify a type of engine class in Hp.	No	No
ENG_CLAS_D	The detailed description of a engine class.	No	No

<b>"eng_cycl" Entity</b>			
Name	Definition	Required	Foreign Key
ENG_CYCLE	The abbreviated number used to identify the engine cycle. (2 –stroke or 4- stroke)	Yes	No
ENG_CYCL_N	The numeric ID used to identify an engine cycle.	No	No
ENG_CYCL_D	The detailed description of an engine cycle.	No	No

<b>"ENG_FAM" Entity</b>			
Name	Definition	Required	Foreign Key
eng_fam	Exhaust emission certification family to which this vehicle belongs.	Yes	No

<b>"ENGINE" Entity</b>			
Name	Definition	Required	Foreign Key
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	Yes
ms_type	General kind of mobile source: 1 = Vehicle 2 = Engine.	Yes	Yes
camefrom	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	No	Yes
engseries	Engine series or product line name.	No	No
eng_fam	Engine family for emission certification purposes. A value of "NONE" indicates the engine does not belong to an engine family, which in turn means that it was not certified.	No	No
eng_class	Intended engine service class. (In conjunction with engine type (SI or CI), and model year, this field allows determination of the emission standards to which many engines were certified; for small spark ignition engines, displacement class, which can be determined from displacement, may be used instead.) Legal values defined ENG_CLAS by translation table.	No	No
bld_date	Approximate date engine was manufactured.	No	No
eng_mod_yr	Engine model year.	No	No
cooling	Type of after cooling. Legal values defined by COOLING translation table.	No	No
fi_meth	Method of fuel injection. Legal values defined by FI_METH translation table.	No	No
injectors	Number of injectors per cylinder.	No	No
fi_press	Fuel injection pressure. Expressed in kpa.	No	No
rate_shape	Is rate shaping used? "YES", "NO", or "NUL"	No	No
maxadvance	Maximum advance Expressed in degrees.	No	No
maxretard	Maximum retard. Expressed in degrees.	No	No
egr_type	Type of exhaust gas recirculation (EGR). Values defined by EGR_TYPE	No	No

<b>"ENGINE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
	translation table.		
airfuel	Air fuel mixture method. Values defined by AIRFUEL translation table.	No	No
parttrap	Is particulate trap used? "YES", "NO", or "NUL".	No	No
eng_cycle	Engine cycle. Legal values defined by ENG_CYCL translation table.	No	No
ratedpower	Rated horsepower of engine.	No	No
ratedspeed	Rated rpm of engine.	No	No
idle_rpm	Idle rpm as declared by the OEM.	No	No
tech_cfg	Description of technical configuration. (Not categorized.)	No	No
pump_type	Type of fuel pump. (Not categorized.)	No	No
ecs_descpt	Description of emission control system.	No	No
elect_cont	Description of electronic control.	No	No
peaktorque	Peak torque in ft-lbs.	No	No
peakspeed	Peak torque speed in rpm.	No	No
peakfrate	Fuel rate @ peak torque in lbs/hr.	No	No
ratedfrate	Fuel rate @ rated speed in lbs/hr.	No	No
mfr_intspd	Manufacturer specified intermediate speed as the percentage of maximum speed.	No	No

<b>"ENGINMAP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
maptype	Type of Engine Map. Legal values defined by MAPTYPE translation table.	No	No
msdrtdpwr	Measured rated horsepower.	No	No
msdrtdsped	Measured rated speed (rpm)	No	No
maxtorque	Measured peak torque. Expressed in foot pounds	No	No
msdtrqsped	Measured torque speed. Expressed in rpm.	No	No
gov_speed	Governed central speed (rpm)	No	No
exrestrict	Exhaust restriction pressure. Expressed in inches of mercury.	No	No
baro	Barometric pressure. Expressed in inches of mercury.	No	No
humidity	Absolute humidity. Expressed in grains of water per pound of dry air.	No	No
inlet_air	Engine inlet air temperature. Expressed in degrees F.	No	No
exhaust	Exhaust temperature, after emission controls. Expressed in degrees F.	No	No
cooler_out	Air temperature after intercooler. Expressed in degrees F.	No	No
coolant_in	Engine coolant input temperature. Expressed in degrees F.	No	No
coolantout	Engine coolant output temperature. Expressed in degrees F.	No	No
chiller	Chiller water temperature. Expressed in degrees F.	No	No

<b>"ENGMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
measure	Test level measurement.	No	No

<b>"ENGMODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
modename	Name of engine test mode. Based on its reference speed, speed fraction, and load fraction. Legal values defined by ENGMODE translation table	Yes	No
refspeed	Reference speed. Identifies which of several speeds the speed aspect of the mode is based on. Legal values defined by REFSPEED translation table.	No	No
speed_frac	Fraction of the reference speed at which this mode is run. Expressed as a percentage.	No	No
load_frac	Fraction of the mapped load at this engine speed at which this mode is run. Expressed as a percentage.	No	No
modedur	Minimum duration of the mode. Expressed in seconds.	No	No
modenum	Mode number. Added for convenience, e.g. to facilitate exporting data to software such as SAS which expects keys to be numeric. Should be considered an arbitrary number, but the first 28 modes are numbered as in SWRI work assignment 2-2.	No	No

<b>"ENGMODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
mode8num	Identifies which of the 8 modes of the heavy-duty engine certification test corresponds to this mode. Contains 0 if mode is not part of 8 mode certification test.	No	No
mode8wght	If mode is included in the 8 mode certification test, contains the weighting factor used to calculate the summary result. Expressed as a percentage. The 8 percentages add to 100. Contains 0 if mode is not included in the 8 mode test.	No	No

<b>"engmount" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
ENGMOUNT	The abbreviated name of how the engine is mounted in the vehicle in relationship to the axle.	Yes	No
ENGMOUNT_N	The numeric ID of the engine mounting scheme.	No	No
ENGMOUNT_D	The detailed description on how the engine is mounted in the vehicle in relationship to the axle.	No	No

<b>"ENGOT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test has dynosecs = 0.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
e_thc	Engine-out total hydrocarbon emissions measurement, expressed in grams per second	No	No
e_co	Engine-out Carbon monoxide emissions measurement, expressed in grams per second	No	No
e_nox	Engine-out Oxides of nitrogen emissions measurement, expressed in grams/sec	No	No
e_co2	Engine-out carbon dioxide emissions measurement, expressed in grams/second	No	No
e_o2	Engine-out oxygen emissions measurement, expressed in grams/second.	No	No
c_thc	Total hydrocarbon emissions in ppm by volume.	No	No
c_co	Carbon monoxide emissions in ppm by volume.	No	No
c_nox	Oxides of nitrogen emissions in ppm by volume.	No	No
c_co2	Carbon dioxide emissions measurement, expressed in volume percent (%).	No	No
c_o2	Oxygen emissions measurement, expressed in volume percent (%).	No	No

<b>"ENGTEST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
usesmap	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
p_ch4	Methane emissions. Expressed in grams per bhp-hr.	No	No
p_thc	Total HC emissions. Expressed in grams per bhp-hr.	No	No
p_co	CO emissions. Expressed in grams per bhp-hr.	No	No
p_co2	CO2 emissions. Expressed in grams per bhp-hr.	No	No
p_nox	NOx emissions. Expressed in grams per bhp-hr.	No	No
p_pm	Total particulate emissions. Expressed in grams per bhp-hr.	No	No
total_work	Total work performed in test. Expressed in bhp-hrs.	No	No
bsfc_meas	Measured brake-specific fuel consumption. Expressed in lbs per bhp-hr.	No	No
bsfc_calc	Calculated brake-specific fuel consumption. Expressed in lbs per bhp-hr.	No	No
et_baro	Average barometric pressure during test. Expressed in inches of Hg. Not meaningful for multi-mode steady-state tests.	No	No
et_humid	Average absolute humidity during test. Expressed in grains of water per pound of dry air. Not meaningful for multi-mode steady-state tests.	No	No
et_inair	Engine inlet air temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_exrestr	Exhaust restriction pressure. Expressed in inches of mercury. Not meaningful for multi-mode steady-state tests.	No	No



<b>"ENGTEST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
et_exhaust	Exhaust temperature, after emission controls. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_cooler	Air temperature after intercooler. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_coolin	Engine coolant input temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_coolout	Engine coolant output temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_chiller	Chiller water temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No

<b>"ENGTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
engsecs	Time within an engine dynamometer test, expressed in seconds, beginning of test has engsecs = 0.	Yes	No
r_thc	Total hydrocarbon emissions measurement. Expressed in grams per second.	No	No
r_co	Carbon monoxide emissions measurement. Expressed in grams per second.	No	No
r_nox	Oxides of nitrogen emissions measurement. Expressed in grams per sec.	No	No
r_co2	Carbon dioxide emissions measurement. Expressed in grams per second.	No	No
rpm	Measured engine rpm.	No	No
torque	Measured torque. Expressed in foot-pounds.	No	No

<b>"EREPMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
engsecs	Time within an engine dynamometer test, expressed in seconds, beginning of test has engsecs = 0.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
erepmeas	Engine test time level measurement of this MEAS ID	No	No

<b>"ETC." Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes

<b>"ETSTMODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
modename	Name of engine test mode. Based on its reference speed, speed fraction, and load fraction. Legal values defined by ENGMODE translation table	Yes	Yes
rpm	Measured engine rpm.	No	No
torque	Measured torque. Expressed in foot-pounds.	No	No
bhp	Brake horsepower.	No	No
r_ch4_gph	Methane emission rate. Expressed in grams per hour.	No	No
r_thc_gph	Total hydrocarbon emission rate. Expressed in grams per hour.	No	No
r_co_gph	Carbon monoxide emission rate. Expressed in grams per hour.	No	No
r_co2_gph	Carbon dioxide emission rate. Expressed in grams per hour.	No	No
r_nox_gph	Oxides of nitrogen emission rate. Expressed in grams per hour.	No	No
r_pm_gph	Total particulate emission rate. Expressed in grams per hour.	No	No
fc_meas	Measured fuel consumption. Expressed in kg. per hour.	No	No
fc_calc	Calculated fuel consumption. Expressed in kg per hour.	No	No
etm_baro	Average barometric pressure during engine test mode. Expressed in inches of Hg.	No	No

<b>"ETSTMODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
etm_humid	Average absolute humidity during engine test mode. Expressed in grains of water per pound of dry air.	No	No
etm_inair	Engine inlet air temperature. Expressed in degrees F.	No	No
etmexrestr	Exhaust restriction pressure. Expressed in inches of Hg.	No	No
etmexhaust	Exhaust temperature, after emission controls. Expressed in degrees F.	No	No
etm_cooler	Air temperature after intercooler. Expressed in degrees F.	No	No
etm_coolin	Engine coolant input temperature. Expressed in degrees F.	No	No
etmcoolout	Engine coolant output temperature. Expressed in degrees F.	No	No
etmchiller	Chiller water temperature. Expressed in degrees F.	No	No

<b>"EVAP_FAM" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
evap_fam	EPA standardized evaporative family name as defined in CFR40 Part 86	Yes	No

<b>"EVAPMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
measure	Test level measurement.	No	No

<b>"EVAPSTAN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
evap_fam	EPA standardized evaporative family name as defined in CFR40 Part 86	Yes	Yes
sales_area	Sales area code. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Evaporative/Refueling Systems Information.  Warning 1: Name of this attribute is somewhat misleading since not all values represent an "area" in a geographic sense. Concepts of authority (e.g. California vs US.) and emission level (e.g. NLEV or Clean fuel) partially determine the domain.  Warning 2: Some domain values represent combinations of others.	Yes	No
tier	Tier code. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Engine Systems Information.	Yes	No
usefullife	Useful life. Expressed as a three digit number, in character form, representing thousands of miles or "N/A"	Yes	No
esfueltype	Emission standards fuel type code. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Evaporative/Refueling Systems Information.	Yes	No
evap_emiss	Evaporative emission name. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Evaporative/refueling Systems Information.  Warning: Some emission names also embody information about the test procedure used to measure the emission.	Yes	No
standard	Numerical emission standard.  Warning: Engineering units vary among standard instances and are not defined in CMUG.	No	No

<b>"EVAPTEST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
w_evap_thc	Total hydrocarbon emissions of test. Expressed in grams.	No	No
precond	Type of preconditioning. Values defined by PRECOND translation table.	No	No

<b>"EVAPTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
evapmins	Time of measurement. Expressed in minutes after start of test.	Yes	No
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
evap_barom	Barometric pressure. Expressed in inches of Hg.	No	No
shed_temp	Temperature of SHED or air surrounding vehicle. Expressed in degrees F.	No	No
fuel_temp	Temperature of vehicle's fuel. Expressed in degrees F.	No	No
w_cum_thc	Cumulative hydrocarbon emissions, since start of test. Expressed in grams.	No	No

<b>"EXSTSTAN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
eng_fam	Exhaust emission certification family to which this vehicle belongs.	Yes	Yes
cert_inuse	Indicates whether standard is a "certification" (C) or "in-use" (I) standard.	Yes	No
sales_area	Sales area code. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Engine Systems Information.  Warning 1: Name of this attribute is somewhat misleading since not all values represent an "area" in a geographic sense. Concepts of authority (e.g. California vs US.) and emission level (e.g. NLEV or Clean fuel) partially determine the domain.  Warning 2: Some domain values represent combinations of others.	Yes	No
tier	Tier code. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Engine Systems Information.	Yes	No
usefullife	Useful life. Expressed as a three digit number, in character form, representing thousands of miles or "N/A"	Yes	No
esfueltype	Emission standards fuel type code. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Engine Systems Information.	Yes	No
exst_emiss	Exhaust emission name. Values are defined in the CFEIS Manufacturers' User Guide (CMUG), Appendix D (Input data records), Engine Systems Information.  Warning: Some emission names also embody information about the test procedure used to measure the emission.	Yes	No
standard	Numerical emission standard.  Warning: Engineering units vary among standard instances and are not defined in CMUG.	No	No

<b>"FBATCH" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
fbatch_id	Fuel batch identification.	Yes	No
mfg_batch	Manufacturer's fuel batch identification	No	No
cetane_num	Cetane number of complete fuel.	No	No
cetane_idx	Cetane index of complete fuel.	No	No
cetane_imp	Amount of cetane improver added, expressed as percentage by volume	No	No
cetane_typ	Type of cetane improver used, e.g. "N" for nitrate type or "P" for peroxide type. Exact set of legal values defined and described by translation table for this field.	No	No
sulfur	Sulfur content, expressed in parts per million.	No	No
sulf_agent	Name of any sulfur doping agent added to the fuel. Value of "NONE" indicates that all sulfur in the fuel was present naturally.	No	No
nitrogen	Nitrogen content, expressed in parts per million.	No	No
tarom	Total aromatics content of fuel, expressed as a percentage by volume. This is a measured value, as opposed as being calculated as the sum of the monoaromatics and polyaromatics fields.	No	No
marom	Monoaromatics content of fuel, expressed as a percentage by weight. This is a measured value, as opposed as being calculated as the difference of the total aromatics and polyaromatics fields.	No	No
parom	Polyaromatics content of fuel, expressed as a percentage by weight. This is a measured value, as opposed as being calculated as the difference of the total aromatics and monoaromatics fields.	No	No
IBP	Initial boiling point expressed in degrees F.	No	No
T10	10% distillation boiling point, expressed in degrees Fahrenheit.	No	No
T50	50% distillation boiling point, expressed in degrees Fahrenheit.	No	No

"FBATCH" Entity			
Name	Definition	Required	Foreign Key
T90	90% distillation boiling point, expressed in degrees Fahrenheit.	No	No
EP	End point of distillation curve, expressed in degrees Fahrenheit.	No	No
spec_grav	Specific gravity.	No	No
API_grav	API gravity, expressed in degrees API	No	No
density	Measured density of the fuel, expressed in pounds per gallon.	No	No
viscosity	Viscosity, expressed in centistokes.	No	No
flash	Flashpoint temperature, expressed in degrees Fahrenheit.	No	No
cloud	Cloudpoint temperature, expressed in degrees Fahrenheit.	No	No
pour	Pourpoint temperature, expressed in degrees Fahrenheit.	No	No
heratio	Ratio of hydrogen to carbon	No	No
oxygen	Amount of oxygen in the fuel, expressed as a percentage by weight.	No	No
oxy_type	Type of oxygenate. "NONE" if no oxygenate was added to the base fuel. Values defined by translation table for this field.	No	No
additives	Total amount of additives, other than cetane improvers, in the fuel, expressed as a percentage by weight.	No	No
lubric_g	Fuel lubricity, expressed in grams. As measured by ASTM D6078 or comparable method.	No	No
lubric_mm	Fuel lubricity, expressed in millimeters of scar wear. As measured by ASTM D6079 or comparable method.	No	No
heat	Net heating value of the fuel, expressed in btu/pound.	No	No
ash	Ash content of fuel, expressed as a percentage.	No	No
ron	Research Octane Number conducted in accordance with ASTM D2699	No	No
mon	Motor Octane Number conducted in accordance with ASTM D2700	No	No
fen_c	Fuel Economy Numerator/C Density conducted in accordance with ASTM E191 (g carbon/gal)	No	No
wgt_fractn	Weight fraction carbon conducted in accordance with ASTM D3343	No	No
recovery	The amount of distillate recovered measured in volume percent.	No	No
residue	The amount of residue matter remaining after distillate has been boiled off and is measured in volume percent.	No	No
loss	The amount of loss measured in volume percent.	No	No
rvp	The Reid Vapor Pressure of the fuel measured in pounds per square inch (psi) in accordance with ASTM D323 or D5191.	No	No
comp_olefn	Olefin composition measured in volume percent of the fuel in accordance with ASTM D1319.	No	No
comp_sat	Saturates Composition measured in volume percent of the fuel in accordance with ASTM D1319.	No	No
comp_aroma	Volume % Aromatics in fuel by ASTM D1319	No	No

"fi_meth" Entity			
Name	Definition	Required	Foreign Key
FI_METH	The abbreviated name of the type of fuel injection method used on an engine.	Yes	No
FI_METH_N	The numeric ID of the type of the fuel injection method type.	No	No
FI_METH_D	The detailed description of the fuel injection method type.	No	No

"FI_TYPE" Entity			
Name	Definition	Required	Foreign Key
FI_TYPE	The abbreviated name of where the fuel injection occurs in the engine.	Yes	No
FI_TYPE_N	The numeric ID of where the fuel injection occurs.	No	No
FI_TYPE_D	The detailed description of the where fuel injection occurs.	No	No

"fixes" Entity			
Name	Definition	Required	Foreign Key
FIXES	The numeric ID for if repairs were made on a vehicle or not.	Yes	No
FIXES_D	The detailed description on if repairs were made on a vehicle.	No	No

"FUEL" Entity			
Name	Definition	Required	Foreign Key
fuel_id	Numeric code uniquely identifying the general type of fuel used. Sometimes referred to as the "gross fuel type".	Yes	No
fuelname	Name of fuel.	No	No

<b>"FUEL" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
oxygenate	Oxygen enriched chemical.	No	No
wtoxygen	Weight of oxygen in this type of fuel.	No	No
rvp	Nominal vapor pressure of this kind of fuel.	No	No
sulferlow	Lower bound sulfur content specification. Expressed in parts per million.	No	No
sulferhigh	Upper bound sulfur content specification. Expressed in parts per million.	No	No

<b>"fuel_del" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
FUEL_DELIV	The abbreviated name of how the fuel is delivered to the engine. (e.g. carbureted, fuel injection, hybrid, etc.)	Yes	No
FUEL_DEL_N	The numeric ID of how the fuel is delivered to the engine.	No	No
FUEL_DEL_D	The detailed description of how the fuel is delivered to the engine.	No	No

<b>"FUELICHEM" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
fuelmeas	Test level fuel measurement.	No	No

<b>"FUELTYPE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
FUELTYPE	The abbreviated name of the fuel used in the engine. (e.g. gasoline, diesel, alcohol, CNG, etc.)	Yes	No
FUELTYPE_N	The numeric ID of fuel used in the engine.	No	No
FUELTYPE_D	The detailed description of fuel used in the engine.	No	No

<b>"gears" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
GEARS	The abbreviated name of the number of gears (shifts) in the engine's transmission.	Yes	No
GEARS_N	The numeric ID of the gears (shifts) in the engine's transmission.	No	No
GEARS_D	The detailed description of gears (shifts) in the engine's transmission.	No	No

<b>"HOW LONG" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
HOW_LONG	The abbreviated name of how long an owner has owned this vehicle.	Yes	No
HOW_LONG_N	The numeric ID of how long an owner has owned this vehicle.	No	No
HOW_LONG_D	The detailed description of how long an owner has owned this vehicle.	No	No

<b>"IGNITION" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
IGNITION	The abbreviated name of the type of ignition system the engine uses. (e.g. compression , spark, etc.).	Yes	No
IGNITION_N	The numeric ID of ignition type.	No	No
IGNITION_D	The detailed description of ignition type.	No	No

<b>"im_stat" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
IM_STATUS	The abbreviated name used to indicate if the vehicle passed or was tested under an Inspection and Maintenance (I/M) emission test.	Yes	No
IM_STAT_N	The numeric ID used to indicate the vehicle passed or was tested on an I/M.	No	No
IM_STAT_D	The detailed description used to indicate if the vehicle passed or was tested under an Inspection and Maintenance (I/M) emission test.	No	No

<b>"im240_pf" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
IM240_PF	The abbreviated name used to indicate if the vehicle passed an Inspection and Maintenance (I/M) emission test.	Yes	No
IM240_PF_N	The numeric ID used to indicate if the vehicle passed an (I/M) emission test.	No	No
IM240_PF_D	The detailed description on if the vehicle passed an (I/M) emission test.	No	No

<b>"INSPECT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
comments	Inspection comments, first portion.	No	No
comments2	Inspection comments, second portion.	No	No
insp_odom	Approximate odometer reading, in miles, at time of mechanics M1 emission component inspection. Zero represents NULL. (This item not collected prior to FY98).	No	No
g_can_init	Weight of evaporative emission canister as vehicle was received. Expressed in grams. If vehicle has multiple canisters weight entered is total of all canisters present. Zero if null.	No	No
g_can_purg	Weight of evaporative emission canister after canister purge. Expressed in grams. If vehicle has multiple canisters weight entered is total of all canisters present. Zero if null.	No	No
g_can_load	Weight of evaporative emission canister after full loading. Expressed in grams. If vehicle has multiple canisters weight entered is total of all canisters present. Zero if null.	No	No
smokecolor	Result of visual observation of smoke emission. Whether and what color smoke was observed. Legal values defined by translation table.	No	No

<b>"INSTRSYS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
INSTRSYS		Yes	No
INSTRSYS_N		No	No
INSTRSYS_D		No	No

<b>"INTEREST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
keyword	Identifies an area of interest within the field of mobile sources of air pollution. Legal values are defined by category translation table keyword.dbf.	Yes	No
wa_id	Work Assignment (or equivalent for TSD) name.	Yes	Yes

<b>"keyword" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
KEYWORD	The abbreviated name used to identify an area of interest within the field of mobile sources of air pollution.	Yes	No
KEYWORD_N	The numeric ID used to identify an area of interest within the field of mobile sources of air pollution.	No	No
KEYWORD_D	The detailed description of the meaning of the keyword.	No	No
REPORTROLE		No	No
REPORTSECT		No	No

<b>"lf_wear" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
LF_WEAR	The abbreviated name used to identify the types of wear on the left front tire.	Yes	No
LF_WEAR_N	The numeric ID used to identify the types of wear on the left front tire.	No	No
LF_WEAR_D	The detailed description on the types of tire wear patterns.	No	No

<b>"liteact" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
LITEACTION	The abbreviated name used to identify the owner's action when the onboard diagnostic (OBD) warning light is on.	Yes	No
LITE_ACT_N	The numeric ID used to identify the owner's action pertaining to the OBD light.	No	No
LITE_ACT_D	The detailed description of owner's action pertaining to the OBD light.	No	No

<b>"LTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test has dynosecs = 0.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
lab_rpm	Engine's rpm for each second.	No	No
lab_torq	Engine's torque (calculated or measured) per second in ft-lbs.	No	No
lab_tempf	Ambient air temperature in degrees F per second.	No	No
lab_baro	Ambient air's barometric pressure measured for each second in inches of mercury.	No	No
lab_humid	Absolute humidity measured each second expressed in grains of water per pound of dry air.	No	No
lfuel_rate	in lbs/sec.	No	No
lab_engcol	Engine coolant temperature (degrees F).	No	No
lab_engoil	Engine oil temperature (degrees F).	No	No
lab_millit	Yes - if millight is on; No if off.	No	No
tp_o2	Oxygen in volume percent (%) as measured at the tailpipe.	No	No
dil_o2	Oxygen in volume percent (%) as measured after mixed with dilution air.	No	No
tp_vol	Tailpipe volume in standard cubic feet per second.	No	No
cvs_vol	cvs flow in standard cubic feet per second.	No	No
dil_vol	Dilution air in standard cubic feet per second.	No	No
tp_thc	Total hydrocarbon in ppm by volume as measured at the tailpipe.	No	No
dil_thc	Total hydrocarbon in ppm by volume as measured after mixed with dilution air.	No	No
tp_co	Carbon monoxide in ppm by volume as measured at the tailpipe.	No	No
dil_co	Carbon monoxide in ppm by volume as measured after mixed with dilution air.	No	No
tp_co2	Carbon dioxide in volume percent (%) as measured at the tailpipe.	No	No
dil_co2	Carbon dioxide in volume percent (%) as measured after mixed with dilution air.	No	No
tp_nox	Nitrogen oxides in ppm by volume as measured at the tailpipe.	No	No
dil_nox	Nitrogen oxides in ppm by volume as measured after mixed with dilution air.	No	No

<b>"M_SOURCE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
ms_type	General kind of mobile source: 1 = Vehicle 2 = Engine.	Yes	No
except	YES if something is exceptional about this mobile source that would make it an outlier for most analysis. (e.g. engine has been replaced, etc.)	No	No
ex_comm	Used if except is true. Comment as to why vehicle is exceptional.	No	No
fueltype	Type of fuel mobile source is designed to use. Legal values defined by FUELTYPE translation table.	No	No
company	Mobile source manufacturer. Is designed to align with the MFR_ fields in CFEIS. Has extended translation table in which COMPANY_N will contain the same numeric code as CFEIS for this manufacturer. Legal values defined by COMPANY translation table. NONROAD manufacturers will also be included in the COMPANY table.	No	No
highway	Yes if mobile source is intended for highway use. No for non-road mobile sources.	No	No
disp_cid	Nominal Engine displacement. Expressed in cubic inches.	No	No
disp_liter	Nominal engine displacement. Expressed in liters.	No	No
fuel_deliv	Kind of fuel delivery system. Legal values defined by FUEL_DEL translation table.	No	No
venturis	Number of venturis. Not meaningful for fuel injected mobile sources.	No	No
fi_type	Type of fuel injection. Legal values defined by FI_TYPE translation table.	No	No
aspirated	Indicates how engine is aspirated. Legal values defined by ASPIRATE translation table.	No	No

<b>"M_SOURCE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
var_vent	YES if size of carburator venturis is designed to vary. Otherwise NO. (or NUL). Intend to convert to a logical type field when good tool is available.	No	No
cylinder	Number of cylinders or rotors.	No	No
air_inj	Represents what method, if any, is used to introduce supplemental air into the exhaust stream. Legal values defined by AIR_INJ translation table.	No	No
cat_type	What type catalyst, if any, is present on the mobile source. Legal values defined by CAT_TYPE translation table.	No	No
closedloop	"YES" indicates a "closed loop" configuration in which the exhaust sensing is used to help control the fuel combustion process. "No means this is not done on the vehicle.	No	No
ignition	Ignition type of engine in mobile source. Legal values defined by IGNITION translation table.	No	No

<b>"make" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
MAKE	The vehicle manufacture.	Yes	No
MAKE_N	The numeric ID of the vehicle manufacturer.	No	No
MAKE_D	The detailed description of the vehicle manufacturer.	No	No

<b>"MAPPOINT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
map_rpm	Speed. Expressed in rpm.	Yes	No
map_torque	Torque. Expressed in foot pounds	No	No

<b>"MAPTYPE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
MAPTYPE	The abbreviated name used to describe a method used to "map" an engine.	Yes	No
MAPTYPE_N	The numeric ID used to describe a method used to "map" an engine.	No	No
MAPTYPE_D	The detailed description on the method used to "map" an engine.	No	No

<b>"MEASTYPE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	No
meas_descr	Measurement description.	No	No
meas_unit	Engineering units applicable to this measurement type.	No	No

<b>"MODE_ID" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
MODE_ID	The abbreviated name used to identify a type of "mode" emission test for a vehicle or engine.	Yes	No
MODE_ID_N	The numeric ID used to to identify a type of "mode" emission test for a vehicle or engine.	No	No
MODE_ID_D	The detailed description of the type of "mode" emission test for a vehicle or engine.	No	No

<b>"modelsiz" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
MODELSIZE	The abbreviated name used to identify a type of vehicle model size. Values are derived from the fuel economy guide or from a VIN decoder.	Yes	No
MODELSIZ_N	The numeric ID used to identify a type of vehicle model size.	No	No
MODELSIZ_D	The detailed description of the vehicle model size.	No	No



<b>"MODEMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
mode_id	Mode identification. Legal values defined by MODE_ID translation table.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
modemeas	Mode level measurement of this MEAS_ID	No	No

<b>"MODETIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
mode_id	Mode identification. Legal values defined by MODE_ID translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
modeseecs	Identifies point in time within a Mode of an chassis exhaust emissions test. Expressed in seconds.	Yes	No
rep_c_thc	Second-by-second measurement of total hydrocarbon concentration. Expressed in parts per million.	No	No
rep_c_co	Second-by-second measurement of carbon monoxide concentration. Expressed as a percentage.	No	No
rep_c_co2	Second-by-second measurement of carbon dioxide concentration. Expressed as a percentage.	No	No
rep_c_no	Second-by-second measurement of nitric oxide (NO) concentration, corrected for humidity. Expressed in parts per million.	No	No
rep_c_nou	Second-by-second measurement of nitric oxide (NO) concentration, not corrected for humidity. Expressed in parts per million.	No	No
rep_rpm	Second-by-second measurement of engine speed. Expressed in revolutions per minute.	No	No
mode_speed	Measured speed. Expressed in miles per hour.	No	No

<b>"NOM SOAK" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
NOM_SOAK	The abbreviated name used to identify the nominal time period that a vehicle or engine was "soaked" before testing its emissions.	Yes	No
NOM_SOAK_N	The numeric ID used to identify the vehicle's nominal "soak" time period.	No	No
NOM_SOAK_D	The detailed description to identify the vehicle's nominal "soak" time period.	No	No

<b>"OBD2CODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
obd2code	Character string code resulting from a scan of a level 2 on board diagnostic system.	Yes	No
obd2code_d	Meaning of a particular level 2 on board diagnostic code.	No	No

<b>"obdlevel" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
OBDLEVEL	The type of onboard diagnostic system. Level 1 system are present on many older vehicles and produce a 2 digit numeric codes that are particular to the vehicle manufacturer and model year. Level 2 system produce a 5 digit numeric code which can have industry standardized significance.	Yes	No
OBDLEVEL_D	The detailed description on the onboard diagnostic system used in the vehicle.	No	No

<b>"OBDSCAN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
comments	Comment associated with scan of vehicle's on board diagnostic system.	No	No
obd_odom	Approximate odometer reading, in miles, at time of OBD scan. Zero represents NULL value.	No	No
obdlevel	Type of on board diagnostic system. Level 1 systems are present on many older vehicles and produce 2 digit numeric codes particular to the vehicle manufacturer and model year. Level 2 system produce 5 character codes that some have industry standardized significance. Legal values defined by OBDLEVEL translation table.	No	No

<b>"OWNERQST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
how_long	Response to question: "How long ago did you purchase the vehicle to be tested?" Legal values defined by HOW_LONG translation table.	No	No
trips	Response to question: "On a typical day, how many trips are made with this vehicle?"	No	No
check_lite	Response to question: "Has the 'check engine' light or any other warning light ever come on while you were driving your vehicle?" Responses are coded as "yes", "no", or "nul"	No	No
liteaction	Response to question: "What did you do after the light came on?" Legal values defined by LITEACT translation table.	No	No
new_cat	Response to question: "Has the catalytic converter ever been replaced on this vehicle?" Coded as YES, NO, NONE or NULL.	No	No
last_im	Response to question: "Date of last city or state emissions inspection?" {99/99/99} if never inspected.	No	No
im_status	Response to question: "Did your vehicle pass or fail the inspection?" Legal values defined by IM_STAT translation table.	No	No
odom_ok	Response to question: "Does the odometer indicate the true number of miles on your vehicle?" Values coded as YES, NO, or NUL.	No	No
true_miles	Response to question: "If no, what are the true miles?" (0 indicates missing or that ODOM_OK = YES.)	No	No
trip2lab	Response to question: "How did you get here today?" Legal values defined by TRIP2LAB translation table.	No	No
miles2lab	Response to question: "Approximate mileage to get here today?"	No	No
quest_odom	Approximate odometer reading at time vehicle owner questionnaire was filled out. Zero if NULL. This item only began to be collected in FY98.	No	No
drv_type	"Type of driving" as indicated on the fuel economy postcard survey. Characterized driving during a period of fuel purchases as to degree of city versus highway driving. Legal values defined by DRV_TYPE translation table.	No	No
survey_mpg	Fuel economy calculated from the fuel economy postcard survey. Expressed in miles per gallon.	No	No
mpg_dist	Distance, in miles, over which fuel economy was measured in the fuel economy postcard survey.	No	No

<b>"OWNERSHP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
OWNERSHIP	The ID of ownership which means "the relationship between the user and the equipment" and will have legal values of private, rental, and gov't in OWNERSHIP category table.	Yes	No
OWNSHIP_N	The numeric ID of ownership.	No	No
OWNSHIP_D	The detailed description of ownership.	No	No

<b>"oxy_type" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
OXY_TYPE	Type of oxygenate in the fuel. "NONE" if no oxygenate was added to the base fuel.	Yes	No
OXY_TYPE_N	The numeric ID of oxygenate type.	No	No
OXY_TYPE_D	The detailed description of oxygenate type.	No	No

<b>"P_CRITER" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
P_CRITERIA	<p>The abbreviated name used to describe additional vehicle-condition-specific criteria that was or was not done.</p> <p>Procurement criteria. A categorical attribute with two valid entries: GENERAL or CONDITIONAL.</p> <p>GENERAL pertains to projects where vehicles were accepted for testing without additional, vehicle-condition-specific criteria. For example, a task might intend to recruit 1997 model year light-duty trucks with less than 6,000 pounds gross vehicle weight. If the first truck meeting these criteria and willing to be tested is accepted for testing, then the procurement would be considered GENERAL. (Rejecting vehicles for testing safety reasons is not considered as an additional criteria.)</p> <p>Most EPA test data is usually not procured in a purely random manner. Vehicle class criteria (i.e., model year) is commonly used as a criteria to limit the scope of the procurement and maximize the data sample in the areas of interest. This "non-random" procurement is normally not a problem as long as the analysis of the data is stratified by the vehicle class criteria.</p> <p>CONDITIONAL refers to tasks which included additional, vehicle-condition-specific criteria in addition to any vehicle class criteria. The additional criteria is based on the condition of the vehicle (i.e., mileage, emission level, vehicle owner, etc.) and not the vehicle as manufactured (i.e., fuel injection, catalyst type, model year, etc.). Users should refer to the text of the work assignment which recruited the vehicle to determine the precise conditions used for recruitment.</p>	Yes	No
P_CRITER_N	The numeric ID used to describe additional vehicle-condition-specific criteria that was or was not done.	No	No
P_CRITER_D	The detailed description on additional vehicle-condition-specific criteria that was or was not done.	No	No

<b>"P_INSP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
part	Identification of emission component usually a field name from the emission component worksheet e.g. E101.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
part_stat	Status of this emission component part. Legal values defined by PART_STA translation table.	No	No

<b>"PART" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
part	Identification of emission component usually a field name from the emission component worksheet e.g. E101.	Yes	No
system	Identification of an emission component system.	Yes	Yes
part_d	More full description of the emission component.	No	No

<b>"part_sta" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PART_STAT	The abbreviated name used to identify the part status after an inspection was performed on that part.	Yes	No
PART_STA_N	The numeric ID used to identify the part status after an inspection was performed.	No	No
PART_STA_D	The detailed description on the part status after an inspection was performed.	No	No

<b>"PARTCODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
part_code	Numeric code which can be used to describe the status of an emission component.	Yes	No
part	Identification of emission component usually a field name from the emission component worksheet e.g. E101.	Yes	Yes
partcode_d	Full description of what the part_code means	No	No

<b>"PC_INSP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
part	Identification of emission component usually a field name from the emission component worksheet e.g. E101.	Yes	Yes
part_code	Numeric code which can be used to describe the status of an emission component.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes

<b>"PMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
activityid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
tpmeas_dt	Second count for each trip.	Yes	Yes
meas_value	The measurement.	No	No

<b>"precond" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PRECOND	Type of preconditioning performed on the vehicle prior to the test.	Yes	No
PRECONDOLD	Old version of preconditioning type naming convention.	No	No
PRECOND_N	The numeric ID of preconditioning types.	No	No
PRECOND_D	The detailed description of preconditioning types.	No	No

<b>"PRESMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
measure	Test level measurement.	No	No

<b>"PRESSTAT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PRESSTAT	The abbreviated name used to identify the result from a fuel tank pressure test.	Yes	No
PRESSTAT_N	The numeric ID used to identify the result from a fuel tank pressure test.	No	No
PRESSTAT_D	The detailed description of the result from a fuel tank pressure test.	No	No

<b>"PRESSTST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
fuel_cap	Fuel cap present? "YES", "NO", or "NUL".	No	No
capokstant	Did gas cap pass the Stant test? "YES", "NO", or "NUL".	No	No
filler_ok	Did filler neck look ok? "YES", "NO", or "NUL".	No	No
canhose_ok	Did canister and hose look ok? "YES", "NO", or "NUL".	No	No
canist_acc	Was the canister accessible? "YES", "NO", or "NUL".	No	No

<b>"PRESSTST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
canist_con	Was the canister connected to the fuel tank? "YES", "NO", or "NUL".	No	No
hose_ok	Were the canister hoses ok, in terms of not being frayed? "YES", "NO", or "NUL".	No	No
press_init	Initial pressure reading. Expressed in inches of water.	No	No
press_1min	Pressure reading after one minute. Expressed in inches of water. Null value is 99.9.	No	No
press_2min	Pressure reading after two minutes. Expressed in inches of water. Null value is 99.9.	No	No
comments	Comment.	No	No
press_odom	Approximate odometer reading at time of pressure test. Expressed in miles . Zero represents NULL value. (This information item was not collected prior to FY98.)	No	No
presstat	Indicates whether evaporative system pressure check could be performed and if not, categorizes reason why. Legal values defined by PRESSTAT translation table.	No	No

<b>"pressure" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PRESSURE	Results of the evaporative system pressure check procedure.	Yes	No
PRESSURE_N	The numeric ID of the type of evaporative system pressure check.	No	No
PRESSURE_D	The detailed description of the type of evaporative system pressure check.	No	No

<b>"proc_mat" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PROC_MATCH	The abbreviated name used to identify the relationship between the originally specified procurement criteria and the vehicle actually recruited.	Yes	No
PROC_MAT_N	The numeric ID used to identify the relationship between the originally specified procurement criteria and the vehicle actually recruited.	No	No
PROC_MAT_D	The detailed description on the relationship between the originally specified procurement criteria and the vehicle actually recruited.	No	No

<b>"PROC METH" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PROC METH	The type of procurement method used to recruit a vehicle.	Yes	No
PROC METH_N	The numeric ID of the procurement method.	No	No
PROC METH_D	The detailed description of the procurement method.	No	No

<b>"PROCURE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
veh_no	Vehicle number historically assigned sequentially by recruitment contractor.	No	No
veh_lane	Number historically used to identify procurement of a vehicle from an I/M lane (as compared with VEH_NO which identified a physical vehicle.) Vehicles were recruited for a series of tests, typically a purge-pressure, IM240 and FTP.	No	No
procmeth	Procurement method. Legal values defined by PROC METH translation table.	No	No
fixes	Identifies minor corrections made to the mobile source to enable testing. These things, such as fixing post catalyst exhaust leaks or brakes would not be expected to affect emission results, but may affect lab test to I/m lane test comparability for those vehicles that were tested in I/m lane before being recruited to the test laboratory. This field was added to the database to accommodate historical data and is nul (0) for most records. Legal values defined by FIXES translation table.	No	No
recruit_no	This field would be rarely used for analysis purposes. Vehicle recruitment number. Previously known as "Recall Number" in some datasets this is the "vehicle recruitment control number" which can be used to link back to paper record recruitment information outside of this database such as the recruitment class. In historical data where "Recall Number was not available" this field will contain the 4 character "vehicle run number" assigned by the recruitment contractor, which was rarely used.	No	No
proc_odom	Approximate odometer reading at time of vehicle recruitment. Expressed in miles.	No	No
fuel_pb	Used to represent the lead content of fuel in vehicle tank as received. Expressed in grams per gallon.	No	No
plumb_test	Whether or not lead was detected on the vehicle exhaust tailpipe with plumb tesmo	No	No

<b>"PROCURE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
	paper. Values are "PASS", "FAIL", and "NULL"		
tankneck	Whether the fuel tank inlet restrictor, if present, was damaged. Legal values defined by translation table. Values are "YES", "NO", "NA" or "NULL".	No	No
rep_time	Time required to perform repairs on this vehicle. Expressed in minutes. If multiple repairs were performed this represents the total time required.	No	No
ecmptime	Time required to perform the emission components inspections on this vehicle. Expressed in minutes.	No	No
conpart	Cost of conventional parts in U.S. dollars. If multiple repairs were conducted this field represents the total cost of these parts.	No	No
twypart	Cost of three way catalyst parts in U.S. dollars. If multiple repairs were conducted this field represents the total cost of these parts.	No	No
statetest	Indicates whether the vehicle recruited passed or failed a state IM test. Legal values defined by STATETES translation table.	No	No
im240_pf	Indicates whether a recruited vehicle passed or failed an EPA-conducted IM240 test. Legal values defined by IM240_PF translation table.	No	No
purge	Contains results of evaporative system purge check procedure. Legal values defined by PURGE translation table.	No	No
pressure	Results of evaporative system pressure check procedure. Legal values defined by PRESSURE translation table.	No	No
proc_match	Relationship between originally specified procurement criteria and vehicle actually recruited. Legal values defined by PROC_MAT translation table.	No	No
tiresize	Tire size. Expressed as a character string. There is no translation table for this field and data may not be well coded.	No	No
tire_mfr	Tire manufacturer.	No	No
lf_psi	Left front tire pressure. Expressed in pounds per square inch.	No	No
rf_psi	Right front tire pressure. Expressed in pounds per square inch.	No	No
lr_psi	Left rear tire pressure. Expressed in pounds per square inch.	No	No
rr_psi	Right rear tire pressure. Expressed in pounds per square inch.	No	No
fpsi_spec	Front tire pressure specification. Expressed in pounds per square inch.	No	No
rpsi_spec	Rear tire pressure specification. Expressed in pounds per square inch.	No	No
lf_wear	Left front tire wear description. Legal values defined by LF_WEAR translation table.	No	No
rf_wear	Right front tire wear description. Legal values defined by RF_WEAR translation table.	No	No
cuthc	Recruitment "cut point" or threshold value for hydrocarbon emissions. Expressed in terms of grams/mile as measured by an IM240 test. Null value of this field is zero.	No	No
cutco	Recruitment "cut point" or threshold value for carbon monoxide emissions. Expressed in terms of grams/mile as measured by an IM240 test. Null value of this field is zero.	No	No
cutnox	Recruitment "cut point" or threshold value for oxides of nitrogen emissions. Expressed in terms of grams/mile as measured by an IM240 test. Null value of this field is zero.	No	No
cutpoints	Information pertaining to the set of IM240 emission "cutpoint" values which governed this procurement. These emission cutpoint levels do not generally correspond to the emission standards to which the vehicle was certified. Legal values defined by CUTPOINT translation table.	No	No
hour_meter	Hours of operation (usually available only for off-road mobile sources). Null value is Zero.	No	No
rebuild_ct	Number of times mobile source was rebuilt, generally applicable only to engines. Null value is 99.	No	No
rebuild_dt	Date of last rebuild.	No	No
rebuildwhy	Purpose or reason for last rebuild.	No	No
modifs	Description of significant post-OEM additions or modifications.	No	No
ownership		No	No
depot		No	No
im_station	IM program station id.	No	No
vin_body	Vehicle physical attributes as described by VIN decoding software for the procurement	No	No
vindcode	Version of VIN decoding software used for the procurement.	No	No

<b>"purge" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
PURGE	The abbreviated name used to identify whether the vehicle passed the evaporative system purge check procedure.	Yes	No
PURGE_N	The numeric ID used to identify whether the vehicle passed the evaporative system purge check procedure.	No	No
PURGE_D	The detailed description on the meaning of the purge values.	No	No

<b>"QUEST_WA" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
wa_id	Work Assignment (or equivalent for TSD) name.	Yes	Yes
quest_id	Identifies a "research question" which is a candidate for investigation.	Yes	Yes

<b>"QUESTION" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
quest_id	Identifies a "research question" which is a candidate for investigation.	Yes	No
question	Statement of a "research question". Research questions are candidates for further investigation via "work assignments".	No	No
first_year	First fiscal year in which this research question was posed.	No	No

<b>"RATEMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
modeid	Mode identification. Legal values defined by MODE_ID translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
ratemeas	Mode level measurement of this MEAS_ID	No	No

<b>"RBAGMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
bag_num	Bag number.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
bag_meas	Bag-level run-loss measurement.	No	No

<b>"REFSPEED" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
REFSPEED	The abbreviated name used to identify the type of reference speed used to test the engine or vehicle.	Yes	No
REFSPEED_N	The numeric ID used to identify the type of reference speed used to test the engine or vehicle.	No	No
REFSPEED_D	The detailed description of what the "refspeed" means.	No	No

<b>"REP_MEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test has dynosecs = 0.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
rep_meas	Repeated measurement.	No	No

<b>"REP_TYPE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
REP_TYPE	The numeric ID used to identify the type of repair completed on an engine or vehicle.	Yes	No
REP_DESC	The detailed description of the type of repair completed.	No	No

<b>"REPAIR" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
rep_type	Type of repair performed. Legal values defined by REP_TYPE translation table.	Yes	No
syst_rep	System(s) affected by the repair. Legal values defined by SYST_REP translation table.	No	No
comments	Repair description - first portion. 50 character field.	No	No
comments2	Repair description - second portion. 50 character field.	No	No
repar_odom	Approximate odometer reading at time repair was made. Expressed in miles. Zero represents NULL value. This information item was not collected prior to FY98.	No	No
repar_hrm	Approximate hour meter reading at time repair was made. Expressed in hours. Zero represents NULL value. This information item was not collected prior to FY2001.	No	No

<b>"RES_KIND" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
RES_KIND	The abbreviated name used to identify which subtype this result belongs to. Overall intent is to aggregate RESULT instances into few different subtypes as practical.	Yes	No
RES_KIND_N	The numeric ID used to identify which subtype this result belongs to.	No	No
RES_KIND_D	The detailed description on the meaning of each RES_KIND.	No	No

<b>"RESULT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	No
fbatch_id	Fuel batch identification.	No	Yes
test_proc	Identifies the specific test procedure used. A more detailed classification than RES_KIND. Based largely upon values of TEST_TYPE in earlier design. Conceptually distinct from the driving or operational schedule used.	No	Yes
wa_id	Work Assignment (or equivalent for TSD) name.	No	Yes
sched_id	Schedule identification.	No	Yes
cause	A foreign key back into RESULT. Identifies the most immediately preceding RESULT instance (e.g. a PROCURE or REPAIR on this mobile source instance) affecting the outcome of this one. A departure from the relational model.	Yes	Yes
prev_rep	A foreign key back into RESULT. Identifies any most immediately preceding RESULT instance for which this RESULT is a replicate (repeat). A departure from the relational model.	Yes	Yes
next_rep	A foreign key back into RESULT. Identifies any most immediately following RESULT instance which is a replicate (repeat) of this one. A departure from the relational model.	Yes	Yes
resultgrp	May be used to relate a RESULT to another RESULT of which it considered a part. This relationship was originally established to relate the FTP, US06 and SC03 portions of the SFTP to the SFTP summary calculations (All four being considered DYNOTESTs.) The SFTP is considered the Result Group and the FTP, US06 and SC03 are considered to belong to this Result Group.  A value of zero is used to indicate that a particular RESULT is not part of a higher-level group.	Yes	Yes
ms_type	General kind of mobile source: 1 = Vehicle 2 = Engine.	Yes	Yes
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	Yes
RES_KIND	RESULT kind. Used to identify which subtype this result belongs to. Overall intent is to aggregate RESULT instances into as few different subtypes as practical. E.g. all vehicle dynamometer tests may be one subtype, all SHED tests another. Legal values	Yes	Yes



<b>"RESULT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
	defined by RES_KIND translation table.		
fuel_id	Numeric code uniquely identifying the general type of fuel used. Sometimes referred to as the "gross fuel type".	No	Yes
test_date	Result date.	No	No
test_tod	Time of day of the start of the result. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted. Legal values defined by SITE translation table.	No	No
nom_temp	Nominal temperature at which test was to be conducted. Expressed in degrees Fahrenheit.	No	No
nom_humid	Nominal absolute humidity at which test was to be conducted. Expressed in grains of water per pound of dry air.	No	No
disable	Indication of any special conditions or "disablements" performed on the mobile source for particular tests. A value of zero indicates that no special condition or disablement to the vehicle was performed. Positive values indicate a particular disablement or set of disablements. Legal values defined by DISABLE translation table.	No	No
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	No	No
No_bags	Number of bags involved in this RESULT. Data for individual bags is stored in the BAG_DATA table.	No	No
No_modes	Number of test modes involved in this result. Data for individual chassis test modes is stored in the DYNOMODE table; data for individual engine dynamometer test modes is stored in the ETSTMODE table.	No	No
old_rkey	Old result key in previous database. This field is intended for data administrator use only. It contains sufficient information to uniquely locate a result-type record in the old database as follows: Site code - 3 columns Program - 4 columns Contract - 4 columns (upper two columns sometimes used for other special key info, e.g. nom-speed in STSTEF98.) Veh_no - 5 columns Test_seq - 3 columns Test_type (test procedure) - 2 columns Lane/lab indicator (Larry Landman) - 1 column	Yes	No
proto_id	Task number. Field has this name because thought at one point was to call these "protocols".	No	Yes
test_modif	Identifies any minor deviation from normal test procedure indicated by "test_proc". Legal values defined by TEST_MOD translation table.	No	No

<b>"rf_wear" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
RF_WEAR	The abbreviated name used to identify the types of wear on the right front tire.	Yes	No
RF_WEAR_N	The numeric ID used to identify the types of wear on the right front tire.	No	No
RF_WEAR_D	The detailed description on the types of tire wear patterns.	No	No

<b>"ROADPHAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
phase_no	Numerically identifies the phase or portion of the test.	Yes	No
start_emis	Indicates whether the vehicle start emissions are included in the test phase. Possible values are "YES", "NO" and "NUL".	No	No
veh_state	State of the vehicle at the start of the road test phase. Legal values defined by VEH_STAT translation table. A blank value of the field is its NUL value.	No	No
avg_temp	Average ambient air temperature during the test phase. Expressed in degrees Fahrenheit.	No	No
avg_humid	Average absolute humidity of ambient air during the test phase. Expressed in grains of water per pound of dry air.	No	No
avg_baro	Average barometric pressure during the test phase. Expressed in inches of mercury.	No	No
timeonroad	Duration of the exhaust measurement period of this test phase. Expressed in seconds.	No	No

<b>"ROADPHAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
totalwork	Total amount of work performed by the vehicle during the test phase. Expressed in brake horsepower hours.	No	No
distance	Total distance traveled during the test phase. Expressed in miles.	No	No
gallons	Gallons of fuel consumed during the test phase.	No	No
w_thc	Total hydrocarbon emissions emitted during the test phase. Expressed in grams.	No	No
w_co	Total carbon monoxide emissions emitted during the test phase. Expressed in grams.	No	No
w_co2	Total carbon dioxide emissions during the test phase. Expressed in grams.	No	No
w_o2	Total oxygen emissions during the test phase. Expressed in grams.	No	No
w_no	Nitric oxide (NO) emissions during the test phase. Expressed in grams.	No	No

<b>"ROADTEST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
route	Route traveled by the vehicle during the test measurement period. Legal values defined by ROUTE translation table.	No	No
instrsys	Onboard exhaust emission measurement system with which the vehicle has been equipped for this test. Legal values defined by INSTRSYS translation table.	No	No
actweight	Actual weight of the vehicle, including driver, fuel, passengers, and cargo, during the test. Averaged if necessary. Expressed in pounds.	No	No
avg_temp	Average ambient air temperature during the test. Expressed in degrees Fahrenheit.	No	No
avg_humid	Average absolute humidity of ambient air during the test. Expressed in grains of water per pound of dry air.	No	No
avg_baro	Average barometric pressure during the test. Expressed in inches of mercury.	No	No
odometer	Approximate odometer reading of vehicle at beginning of test. Expressed in miles.	No	No
precond	Type of preconditioning performed on the vehicle prior to the test. Legal values defined by PRECOND translation table.	No	No
timeonroad	Duration of the exhaust measurement period of this test. Expressed in seconds.	No	No
distance	Total distance traveled during the exhaust measurement period. Expressed in miles.	No	No
totalwork	Total amount of work performed by the vehicle during the test measurement period. Expressed in brake horsepower hours.	No	No
gallons	Gallons of fuel consumed during the test measurement period.	No	No
w_thc	Total hydrocarbon emissions emitted during the test measurement period. Expressed in grams.	No	No
w_co	Total carbon monoxide emissions emitted during the test measurement period. Expressed in grams.	No	No
w_co2	Total carbon dioxide emissions during the test measurement period. Expressed in grams.	No	No
w_o2	Total oxygen emissions during the test measurement period. Expressed in grams.	No	No
w_no	Nitric oxide (NO) emissions during the test measurement period. Expressed in grams.	No	No

<b>"ROADTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
roadsecs	Time within road exhaust emission test, expressed in seconds, beginning of test has roadsecs = 0.	Yes	No
phase_no	Numerically identifies the phase or portion of the test.	Yes	Yes
roadspeed	Vehicle speed. Expressed in miles per hour.	No	No
enginerpm	Engine revolutions per minute.	No	No
roadtorque	Engine output torque. Expressed in foot pounds.	No	No
roadtemp	Ambient temperature. Expressed in degrees Fahrenheit.	No	No
r_thc	Rate of total hydrocarbon emissions. Expressed in grams per second	No	No
r_co	Rate of carbon monoxide emissions. Expressed in grams per second	No	No

<b>"ROADTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
r_no	Rate of nitric oxide (NO) emissions. Expressed in grams per second.	No	No
r_co2	Rate of carbon dioxide emissions measurement. Expressed in grams per second.	No	No
r_o2	Rate of oxygen emissions measurement. Expressed in grams per second.	No	No

<b>"ROADTRIP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
timeonroad	Duration of the trip. Expressed in seconds.	No	No
distance	Total distance traveled during the trip. Expressed in miles.	No	No
idle	Percentage of time at idle	No	No
per_0mph	Percentage of time spent traveling at speed greater than 0 but less than 5 miles per hour.	No	No
per_5mph	Percentage of time spent traveling at least 5 miles per hour but less than 10 miles per hour.	No	No
per_10mph	Percentage of time spent traveling at least 10 miles per hour but less than 15 miles per hour.	No	No
per_15mph	Percentage of time spent traveling at least 15 miles per hour but less than 20 miles per hour.	No	No
per_20mph	Percentage of time spent traveling at least 20 miles per hour but less than 25 miles per hour.	No	No
per_25mph	Percentage of time spent traveling at least 25 miles per hour but less than 30 miles per hour.	No	No
per_30mph	Percentage of time spent traveling at least 30 miles per hour but less than 35 miles per hour.	No	No
per_35mph	Percentage of time spent traveling at least 35 miles per hour but less than 40 miles per hour.	No	No
per_40mph	Percentage of time spent traveling at least 40 miles per hour but less than 45 miles per hour.	No	No
per_45mph	Percentage of time spent traveling at least 45 miles per hour but less than 50 miles per hour.	No	No
per_50mph	Percentage of time spent traveling at least 50 miles per hour but less than 55 miles per hour.	No	No
per_55mph	Percentage of time spent traveling at least 55 miles per hour but less than 60 miles per hour.	No	No
per_60mph	Percentage of time spent traveling at least 60 miles per hour but less than 65 miles per hour.	No	No
per_65mph	Percentage of time spent traveling at least 65 miles per hour but less than 70 miles per hour.	No	No
per_70mph	Percentage of time spent traveling at least 70 miles per hour but less than 75 miles per hour.	No	No
per_75mph	Percentage of time spent traveling at least 75 miles per hour but less than 80 miles per hour.	No	No
per_80mph	Percentage of time spent traveling 80 miles per hour or more.	No	No
ac_time	The total time a vehicle's air conditioning was turned on by the vehicle operator. Expressed in seconds.	No	No
comp_time	Total time the vehicle's air conditioning compressor was running. Expressed in seconds.	No	No
temp	Ambient air temperature associated with this trip. Expressed in degrees Fahrenheit.	No	No
humidity	Absolute ambient air humidity associated with this trip. Expressed in grains of water per pound of dry air.	No	No
rel_humid	Relative ambient air humidity associated with this trip. Expressed as a percentage of maximum.	No	No
heat_index	Heat index of ambient air associated with this trip. Expressed in equivalent degrees Fahrenheit.	No	No

<b>"ROUTE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
ROUTE	The abbreviated name used to identify the route traveled by the vehicle during the test measurement period.	Yes	No
ROUTE_N	The numeric ID used to identify the route traveled by the vehicle during the test measurement period.	No	No
ROUTE_D	The detailed description of the ROUTE.	No	No

<b>"RUNL_BAG" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
bag_num	Bag number.	Yes	No
w_runl_thc	Total hydrocarbon evaporative emissions, (for this portion of the test). Expressed in grams. Often termed "running loss" emissions.	No	No
targ_ftemp	Target fuel tank temperature. Expressed in degrees Fahrenheit.	No	No
obs_ftemp	Observed fuel tank temperature. Expressed in degrees Fahrenheit.	No	No
tank_press	Fuel tank pressure. Expressed in pounds per square inch.	No	No
purg_flow	Purge air flow volume during this portion of the test. Expressed in liters.	No	No
RNL_BARO	Barometric pressure. Expressed in inches of mercury.	No	No
RNL_HUMID	Humidity. Expressed in grains of water per pound of dry air.	No	No
RNL_DIST	Distance traveled. Expressed in miles.	No	No
RNL_THC	Total hydrocarbon emissions. Expressed in grams per mile.	No	No
RNL_CO	Carbon monoxide emissions. Expressed in grams per mile.	No	No
RNL_CO2	Carbon dioxide emissions. Expressed in grams per mile.	No	No
RNL_TEMP	Temperature. Expressed in degrees Fahrenheit.	No	No
RNL_NOX	Emissions of oxides of nitrogen. Expressed in grams per mile.	No	No
RNL_MPG	Fuel economy. Expressed in miles per gallon.	No	No

<b>"RUNLOSS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
testwght	Dynamometer inertia weight setting used for this test. Expressed in pounds.	No	No
road_hp	Dynamometer road load horsepower setting used for this test.	No	No
ac_hp	Did dynamometer road load setting for this test include air conditioning load factor? YES, NO, or NUL.	No	No
dynotype	Type of dynamometer used. Legal values defined by DYNOTYPE translation table.	No	No
odometer	Approximate odometer reading of vehicle at beginning of test. Expressed in miles.	No	No
precond	Type of preconditioning performed on the vehicle prior to the test. Legal values defined by PRECOND translation table.	No	No
tarcnwght	Target canister weight. Expressed in grams	No	No
norcanwght	Normalized canister weight. Expressed in grams	No	No
endcanwght	Observed canister weight at end of test. Expressed in grams.	No	No
targiftemp	Target initial fuel tank temperature. Expressed in degrees Fahrenheit.	No	No
obsiftemp	Observed initial fuel tank temperature. Expressed in degrees Fahrenheit.	No	No

<b>"S_INSP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
system	Identification of an emission component system.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
system_stat	Status of the emission component system. Legal values defined by SYSTEM_S translation table.	No	No

<b>"SCANSYS1" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
obd1code	Numeric code resulting from a scan of level 1 on board diagnostic system.	Yes	No
obd1descr	Narrative explaining significance of individual code resulting from scan of a level 1 on board diagnostic system.	No	No

<b>"SCANSYS2" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
obd2code	Character string code resulting from a scan of a level 2 on board diagnostic system.	Yes	Yes

<b>"SCC" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
scc	This is the Source classification code to identify the industrial or commercial use of the engine or vehicle.	Yes	No
scc_n	The numeric ID used to identify the industrial or commercial use of the engine or vehicle.	No	No
scc_d	The detailed description of the SCC.	No	No

<b>"SCHED_PT" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
sched_id	Schedule identification.	Yes	Yes
sched_type	Schedule type. Legal values defined by SCHED_TY translation table.	Yes	No
test_time	Number of seconds from the beginning of the schedule.	Yes	No
sched_val	Value of the scheduled test parameter at this time in the schedule.	No	No

<b>"sched_ty" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
SCHED_TYPE	The numeric ID used to identify the units that a test schedule will be measured.	Yes	No
UNITS	The detailed description of the units that a schedule is measured in (e.g. miles/hour, Normalized RPM, as % of maximum, etc.)	No	No

<b>"SCHEDULE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
sched_id	Schedule identification.	Yes	No
sched_d	Description of the schedule or "cycle."	No	No
sched_len	Number of seconds in schedule. Not necessarily the number of schedule points.	No	No

<b>"SCHEDSUM" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
sched_n	Schedule identification.	Yes	Yes
sched_type	Schedule type. Legal values defined by SCHED_TY translation table.	Yes	Yes
sched_avg	Average value of schedule parameter. A calculated summary value which is meaningful only for schedules which have a single schedule type.	Yes	No
sched_max	Maximum schedule value. A calculated summary value which is meaningful only for schedules which have a single schedule type.	Yes	No
tm_max_spd	The time of the maximum speed occurs.	Yes	No
sched_min	Minimum schedule value. A calculated summary value which is meaningful only for schedules which have a single schedule type.	Yes	No
tm_min_spd	The time of the minimum speed occurs.	Yes	No
sched_acc	Maximum acceleration. A calculated summary value which is meaningful only for schedules which have a single schedule type.  More generally the maximum value of the slope or first derivative of the schedule.	Yes	No

<b>"SCHEDSUM" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
	Calculated as the maximum difference between two successive schedule points divided by the number of seconds between successive schedule points.		
tm_max_acc	The time of the maximum acceleration occurs.	Yes	No
sched_dec	Maximum deceleration. A calculated summary value which is meaningful only for schedules which have a single schedule type.  More generally the maximum value of the slope or first derivative of the schedule.  Calculated as the maximum difference between two successive schedule points divided by the number of seconds between successive schedule points.	Yes	No
tm_max_dec	The time of the maximum deceleration occurs.	Yes	No
tot_miles	Total miles in cycle.	Yes	No
idle_secs	Number of seconds in Idle.	No	No

<b>"SITE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
SITE	The abbreviated name used to identify the location where test was conducted or where instrument was installed on vehicle.	Yes	No
SITE_N	The numeric ID used to identify the location where test was conducted or where instrument was installed on vehicle.	No	No
SITE_D	The detailed description of the site location.	No	No
site_state	The state in which the site resides.	No	No

<b>"SMOKECOL" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
SMOKECOLOR	The abbreviated name used to identify the color of the tailpipe smoke.	Yes	No
SMOKECOL_N	The numeric ID used to identify the color of the tailpipe smoke.	No	No
SMOKECOL_D	The detailed description of the SMOKECOLOR.	No	No

<b>"smokemod" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
SMOKEMODE	The abbreviated name used to identify the type of smoke testing mode conducted.	Yes	No
SMOKEMOD_N	The numeric ID used to smoke testing mode.	No	No
SMOKEMOD_D	The detailed description of the SMOKEMODE.	No	No

<b>"SMOKETST" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
smoke_sum	Single number representing the overall results of the smoke test, in units of percent opacity. For smoke test procedures which do not have such a summary result this field will be null.	No	No

<b>"standard" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
STANDARDS	The abbreviated name used to identify the set of emission standards applicable to this vehicle or engine.	Yes	No
STANDARD_N	The numeric ID used to identify the set of emission standards applicable to this vehicle or engine.	No	No
STANDARD_D	The detailed description of STANDARDS field.	No	No

<b>"statetes" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
STATETEST	The abbreviated name used to identify the type of emission failure(s) from a state's Inspection and maintenance (I/M) test.	Yes	No
STATETES_N	The numeric ID used to identify the type of emission failure(s) from a state's I/M test.	No	No
STATETES_D	The detailed description of STATETEST field.	No	No

<b>"STSTMODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
smokemode	Name of the smoke test mode. Legal values defined by translation table.	Yes	No
smoke_opac	Percent smoke opacity measured during one mode of a smoke test.	No	No

<b>"syst_rep" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
SYST_REP	The abbreviated name used to identify the system(s) affected by the repair.	Yes	No
SYST_REP_N	The numeric ID used to identify the system(s) affected by the repair.	No	No
SYST_REP_D	The detailed description of SYST_REP field.	No	No

<b>"SYSTEM" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
system	Identification of an emission component system.	Yes	No
system_d	More lengthy description of the emission component system.	No	No
old_syst	Name of field describing this emission component "system" in the old database.	No	No

<b>"SYSTEM_S" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
SYSTEM_STA	Identifies if the status of the emission component system (e.g. passed or failed).	Yes	No
SYSTEM_S_N	The numeric ID used to identify the status of the emission component system.	No	No
SYSTEM_S_D	The detailed description of SYSTEM_STA field.	No	No

<b>"TASK" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
proto_id	Task number. Field has this name because thought at one point was to call these "protocols".	Yes	No
contract	A number intended to identify the contract, as historically classified, to which a Task belongs.	Yes	No
program	Test program, as historically classified, to which the Task belonged. This data element formed the "SUFFIX" portion of tablename in an older, non-relational, implementation of this database.	Yes	No
task_d	Brief task title or description.	Yes	No
p_criteria	<p>Procurement criteria. A categorical attribute with two valid entries: GENERAL or CONDITIONAL.</p> <p>GENERAL pertains to projects where vehicles were accepted for testing without additional, vehicle-condition-specific criteria. For example, a task might intend to recruit 1997 model year light-duty trucks with less than 6,000 pounds gross vehicle weight. If the first truck meeting these criteria and willing to be tested is accepted for testing, then the procurement would be considered GENERAL. (Rejecting vehicles for testing safety reasons is not considered as an additional criteria.)</p> <p>Most EPA test data is usually not procured in a purely random manner. Vehicle class criteria (i.e., model year) is commonly used as a criteria to limit the scope of the procurement and maximize the data sample in the areas of interest. This "non-random" procurement is normally not a problem as long as the analysis of the data is stratified by the vehicle class criteria.</p> <p>CONDITIONAL refers to tasks which included additional, vehicle-condition-specific criteria in addition to any vehicle class criteria. The additional criteria is based on the condition of the vehicle (i.e., mileage, emission level, vehicle owner, etc.) and not the vehicle as manufactured (i.e., fuel injection, catalyst type, model year, etc.). Users</p>	No	No

<b>"TASK" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
	should refer to the text of the work assignment which recruited the vehicle to determine the precise conditions used for recruitment.		

<b>"TEST_MOD" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
TEST_MODIF	The numeric ID used to identify any modifications that occurred from a normal testing procedure.	Yes	No
TEST_MOD D	The detailed description of TEST_MODIF field.	No	No

<b>"TEST_PRO" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
test_proc	Identifies the specific test procedure used. A more detailed classification than RES_KIND. Based largely upon values of TEST_TYPE in earlier design. Conceptually distinct from the driving or operational schedule used.	Yes	No
test_pro_n	Unique number associated with a test procedure.	No	No
test_pro_d	Brief description of the test procedure.	No	No
hc_method	Hydrocarbon emission measurement method normally used when this test procedure is conducted. e.g. Propane equivalent or hexane equivalent.	No	No
has_start	True for test procedures which measure exhaust emissions and which include one or more engine starts. False otherwise.	No	No
nom_soak	Categorical field characterizing the amount of soak time prior to any engine starts included in the test procedure.  Meaningful only for exhaust emission test procedures that include an engine start (HAS_START = .T.).  Legal values defined by NOM_SOAK translation table.	No	No

<b>"TESTMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	No
measure	Test level measurement.	No	No

<b>"TIMEMEAS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
evapmins	Time of measurement. Expressed in minutes after start of test.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
time_meas	Test level measurement.	No	No

<b>"tran_typ" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
TRAN_TYPE	The abbreviated name used to identify the transmission type in an engine or vehicle.	Yes	No
TRAN_TYP_N	The numeric ID used to identify the transmission type in an engine or vehicle.	No	No
TRAN_TYP_D	The detailed description of the TRAN_TYPE field.	No	No



<b>"TRIP" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
resultid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
activityid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
trip_id	ID that identifies a trip of an activity.	No	No
ins_config	Instrumentation Configuration.	No	No
operator_id	Type of operator that is using the vehicle. (Owner, Experienced Operator, etc.)	No	No
tstart_dt	Date and time at the start of each trip.	No	No
tend_dt	Date and time at the end of each trip.	No	No
payload	Total weight of passengers in the vehicle in pounds.	No	No
passenger	Number of passengers in the vehicle.	No	No

<b>"trip2lab" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
TRIP2LAB	The abbreviated name used to identify the type of route the vehicle was driven on to get to the lab (owner's question)	Yes	No
TRIP2LAB_N	The numeric ID used to identify the type of route the vehicle was driven on to get to the lab.	No	No
TRIP2LAB_D	The detailed description of TRIP2LAB field.	No	No

<b>"TTIME" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
tpmeas_dt	Second count for each trip.	Yes	No
activityid	Unique number sequentially assigned to each RESULT instance (including all RESULT subtype instances) as it is entered into this database. Number has no other significance.	Yes	Yes
trip_speed	Vehicle speed (miles per hour) for each second.	No	No
trip_rpm	Engine's rpm for each second.	No	No
trip_torq	Engine's torque (calculated or measured) per second in ft-lbs.	No	No
trip_tempf	Ambient air temperature in degrees F per second.	No	No
trip_temp	Ambient air temperature in degrees C per second.	No	No
trip_baro	Ambient air's barometric pressure measured for each second in inches of mercury.	No	No
inst_baro	Ambient air's barometric pressure measured for each second in kPa.	No	No
trip_humid	Absolute humidity measured each second expressed in grains of water per pound of dry air.	No	No
trip_lat	Latitude of the vehicle measured for each second.	No	No
trip_long	Longitude of the vehicle measured for each second.	No	No
trip_alt	Altitude of the vehicle measured for each second.	No	No
trip_grade	Grade measured for each second.	No	No
trip_massf	Grams of exhaust per second (gm/sec)	No	No
trip_volf	Standard cubic feet of exhaust per minute (cubic feet/min)	No	No
fuel_rate	in lbs/sec.	No	No
trip_thc	Total Hydrocarbon in grams/sec.	No	No
trip_co	Carbon Monoxide in grams/sec.	No	No
trip_co2	Carbon Dioxide in grams/sec.	No	No
trip_nox	Nitrogen Oxides in grams/sec.	No	No
trip_o2	Oxygen in grams/sec.	No	No
eng_cool_t	Engine coolant temperature (degrees F).	No	No
eng_oil_t	Engine oil temperature (degrees F).	No	No

<b>"VEH_MISC" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
vehmeas	Vehicle measurement.	No	No

<b>"veh_stat" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
VEH_STATE	The abbreviated name used to identify the state of the vehicle at he start of the road test phase.	Yes	No
VEH_STAT_N	The numeric ID used to identify the state of the vehicle at he start of the road test phase.	No	No
VEH_STAT_D	The detailed description of VEH_STATE field.	No	No

<b>"VEHCLASS" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
VEHCLASS	The abbreviated name used to identify the vehicle class.	Yes	No
VEHCLASS_N	The numeric ID used to identify the vehicle class.	No	No
VEHCLASS_D	The detailed description of VEHCLASS field.	No	No
MIN_GVWR	The minimum gross vehicle weight rating (GVWR) that identifies that vehicle class.	No	No
MAX_GVWR	The maximum gross vehicle weight rating (GVWR) that identifies that vehicle class.	No	No

<b>"VEHICLE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	Yes
ms_type	General kind of mobile source: 1 = Vehicle 2 = Engine.	Yes	Yes
evap_fam	EPA standardized evaporative family name as defined in CFR40 Part 86	No	Yes
eng_fam	Exhaust emission certification family to which this vehicle belongs.	No	Yes
vehclass	Vehicle class. Legal values defined by VEHCLASS translation table.	No	No
model_yr	Model year.	No	No
make	Vehicle make e.g. Buick, as distinct from vehicle manufacturer, GM. Legal values defined by MAKE translation table.	No	No
model_name	Model name.	No	No
overdrive	Indicates whether vehicle has overdrive gear.	No	No
tran_type	Transmission type. Legal values defined by TTRNTRAN translation table.	No	No
creeper	Indicates whether vehicle has creeper gear.	No	No
lockup	Indicates whether vehicle has lockup transmission.	No	No
gears	Number of forward gears in vehicle transmission. Legal values defined by GEARS translation table.	No	No
gvwr	Gross vehicle weight rating in pounds. The value specified by the manufacturer as the loaded weight of a single vehicle.	No	No
gcwr	The weight rating, expressed in pounds, specified by the vehicle manufacturer as the loaded weight of a combination (articulated) vehicle. In the absence of a value specified by the manufacturer, GCVR will be determined by adding the GVWR of the power unit and the total weight of the towed unit and any load thereon.	No	No
curbweight	Curb weight in pounds. For on-road vehicles this has a precise definition. For other mobile sources, e.g. non-road vehicles, the unadjusted actual weight of the mobile source is used.	No	No
ac	Is vehicle equipped with air conditioning? YES, NO, or NUL Intend to change to logical type field when good tool is available.	No	No
bld_date	Approximate date the vehicle was manufactured. Usually collected to nearest month only with day set to 15.	No	No
thcstd	Total hydrocarbon standard level to which vehicle was certified. Expressed in grams per mile.	No	No
nmhcstd	Non methane hydrocarbon standard level to which vehicle was certified. Expressed in grams per mile.	No	No
costd	Carbon monoxide standard level to which vehicle was certified. Expressed in grams per mile.	No	No
noxstd	Oxides of nitrogen standard level to which vehicle was certified. Expressed in grams per mile.	No	No
thcestd	Total hydrocarbon equivalent standard to which vehicle was certified. Expressed in grams per mile.	No	No
pmstd	Particulate matter standard to which vehicle was certified. Expressed in grams per mile.	No	No
nmhcestd	Non-methane hydrocarbon equivalent standard to which vehicle was certified.	No	No

<b>"VEHICLE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
	Expressed in grams per mile.		
evapstd	Evaporative emissions standard to which vehicle was certified. Expressed in grams per mile.	No	No
fueltanks	Number of fuel tanks on vehicle.	No	No
tank_cap	Total fuel tank capacity to nearest gallon. (Includes all tanks.)	No	No
canister	Type of canister on vehicle. Legal values defined by CANISTER translation table.	No	No
egr	Does vehicle have exhaust gas recirculation? YES, NO, or NUL.	No	No
city_fe	Represents the city fuel economy rating in miles per gallon from the fuel economy guide.	No	No
hway_fe	Represents the highway fuel economy rating in miles per gallon from the fuel economy guide.	No	No
drv_trn	Represents drive train. Legal values defined by DRV TRN translation table.	No	No
modelsiz	Represents the EPA Fuel Economy Guide model size category for the vehicle. Legal values defined by MODELSIZ translation table.	No	No
axle_ratio	Axle ratio.	No	No
standards	Identifies set of emission standards applicable to this vehicle. This field is collected only for older data where there were only a few different standards in existence. Field is not adequate to characterize emission standards applicable to later model year vehicles. Legal values defined by STANDARDS translation table.	No	No
engmount	Orientation of engine as mounted in the vehicle. Legal values defined by ENGMOUNT translation table.	No	No
purpose	Purpose or use of the mobile source. Addition of this field was motivated by the need to describe the function of non-road vehicles and equipment and will likely be blank for other mobile sources.	No	No
scc	Source classification code.	No	No
cert_nox	Oxides of nitrogen emission level at which vehicle was certified. Expressed in grams per mile.	No	No
cert_pm	Particulate matter emission level at which vehicle was certified. Expressed in grams per mile.	No	No
axle	The number of axles the vehicle has.	No	No
cert_co	Carbon Monoxide emission level at which the heavy-duty vehicle or engine was certified. Expressed in grams per mile.	No	No
cert_hc	Hydrocarbon emission level at which vehicle was certified. Expressed in grams per mile.	No	No
vin8	The first eight characters of vehicle Identification Number (VIN).	No	No
vin_body	Vehicle physical attributes as described by VIN decoding software for the first procurement of the vehicle into MSOD.	No	No

<b>"VIN BODY" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
vin_body	The abbreviated name used to identify the different types of vehicle body styles.	No	No

<b>"VINDCODE" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
vindcode	Official title and version of the decoding software.	Yes	No
vindcode_d	Description of the official title and version of the decoding software.	No	No

<b>"wa_stat" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
WA_STATUS	The abbreviated name used to identify the status of a work assignment (WA_ID)	Yes	No
WA_STAT_N	The numeric ID used to identify the status of a work assignment	No	No
WA_STAT_D	The detailed description of WA_STATUS field.	No	No

<b>"WKASSIGN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Foreign Key</b>
wa_id	Work Assignment (or equivalent for TSD) name.	Yes	No
wa_desc	Longer, descriptive name of the work assignment.	No	No
epa_contno	EPA Contract Number of the contract to which the work assignment belongs.	No	No
epa_wano	Work assignment number, as it appears in EPA contracts function. e.g. "2_05"	No	No
contractor	Name of contractor.	No	No
fiscalyr	Fiscal Year of work assignment.	No	No
contact	Contract person, often initially the work assignment manager or WAM, responsible for the work assignment and who can be contacted for additional information about it.	No	No
phone_no	Telephone number of contact person for this work assignment.	No	No
alternate	Alternate EPA contract person, initially the alternate work assignment manager, responsible for the work assignment and who can be contacted for additional information about it.	No	No
sow_fname	Name of file containing the SOW for this work assignment. Additional filing conventions at any point in time, would be combined with this information to find the actual document. The SOW is not as likely to be updated as the project progresses as the workplan and the work assignment report.	No	No
wp_fname	Name of file containing the contractor's approved work plan for this work assignment. Filing conventions in effect at a given point in time, in combination with this file name, would allow one to find the document.	No	No
abstract	Short description of this work effort.	No	No
no_msource	Number of mobile sources the work assignment is intended to procure or test.	No	No
frpt_fname	Name of file containing contractor's final report.	No	No
p_criteria	<p>Procurement criteria. A categorical attribute with two valid entries: GENERAL or CONDITIONAL.</p> <p>GENERAL pertains to projects where vehicles were accepted for testing without additional, vehicle-condition-specific criteria. For example, a task might intend to recruit 1997 model year light-duty trucks with less than 6,000 pounds gross vehicle weight. If the first truck meeting these criteria and willing to be tested is accepted for testing, then the procurement would be considered GENERAL. (Rejecting vehicles for testing safety reasons is not considered as an additional criteria.)</p> <p>Most EPA test data is usually not procured in a purely random manner. Vehicle class criteria (i.e., model year) is commonly used as a criteria to limit the scope of the procurement and maximize the data sample in the areas of interest. This "non-random" procurement is normally not a problem as long as the analysis of the data is stratified by the vehicle class criteria.</p> <p>CONDITIONAL refers to tasks which included additional, vehicle-condition-specific criteria in addition to any vehicle class criteria. The additional criteria is based on the condition of the vehicle (i.e., mileage, emission level, vehicle owner, etc.) and not the vehicle as manufactured (i.e., fuel injection, catalyst type, model year, etc.). Users should refer to the text of the work assignment which recruited the vehicle to determine the precise conditions used for recruitment.</p>	No	No
sponsor	Organization principally responsible for funding and defining the work assignment.	No	No
wa_status	Status of work assignment. e.g. COMPLETE, UNDERWAY, or PLANNED. Legal values defined by translation table.	No	No
min_mod_yr	Earliest model year of mobile sources involved in the work assignment.	No	No
max_mod_yr	Latest model year of mobile sources involved in the work assignment.	No	No
email	e-mail address.	No	No

## Work Assignment Category Table

WA_ID	WA_DESC
RWHS_01	Real World Hot Soak Testing - First Work Assignment
AC_ACTIV_A	Study of in-use air-conditioner operation in Phoenix, AZ, 20 LD highway vehicles recruited & operated 2 weeks by owners, temp/humid noted at beginning of trip
NEW_TEC_DC	Inspection and Maintenance of New Technology Vehicles in Washington, DC (Task 19)
NEW_TEC_MD	Inspection and Maintenance of New Technology Vehicles in Maryland (Task 22)
WAI_VEH	Incremental Emission Benefits of Repairing I/M Waiver Cars (Task 43)
WAI_VEH	I/M Test Variability (Task 45)
OBD_TYPE_I	Comparison of On-Board I Diagnostics to Tailpipe I/M (Task 51)
AFTER_MRK	Testing for effectiveness of new aftermarket catalyst (Task 50)
IM+HAMMOND	Operation of an Enhanced I/M Lane in Indiana
IM+SBEND	Laboratory Testing of IM-Lane Recruited Vehicles in Indiana
RUNLOSS_Y	Continued efforts towards fuel, cycle, temperature & remedial maintenance & remedial maintenance effect on running loss emissions.
RUNLOSS_Z	Continued efforts towards fuel, cycle, temperature & remedial maintenance & remedial maintenance effect on running loss emissions.
78T081LDVS	A Study of Emissions from Light Duty Vehicles in San Antonio, Texas EPA Contract
RL0041_1-5	Fuel, Cycle, Temperature and Evaporative RM Effect on Running Losses
RL0041_0-2	Fuel, Cycle, & Temperature Effect on Running Losses
RL0041_0-3	Fuel, Cycle, Temperature, and A/C Effect on Running Losses
RL0041_0-5	Fuel, Cycle, and Temperature Effect on Running Losses
IM0046_2-2	The Effects of Improved I/M Short Tests and Criteria
TRR055_2-8	The purpose of work was to procure a random selection of vehicles for FTP testing, repair & retesting.
TRR055_2-2	To procure vehicles for testing, repair, retesting based on enhanced I/M 240 lane test.
DRF055_2-4	The purpose of this work was to continue the EPA evaluation of the diagnostic & repair flowchart which was begun in WA1-7 & WA 1-8.
NONROAD_3	EPCD's 9 NR diesel engine emission program on Cert fuel, nonroad diesel, & CA diesel over 40-mode S-S & 6 transient cycles; includes mini-dilution PM, smoke tests, after-treatment and non-regulated. Re-do of JD6101 excavator for emission deterioration
RTER55_2_9	39 randomly selected vehicles. Test new (1993) procedure for diurnal emissions.
RLPP6_0_3	To test late model, LD vehicles for running loss evaporative emissions. Second purpose was to evaluate the effectiveness of purge/pressure testing in identifying evaporative emission failures at state I/M facility.
DIUR6_0_05	The purpose of work assignment 0-5 was to provide EPA with measurements of emissions levels from older in-use vehicles using the new test procedure.
RLPP6_0_12	The purpose of this work was to provide updated information on evaporative emissions from in-use LD vehicles. A secondary purpose was to evaluate the effectiveness of purge/pressure testing.
TIER_1	Determining Basic Exhaust Emission Rates for Tier 1 Light Duty Cars using Multiple Drive Schedules
LDV_AC_A	Determining Basic Exhaust Emission Rates for Light Duty Cars and Trucks using Multiple Drive Schedules
CYCLES_A	Determining Basic Exhaust Emission Rates for Light Duty Cars and Trucks using Multiple Drive Schedules and with the Air Conditioning On and Off
LHDT_C	Determining Basic Exhaust Emission Rates for Light Heavy Duty Trucks using Multiple Drive Schedules and Payloads
LHDT_EVAPB	Determining Basic Evaporative Emission Rates for Light-Heavy Duty Trucks at 2 Different Temperature Schedules and 3 Different Fuels on the 48 Hour Diurnal
LDV_EVAPB	Determining Basic Evaporative Emission Rates for Light Duty Vehicle at 2 Different Temperature Schedules and 3 Different Fuels on the 48 Hour Diurnal
ROVER_A	Determining the Viability of Gathering with ROVER Exhaust and Vehicle Information for Diesel and Gasoline Powered Light-Heavy Duty Trucks
OBD_A	Determining the Effectiveness of Onboard Diagnostic Systems in Identifying Vehicles that Fail the FTP

WA_ID	WA_DESC
AAMA	In-use Vehicle FTP Test Data
GRANT98_CO	Determining the Emissions Benefits and Costs of a Smoke Opacity Based I/M Program for HDDVs.
CDHOT_PM_A	Determining the Relationship of Opacity and Exhaust Emissions (Including Total PM) in In-use Gasoline Powered Vehicles During an IM240
CRCE_24_1G	Measurement of Exhaust Particulate Matter Emissions from In-Use Light Duty Motor Vehicles in the Denver, Colorado Area
CRCE_24_1C	Measurement of Exhaust Particulate Matter Emissions from In-Use (smoking vehicles) Light Duty Motor Vehicles in the Denver, CO Area
CRCE_24_2G	Measurement of Primary Particulate Matter Emissions from Light-Duty Motor Vehicles in South Coast Air Quality Management District
CRCE_24_2C	Measurement of Primary Particulate Matter Emissions from Light-Duty (high emitters) Motor Vehicles in South Coast Air Quality Management District
CRCE_24_3G	Measurement of Primary Particulate Matter Emissions from Light-Duty Motor Vehicles in San Antonio, Texas
CRCE_24_3C	Measurement of Primary Particulate Matter Emissions from Light-Duty (smoking vehicles) Motor Vehicles in San Antonio, Texas
HIMILE_A	High Mileage-Vehicle Emissions from Late-Model-Fuel Injected Vehicles
RSD_EVAL_A	Preliminary Evaluation of Siting Effects on Remote I/M Test Results
LHDT_A	Investigation of gasoline 10 LHDTs on 8 driving cycles at different loads, start emissions, IMs, FTPs and different fuel sulfur levels
98N20A	Nitrous Oxide (N2O) Study on Tier 1 LDVs, LDTs, and LEVs (LDVs) at various mileages.
LDV_AC_B	Correlation between EPA and GM's Rochester, NY test facility for Air Conditioning testing in a environmental chamber with solar loading.
LHDT_B	Investigation on gasoline LHDT exhaust emissions on various driving cycles, payloads, and fuels (sulfur) toxics, PMs and unregulated pollutants.
LHDDT_A	Investigation on diesel LHDT exhaust emissions on various cycles, payloads including measuring for
CE_CERT_B	Investigation of Exhaust Emissions from LHDVs (Diesel & Gasoline) as a Function of Payload
CE_CERT_A	Correlation of Diesel Truck In-Use Emission Test Program (Correlation with LHDDT A)
HD_PM_FAIL	Investigation of Exhaust Emissions on Induced PM Failures on One Diesel Engine (Deterioration Testing)
LHDDT_B	Investigation on diesel LHDT exhaust emissions over different driving cycles (including SFTP and starts), fuels, and payloads
TIER_1_B	Investigation on gasoline vehicles/trucks/SUVs over different driving cycles including SFTP
LHDT_LDT	Inventory Cycles/LA92 Exhaust Emissions Data Collection and Amendment #1 Sulfur Fuel Testing
LHDT_EVAP	LHDTs with evaporative emission tests at 3 different temp. ranges and two different fuels (6.3 and 9.0) including FTPs. Gas cap on/off followed .
NONROAD_1	Emission Factors for Compression-Ignition Nonroad Engines Operated on #2 Highway and Nonroad Diesel Fuel
LDV_A	25 gasoline LDV/LDTs MY1991 and later exhaust emission tests using FTP and ASM cycles
EVAP_A	4 LDTs/1 LHDT with evaporative emission tests at 3 different temp. ranges and two different fuels (6.3 and 9.0) including FTPs. Gas cap on/off testing as included.
LDV_T1SA	Tier 1 Light Duty Vehicle (LDV) Exhaust Emission and Sulfur-Doped Fuel Study
RWHS_02	LDVs--Emission Factor Evaporative Determination with Purge/Pressure
RWHS_03	LDVs--Emission Factor Evaporative Determination with Purge/Pressure
GRANT97_NY	New York/DEC-Characterization and Control of HD Diesel Vehicle Emissions in the New York Metropolitan Area
GRANT99_NR	NESCAUM-Methods for Estimating Construction Equipment Activity at the Local Level
NONROAD_2	Constructing an Excavator Transient Emission Duty Cycle
OEM_2100	An Investigation of OEM 2100's Capabilities to Accurately Measure Emissions of Late-Model Gasoline Vehicles
PRE75_PM	Heavy Duty Diesel Truck In-Use Emission Test Program for Model Years 1975 and Older
RL0041_1-1	Fuel, Cycle, Temperature and Evaporative Restorative Maintenance Effect on Running Losses
RL0041_1-3	Fuel, Cycle, Temperature and Evaporative Restorative Maintenance Effect on Running Losses
TRUCK_DF00	Determining Deterioration Factors of Previously Tested Light Duty Vehicles, Light Duty Trucks, and Light-Heavy Duty Trucks

WA_ID	WA_DESC
CRC_E_54	Central Carolina Vehicle Particulate Emission Study
SHOOT_OUTA	On-Road Emission Test Data from 15 Light-Duty Vehicles and 15 Heavy Duty Diesel Trucks for On-Board Emission Data Analysis and Collection for the New Generation Model
AZ_IM_0201	Arizona Inspection and Maintenance (I/M) program entitled "Car Care". Total data from January 1, 2002 to June 30, 2002. Split into two datasets
BC_IM_0101	British Columbia (I/M) program entitled AIRCARE. Total Data from January 1, 2001 to June 3, 2002. YMM will be the year and month contained in that set of files.
CO_IM_9901	Colorado Inspection and Maintenance (I/M) program entitled Air Care. Total data from Jan. 1, 1999 to Sept 2002. YMM will be the year and month contained in that set of files
CARB_UCC96	California Air Resources Board (CARB) development of Unified Correction Cycles (UCC) in 1996
CRC_S_LDVI	Coordinating Research Council (CRC) study in 1997 to determine the effects of sulfur levels in fuel on vehicles.
NYIPA	The NY State Instrumentation/Protocol Assessment Study which compares the standard IM240 test procedure & instrumentation w/ the NY Transient Emissions Short Test (NYTEST). This is NOT the NY I/M program test data
NCSU_TRAF	North Carolina State University conducted an experiment to determine the emissions savings that could be achieved through better traffic management
CECERT_NH3	University of California Riverside College of Engineering Center for Environmental Research and Technology (CE_CERT) Emissions of Ammonia for Light -duty vehicles
WVU_1	West Virginia University testing of heavy duty vehicles using their portable dynamometer.
WVU_2	West Virginia University testing of heavy duty vehicles using their portable dynamometer.
WVU_3	West Virginia University testing of heavy duty vehicles using their portable dynamometer.
ETC_N20	Environment Canada's study on the Effects of Aged Catalysts and Cold Ambient Temperatures on Nitrous Oxide Emissions.
CARB_N20	California Air Resources Board (CARB) 16th Vehicle Surveillance Program with N20 bag data.
CECERT_HDD	University of California Riverside College of Engineering Center for Environmental Research and Technology (CE-CERT) Heavy-duty Diesel Truck study
CRC_E55_59	Coordinating Research Council (CRC) study in 2002 on Heavy-duty Vehicle Chassis Dynamometer Testing for Emissions Inventory.
TXDOT_UT	Texas Department of Transportation and the University of Texas study in 2002-03 on the use of new fuels in heavy-duty diesel vehicles
WVU_4	West Virginia University testing of heavy duty vehicles using their portable dynamometer. (4th data set received)
CRC_AQIRP	Coordinating Research Council (CRC) Auto/Oil Air Quality Improvement Research Program (early 1990's).
NCHRP	University of California Riverside College of Engineering Center for Environmental Research & Technology (CE_CERT) NCHRP 25-11 Comprehensive Modal Emissions Model and Vehicle Emissions Database,

**Work Assignment Category Table - continued**

WA_ID	EPA_CONTNO	EPA_WANO	CONTRACTOR	FISCALYR	CONTACT	SOW_FNAME	WP_FNAME	ALTERNATE
RWHS_01	68-C5-0006	0-02	ATL	1995				
AC_ACTIV_A	68-C2-0125	1-01	ATL	1994	FRENCH			
NEW_TEC_DC	68-03-3202	1	EG&G	1984	LANDMAN			CUMBERWORTH
NEW_TEC_MD	68-03-3222	1& 2	EG&G	1985	LANDMAN			CUMBERWORTH
WAIVER_VEH	68-03-3222	3	EG&G	1986	LANDMAN			CUMBERWORTH
IM_VARIABL	68-03-3222	4	EG&G	1986	LANDMAN			CUMBERWORTH
OBD_TYPE_I	68-03-3436	1	EG&G	1987	LANDMAN			CUMBERWORTH
AFTER_MRK	3380/3436	?&2	EG&G	1987	LANDMAN			CUMBERWORTH
IM+HAMMOND	68-C3-0370	0-5	ATL	1994	BEJMA	SOWIM+H	WPIM+H	
IM+SBEND	68-C3-0370	0-6	ATL	1994	BEJMA	SOWIM+S	WPIM+S	
RUNLOSS_Y	68-C9-0041	2-01	ATL	1992		RUNY_SOW	RUNY_WP	
RUNLOSS_Z	68-C9-0041	2-02	ATL	1992		RUNZ_SOW	RUNZ_WP	
78TO8ILDVS	68-03-3024		EG&G	1981	BEJMA			
RL0041_1-5	68-C9-0041	1-5	ATL	1991	SHELTON	RL1-5SOW	RL1-5PLN	SCARBRO
RL0041_0-2	68-C9-0041	0-2	ATL	1990	SHELTON	RL0-2SOW	RL0-2PLN	SCARBRO
RL0041_0-3	68-C9-0041	0-3	ATL	1990	SHELTON	RL0-3SOW	RL0-3PLN	SCARBRO
RL0041_0-5	68-C9-0041	0-5	ATL	1990	SHELTON	RL0-5SOW	RL0-5PLN	SCARBRO
IM0046_2-2	68-C9-0046	2-2	ATL	1990	SHELTON	IM2-2SOW	IM2-2WPL	SCARBRO
TRR055_2-8	68-C1-0055	2-8	ATL MESA,AZ	1994				
TRR055_2-2	68-C1-0055	2-2	ATL	1994				
			MESA,ARIZON					
			A					
DRF055_2-4	68-C1-0055	2-04	ATL,Arizona	1994				
NONROAD_3	68-C-98-169	0-03	SWRI	1999	C_JACKSON	SOW_NRL10	WP03NRCI	HELMER
RTEE55_2_9	68-C1-0055	2-9	ATL	1994				
			ARIZONA					
RLPP6_0_3	68-C5-0006	0-03	ATL	1995	BEJMA	SOW6_0_3		
DIUR6_0_05	68-C5-0006	0-05	ATL	1995				
RLPP6_0_12	68_C5_0006	0-12	ATL	1995		SW6_0_12	WP6_0_12	FULPER
TIER_1	EPA	98-1	NVFEL	1998	SCARBRO	SOWTIER1	NONE	FULPER
LDV_AC_A	68-C5-0006	1-03	ATL	1997	SCARBRO	SOWT1-3	WP1-3	FULPER
CYCLES_A	EPA	97-1	NVFEL	1997	SCARBRO	SOWTSDFC	NONE	FULPER
LHDT_C	68-C5-0006	3-11	ATL	1999	SCARBRO	SOWLHDTC	WPLHDTC	CUMBERWORTH
LHDT_EVAPB	EPA	99-1	NVFEL	1999	SCARBRO	SOWLHEPPB		HELMER
LDV_EVAPB	EPA	99-2	NVFEL	1999	SCARBRO	SOWLDVEP		HELMER
ROVER_A	68-C-98-158	0-03	SWRI	1999	SCARBRO	SOWROVER		FULPER
OBD_A	68-C5-0006	2-10	ATL	1998	GARDETTO	SOWWA210		SCARBRO
AAMA_A			AAMA	1999	SCARBRO			FULPER
GRANT98_CO			CIFER	1998	SCARBRO			FULPER
CDHOT_PM_A	68-C9-0041	0-1	ATL	2000	SCARBRO	SOWSMKC		FULPER
CRCE_24_1G	NONE	NONE	CDPHE	1998	SCARBRO			HELMER
CRCE_24_1C	NONE	NONE	CDPHE	1998	SCARBRO			HELMER
CRCE_24_2G	NONE	NONE	CE-CERT	1998	SCARBRO			HELMER
CRCE_24_2C	NONE	NONE	CE-CERT	1998	SCARBRO			HELMER
CRCE_24_3G	NONE	NONE	SWRI	1998	SCARBRO			HELMER
CRCE_24_3C	NONE	NONE	SWRI	1998	SCARBRO			HELMER
HIMILE_A	68-C5-0006	1-04	ATL	1997	BEJMA			SCARBRO



WA_ID	EPA_CONTNO	EPA_WANO	CONTRACTOR	FISCALYR	CONTACT	SOW_FNAME	WP_FNAME	ALTERNATE
RSD_EVAL_A	68-C9-0046	1-03	ATL	1990	GLOVER	RSDSOW46	RSDWPN46	LANDMAN
LHDT_A	EPA	98-2	NVFEL	1998	FULPER	SOWLHDTA	WPLHDT1	
98N20A	EPA	98-4	NVFEL	1998	FULPER	SOWN20A	NONE	
LDV_AC_B			GM	1998	KOUPAL	SOWAC3	NONE	FULPER
LHDT_B	EPA	99-3	NVFEL	1999	FULPER	SOWLHDTB	NONE	SCARBRO
LHDDT_A	68-C-98-158	0-02	SWRI	1999	KELLER	SOW0-02	WP0-02	FULPER
CE_CERT_B	CX827312010		CECERT	1999	WHITE	CERTSOW		FULPER
CE_CERT_A	CX827312010		CECERT	1999	WHITE	SOWCERT2		FULPER
HD_PM_FAIL	68-C-98-169	0-13	SWRI	2000	MCDONALD	SOWDIEDF		FULPER
LHDDT_B	68-C-98-158	1-04	SWRI	2000	FULPER	SOWI1-04	WP1-04	SCARBRO
TIER_1_B	68-C-99-241	0-03	ATL	2000	FULPER	SOW0-03	WP0-03	CUMBERWORTH
LHDT_LDT	68-C5-0006	2-05	ATL	1998	HELMER	SOWLHDTV	WPLHDTV	
LHDT_EVAP	EPA	98-3	NVFEL	1998	HELMER	SOWSHEDI	NONE	
NONROAD_1	68-C5-0077	2-02	SWRI	1997	HELMER	SOW_SWRI	WPNROAD1	
LDV_A	68-C5-0006	1-06	ATL	1997	BEJMA			HELMER
EVAP_A	EPA	97-2	NVFEL	1997	HELMER	SOW_EVAP	NONE	
LDV_TISA	EPA	99-4	NVFEL	1999	HELMER	SOWTIER1		KELLER
RWHS_02	68-C5-0006	0-07	ATL	1996	BEJMA			HELMER
RWHS_03	68-C5-0006	0-11	ATL	1996	BEJMA			HELMER
GRANT97_NY			EEA/WVU	1997	HELMER			CUMBERWORTH
GRANT99_NR			ENVIRON	1999	HELMER			COOPER
NONROAD_2	68-C-98-158	0-01	SWRI	1999	HELMER			
OEM_2100			NVFEL	2000	SCARBRO	SOWPITT	NONE	FULPER
PRE75_PM	68-C-98-158	1-06	SWRI	2000	SCARBRO	1-06SOW	1-06WPL	FULPER
RL0041_1-1	68-C9-0041	1-1	ATL	1991	SHELTON			SCARBRO
RL0041_1-3	68-C9-0041	1-3	ATL	1992	SHELTON			SCARBRO
TRUCK_DF00	68-C-99-241	0-07	ATL	2000	SCARBRO	SOWTRUCK	WPLTRUCK	FULPER
CRC_E_54			EPA-ORD/DRI	2000	SCARBRO			FULPER
SENSORS				2001	SCARBRO			734.214.4400
SHOOT_OUTA				0	JOHN WALLS			
AZ_IM_0201				0	DAVID GOURLEY			
BC_IM_0101				0	JAMES SIDEBOTTOM			
CO_IM_9901				0	JEFF LONG			
CARB_UCC96				0	BRENT BAILEY			
CRC_S_LDV1				0	CELIA SHIH			
NYIPA				0	CHRISTOPHER FREY			
NCSU_TRAF				0	MATTHEW BARTH			
CECERT_NH3				0	RALPH NINE			
WVU_1				0				
WVU_2				0				
WVU_3				0				
ETC_N20				0				
CARB_N20				0				
CECERT_HDD				0				
CRC_E55_59				0				
TXDOT_UT				0				
WVU_4				0				
CRC_AQIRP				0	MATTHEW BARTH			
NCHRP				0				

# Work Assignment Category Table - continued

WA_ID	NO_MSOURCE	FRPT_FNAME	SPONSOR	MIN_MOD_YR	MAX_MOD_YR	WA_STATUS	P_CRITERIA	EMAIL
RWHS_01	180		EPA	1981	1995		CONDITIONAL	
AC_ACTIV_A	19	PHX-RPT	EPA	1993	1995		GENERAL	
NEW_TEC_DC	80		EPA	1980	1981		CONDITIONAL	
NEW_TEC_MD	107		EPA	1981	1984		CONDITIONAL	
WAIVER_VEH	43		EPA	1976	1984		CONDITIONAL	
IM_VARIABL	103		EPA	1983	1985		CONDITIONAL	
OBD_TYPE_I	27		EPA	1983	1986		CONDITIONAL	
AFTER_MRK	24		EPA	1975	1984		CONDITIONAL	
IM+HAMMOND	2175	FNL-5&6	EPA	1977	1994		GENERAL	
IM+SBEND	121	FNL-5&6	EPA	1983	1993		CONDITIONAL	
RUNLOSS_Y	36	RUNY_FPT	EPA	1983	1991		CONDITIONAL	
RUNLOSS_Z	28	RUNZ_FPT	EPA	1984	1991		CONDITIONAL	
78TO81LDVS	300	78TO81LD	EPA	1978	1982		GENERAL	
RL0041_1-5	24	RL1-5RPT	EPA	1983	1990		CONDITIONAL	
RL0041_0-2	12	RL0-2RPT	EPA	1985	1989		CONDITIONAL	
RL0041_0-3	20	RL0-3RP	EPA	1981	1989		CONDITIONAL	
RL0041_0-5	11	RL0-5RP	EPA	1981	1989		CONDITIONAL	
IM0046_2-2	39	IM2-2RPT	EPA	1978	1991		GENERAL	
TRR055_2-8	39	2-8.DOC	EPA	1984	1993		CONDITIONAL	
TRR055_2-2	0	FR55_2-2	EPA	1983	1992		CONDITIONAL	
DRF055_2-4	18	FR55_2-4	EPA	1983	1989		CONDITIONAL	
NONROAD_3	10	NONE	EPA/CARB (Chevron)	1997	1999	UNDERWAY	GENERAL	
RTEE55_2_9	39	FR55_2_9	EMA	1981	1993	COMPLETE	GENERAL	
RLPP6_0_3	12	FR6_0_3	EPA	1990	1994	COMPLETE	CONDITIONAL	
DIUR6_0_05	9	FR6_0_05	EPA	1974	1983	COMPLETE	CONDITIONAL	
RLPP6_0_12	13	FR6_0_12	EPA	1972	1993	COMPLETE	CONDITIONAL	
TIER_1	35		EPA	1995	1997	COMPLETE	GENERAL	
LDV_AC_A	62	FRPT1-3	EPA	1983	1996	COMPLETE	GENERAL	
CYCLES_A	44		EPA	1990	1996	COMPLETE	GENERAL	
LHDT_C	18		EPA	1989	1997	COMPLETE	GENERAL	
LHDT_EVAPB	10		EPA	0	0	UNFUNDED	GENERAL	
LDV_EVAPB	30		EPA	0	0	UNFUNDED	GENERAL	
ROVER_A	8		EPA	0	0	UNDERWAY	GENERAL	

WA_ID	NO_MSOURCE	FRPT_FNAME	SPONSOR	MIN_MOD_YR	MAX_MOD_YR	WA_STATUS	P_CRITERIA	EMAIL
OBD_A	131	DATAREP	EPA	1996	1998	COMPLETE	CONDITIONAL	
AAMA_A	3534		AAMA	1990	1993	COMPLETE	GENERAL	
GRANT98_CO	19		CIFER	0	0	COMPLETE	CONDITIONAL	
CDHOT_PM_A	600		EPA	0	0	COMPLETE	GENERAL	
CRCE_24_1G	171	CRCE24_1	CRC	1971	1996	COMPLETE	GENERAL	
CRCE_24_1C	24	CRCE24_1	CRC	1966	1990	COMPLETE	CONDITIONAL	
CRCE_24_2G	109	CRCE24_2	CRC	1972	1997	COMPLETE	GENERAL	
CRCE_24_2C	39	CRCE24_2	CRC	1965	1997	COMPLETE	CONDITIONAL	
CRCE_24_3G	61	CRCE24_3	CRC	1968	1997	COMPLETE	GENERAL	
CRCE_24_3C	7	CRCE24_3	CRC	1982	1990	COMPLETE	CONDITIONAL	
HIMILE_A	101	FRPT1-4	EPA	0	0	COMPLETE	CONDITIONAL	
RSD_EVAL_A	636	RSDRPT46	EPA	1976	1991	COMPLETE	GENERAL	
LHDT_A	10		EPA	1991	1997	COMPLETE	GENERAL	
98N20A	23		EPA	1995	1999	COMPLETE	GENERAL	
LDV_AC_B	1		GM	1996	1996	COMPLETE	GENERAL	
LHDT_B	2		EPA	1993	1995	COMPLETE	GENERAL	
LHDDT_A	6		EPA	1998	1999	COMPLETE	GENERAL	
CE_CERT_B	7	CECERTB1	CECERT	0	0	UNDERWAY	GENERAL	
CE_CERT_A	1		CECERT	0	0	UNDERWAY	GENERAL	
HD_PM_FAIL	1		EPA	0	0	COMPLETE	GENERAL	
LHDDT_B	6		EPA	0	0	COMPLETE	GENERAL	
TIER_1_B	15		EPA	0	0	COMPLETE	GENERAL	
LHDT_LDT	46		EPA	1988	1997	COMPLETE	GENERAL	
LHDT_EVAP	4		EPA	1989	1997	COMPLETE	GENERAL	
NONROAD_1	10		EPA	1988	1997	COMPLETE	GENERAL	
LDV_A	25		EPA	1991	1996	COMPLETE	GENERAL	
EVAP_A	4		EPA	1990	1996	COMPLETE	GENERAL	
LDV_TISA	0		EPA	1995	2000	UNFUNDED	GENERAL	
RWHS_02	6		EPA	1991	1994	COMPLETE	CONDITIONAL	
RWHS_03	16		EPA	1971	1994	COMPLETE	CONDITIONAL	
GRANT97_NY	35		NEW YORK	1984	1999	COMPLETE	GENERAL	
			CITY/EPA					
GRANT99_NR	0		NESCAUM/	0	0	UNDERWAY	GENERAL	
			EPA					
NONROAD_2	2		EPA	1997	1997	COMPLETE	GENERAL	
OEM_2100	2	RPTPTT	EPA	1996	1998	COMPLETE	GENERAL	
PRE75_PM	10	1-06RPT	EPA	1950	1975	COMPLETE	CONDITIONAL	

WA_ID	NO_MSOURCE	FRPT_FNAME	SPONSOR	MIN_MOD_YR	MAX_MOD_YR	WA_STATUS	P_CRITERIA	EMAIL
RL0041_1-1	9	RL1-1RPT	EPA	1985	1989	COMPLETE	CONDITIONAL	
RL0041_1-3	28	RL1-3RPT	EPA	1981	1990	COMPLETE	CONDITIONAL	
TRUCK_DF00	20	RPTTRUCK	EPA	1994	1998	COMPLETE	CONDITIONAL	
CRC_E_54	255	CRC54FNL	CRC/NREL/ EPA-ORD	1965	1997	COMPLETE	GENERAL	
SHOOT_OUTA	45		EPA	1996	2000	COMPLETE	CONDITIONAL	
AZ_IM_0201	0			0	0	COMPLETE		walls.john@ev.state.az.us
BC_IM_0101	0			0	0	COMPLETE		dave_gourley@translink.bc.ca
CO_IM_9901	0			0	0	COMPLETE		james.sidebottom@state.co.us
CARB_UCC96	0			0	0	COMPLETE		jlong@arb.ca.gov
CRC_S_IDV1	0			0	0	COMPLETE		bkbailey@ercac.com
NYIPA	0			0	0	COMPLETE		cxshih@gw.dec.state.ny.us
NCSU_TRAF	0			0	0	COMPLETE		frey@eos.ncsu.edu
CECERT_NH3	0			0	0	COMPLETE		barth@cert.ucr.edu
WVU_1	0			0	0	COMPLETE		ralph.nine@mail.wvu.edu
WVU_2	0			0	0	COMPLETE		
WVU_3	0			0	0	COMPLETE		
ETC_N2O	0			0	0	COMPLETE		
CARB_N2O	0			0	0	COMPLETE		
CECERT_HDD	0			0	0	COMPLETE		
CRC_E55_59	0			0	0	COMPLETE		
TXDOT_UT	0			0	0	COMPLETE		
WVU_4	0			0	0	COMPLETE		
CRC_AQIRP	0			0	0	COMPLETE		barth@cert.ucr.edu
NCHRP	0			0	0	COMPLETE		

## Category FUEL-ID Table Definitions

FUEL_ID	FUELNAME	OXYGENATE	WTOXYGEN	RVP	SULFERLOW	SULFERHIGH
6	Unleaded Test Gasoline (96 RON) (CFR 86.113-9)(a))		0	9	0	1000
45	Oxygenated Test Gasoline	MTBE	3	9	0	0
16	Unleaded Test Gasoline (11.7 RVP)		0	11.7	0	0
18	Gasohol (8.8 RVP)	ethanol	3.4	8.8	0	0
48	Phase I Low Sulfur Gasoline	MTBE	2.3	8.8	0	0
22	Unleaded Test Gasoline (10.5 RVP)		0	10.5	0	0
49	Phase I Gasoline	MTBE	2	8	0	0
43	Clean Air Act Baseline Gasoline		0	8.8	304	354
50	Low T-90 Unleaded Gasoline		0	8.7	0	0
44	Federal Phase II Gasoline		2	7	130	140
51	Gasohol (9.0 RVP)	MTBE	3.4	9	0	0
0	Tank (Whatever came with vehicle)	ethanol	0	0	0	0
9	Diesel Fuel		0	0	0	0
1	Low RVP Test Gasoline		0	0	800	1200
60	Unleaded Test Gasoline (96 RON) 50-80 PPM SULFUR		0	6.3	0	1000
61	Unleaded Test Gasoline (96 RON) 140-160 PPM SULFUR		0	9	50	80
62	Unleaded Test Gasoline (96 RON) 330-370 PPM SULFUR		0	9	140	160
63	Unleaded Test Gasoline (96 RON) 620-680 PPM SULFUR		0	9	330	370
64	Oxynol 50	MeOH, EtOH	2.6	9.1	620	680
65	Oxynol	MeOH, TBA	2.7	8.8	0	0
66	Unleaded Test Gasoline (7.0 RVP)		0	7	0	0
67	Unleaded Test Gasoline (11.0 RVP)		0	11	0	0
69	Commercial Fuel Used by Southwest (id EM-616-F)		0	9.2	0	0
70	High RVP Gasoline		0	14.6	0	0
71	Special gasoline, with T40 point = 160 deg F		0	10.4	0	0
72	Special gasoline, with T40 point = 160 deg F		0	9	0	0
73	Gasohol (11.8 RVP)	ethanol	3.4	11.8	0	0
74	Special gasoline (with MTBE, 12.2 RVP)	MTBE	0	12.2	0	0
75	Special gasoline (10 RVP)		0	10	0	0
76	Gasohol (9.8 RVP)	ethanol	3.4	9.8	0	0
77	Oxygenated Test Gasoline	MTBE	0	9.5	0	0
80	Base formula fuel		0	8.7	0	0
81	Low RVP Fuel		0	8	0	0
82	Low Sulfur Fuel		0	8.7	0	0
83	Low Sulfur, Low RVP, Low T90 Fuel		0	8	0	0
84	Baseline Fuel, 32% aromatics, 1.5% benzene		0	8.7	0	0
85	Formula Fuel with Ethanol	ethanol	0	8.1	0	0
86	Formula Fuel with MTBE	MTBE	0	8.1	0	0
87	High T50 Fuel with MTBE	MTBE	0	8.1	0	0
88	High T90 Fuel with MTBE	MTBE	0	8.1	0	0
89	MTBE, Heavy Ends, Predominately Aromatics	MTBE	0	8.1	0	0





323	T - AQIRP fuel	ETOH	0	9.3	0	0
324	U - AQIRP fuel	ETOH	0	9.6	0	0
325	V - AQIRP fuel		0	7.8	0	0
326	W - AQIRP fuel	ETOH	0	9	0	0
327	X - AQIRP fuel	ETOH	0	9.6	0	0
328	Y2 - AQIRP fuel		0	8.8	0	0
329	Z - AQIRP fuel	MEOH	0	8.8	0	0
330	ZZ - AQIRP fuel	MEOH	0	12	0	0
331	10A - AQIRP fuel	MTBE	0	8.7	0	0
332	11A - AQIRP fuel	MTBE	0	8.7	0	0
333	12A - AQIRP fuel	MTBE	0	8.9	0	0
334	13A - AQIRP fuel	MTBE	0	9	0	0
335	14A - AQIRP fuel	MTBE	0	8.6	0	0
336	15A - AQIRP fuel	MTBE	0	8.5	0	0
337	16A - AQIRP fuel	MTBE	0	8.6	0	0
338	17A - AQIRP fuel	MTBE	0	8.7	0	0
339	18A - AQIRP fuel	MTBE	0	8.5	0	0
340	A2 - AQIRP fuel		0	8.7	0	0
341	C1 - AQIRP fuel		0	6.9	0	0
342	C3 - AQIRP fuel	MTBE	0	6.8	0	0
343	C35 - AQIRP fuel	MTBE	0	6.8	0	0
344	C4 - AQIRP fuel	MTBE	0	6.9	0	0
345	C46 - AQIRP fuel	MTBE	0	6.8	0	0
346	C5 - AQIRP fuel	MTBE	0	6.8	0	0
347	C6 - AQIRP fuel	MTBE	0	6.7	0	0
348	C7 - AQIRP fuel	MTBE	0	6.7	0	0
349	C8 - AQIRP fuel	MTBE	0	6.9	0	0
350	CG1A - AQIRP fuel		0	0	0	0
351	CG1B - AQIRP fuel		0	0	0	0
352	CG1C - AQIRP fuel		0	0	0	0
353	CG2A - AQIRP fuel		0	0	0	0
354	CG2B - AQIRP fuel		0	0	0	0
355	CG2C - AQIRP fuel		0	0	0	0
356	CG2D - AQIRP fuel		0	0	0	0
357	CG3A - AQIRP fuel		0	0	0	0
358	CG3B - AQIRP fuel		0	0	0	0
359	CG3C - AQIRP fuel		0	0	0	0
360	CG4A - AQIRP fuel		0	0	0	0
361	CG4B - AQIRP fuel		0	0	0	0
362	CG4C - AQIRP fuel		0	0	0	0
363	CG4D - AQIRP fuel		0	0	0	0
364	CR1 - AQIRP fuel	MTBE	0	6.7	0	0
365	CR2 - AQIRP fuel	MTBE	0	6.6	0	0
366	E85A - AQIRP fuel	ETOH	0	6.5	0	0



367	E85D - AQIRP fuel	ETOH	0	6.9	0	0
368	R1A - AQIRP fuel	MTBE	0	8.7	0	0
369	R1B - AQIRP fuel	MTBE	0	8.7	0	0
370	R2A - AQIRP fuel	MTBE	0	8.6	0	0
371	R2B - AQIRP fuel	MTBE	0	8.5	0	0
372	R3A - AQIRP fuel	MTBE	0	8.5	0	0
373	R3B - AQIRP fuel	MTBE	0	8.5	0	0
374	R4A - AQIRP fuel	MTBE	0	8.4	0	0
375	R4B - AQIRP fuel	MTBE	0	8.6	0	0
376	R5A - AQIRP fuel	MTBE	0	8.6	0	0
377	R5B - AQIRP fuel	MTBE	0	8.6	0	0
378	R6A - AQIRP fuel	MTBE	0	8.7	0	0
379	R6B - AQIRP fuel	MTBE	0	9	0	0
380	R7A - AQIRP fuel	MTBE	0	8.8	0	0
381	R7B - AQIRP fuel	MTBE	0	8.7	0	0
382	R8A - AQIRP fuel	MTBE	0	8.5	0	0
383	R8B - AQIRP fuel	MTBE	0	8.9	0	0
384	R9A - AQIRP fuel	MTBE	0	8.9	0	0
385	S0 - AQIRP fuel	MTBE	0	9.3	0	0
386	S1 - AQIRP fuel	MTBE	0	9.3	0	0
387	S2 - AQIRP fuel	MTBE	0	9.3	0	0
388	Y3 - AQIRP fuel		0	0	0	0
389	Y4 - AQIRP fuel	MTBE	0	8.9	0	0
390	Y5 - AQIRP fuel	MTBE	0	8.9	0	0
391	Y6 - AQIRP fuel	MTBE	0	8.9	0	0
392	Y7 - AQIRP fuel	MTBE	0	8.9	0	0
393	Y8 - AQIRP fuel	MTBE	0	8.9	0	0
394	YA - AQIRP fuel	TAME	0	8.8	0	0
395	YM - AQIRP fuel	MTBE	0	9.1	0	0
396	Z1 - AQIRP fuel	MEOH	0	7.7	0	0
397	ZC2 - AQIRP fuel	MTBE/MEOH	0	7.1	0	0
398	ZCC - AQIRP fuel	MTBE/MEOH	0	9.6	0	0

### Engine Mode Type Categories

MODE_ID	MODE_ID_N	MODE_ID_D
ASM_5015	1	ASM Test Procedure - 50% Load at 15 mph.
ASM_2525	2	ASM Test Procedure - 25% Load at 25 mph.
IDLE	3	Idle in Neutral
IDLE_DRIVE	4	Idle in Drive, Assumes Automatic Transmission
IDLE_2500	5	Unloaded idle at 2500 rpm
IDLE_AGAIN	6	Repeated Idle in Neutral, Needed for 4 Mode Tests
50MPH	7	Steady speed driving at 50 miles per hour
30MPH	8	Steady speed driving at 30 miles per hour
IDLE_25X04	14	Unloaded idle at 2500 rpm; following 15 minute soak; step 4 of TEST_PROC = 'XSI'
IDLE___X05	15	Idle in Neutral; following 30 secs of idle at 2500 rpm; step 5 of TEST_PROC = 'XSI'
IDLE___X07	17	Idle in Neutral; following 505 cycle; step 7 of TEST_PROC = 'XSI'
IDLE_25X08	18	Unloaded idle at 2500 rpm; following 30 secs of idle; step 8 of TEST_PROC = 'XSI'
IDLE___X09	19	Idle in Neutral; following 30 secs of idle at 2500 rpm; step 9 of TEST_PROC = 'XSI'
IDLE_25X11	21	Unloaded idle at 2500 rpm; following engine restart; step 11 of TEST_PROC = 'XSI'
IDLE___X12	22	Idle in Neutral; following 30 secs of idle at 2500 rpm; steps 12 -13 of TEST_PROC = 'XSI'
IDLE_25X14	24	Unloaded idle at 2500 rpm; following 30 mins of idle; step 14 of TEST_PROC = 'XSI'
IDLE___X15	25	Idle in Neutral; following 30 secs of idle at 2500 rpm; step 15 of TEST_PROC = 'XSI'
IDLE_25X17	27	Unloaded idle at 2500 rpm; following engine restart; step 17 of TEST_PROC = 'XSI'
IDLE___X18	28	Idle in Neutral; following 30 secs of idle at 2500 rpm; step 18 of TEST_PROC = 'XSI'
IDLE_25X19	29	Unloaded idle at 2500 rpm; following 60 secs of idle; step 19 of TEST_PROC = 'XSI'
IDLE_25X21	31	Unloaded idle at 2500 rpm; previous step varies; step 21 of TEST_PROC = 'XSI'
IDLE___X22	32	Idle in Neutral; following 30 secs of idle at 2500 rpm; step 22 of TEST_PROC = 'XSI'
30MPH___X23	33	Loaded (7.0 HP) cruise at 28-32 mph; following 1 min of idle; step 23 of TEST_PROC = 'XSI'
IDLE___X24	34	Idle in Neutral; following 30 secs of 30mph cruise; step 24 of TEST_PROC = 'XSI'

**Schedule Type Category Definition Table**

SCHED ID	SCHED_NAME	SCHED_LEN	SCHED_AVG	SCHED_MAX	SCHED_ACC
ARB02	ARB weighted aggressive driving (non-FTP) cycle	1639	43.54	80.3	8.1
ART-AB	Level of service A & B arterial/collector simulation inventory cycle (24.8mph)	736	24.76	58.91	6.59
ART-CD	Level of service C & D arterial/collector simulator inventory cycle (19.2mph)	628	19.2	49.52	7.7
ART-EF	Level of service E & F arterial/collector simulation inventory cycle (11.6mph)	503	11.58	39.89	5.78
CAART1	California arterial1 (14.35mph)	907	14.36	45	8
CAART2	California arterial2 (24.05mph)	931	24.07	46	9
CAART3	California arterial3 (34.22mph)	944	34.25	55	12
CACYC1	California freeway speed correction1 (60.09mph)	468	60.08	71	3
CACYC2	California freeway speed correction2 (53.37mph)	607	53.37	68	3
CACYC3	California freeway speed correction3 (40.89mph)	907	40.88	65	5
CACYC4	California freeway speed correction4 (31.35mph)	909	31.35	62	6
CACYC5	California freeway speed correction5 (23.92mph)	909	23.92	56	6
CACYC6	California freeway speed correction6 (16.50mph)	919	16.5	45	6
CACYC7	California freeway speed correction7 (9.11mph)	581	9.13	40	5
CDH226	Colorado department of health (22.32mph)	225	22.42	51.3	3.5
CY6084	Real time diurnal temperature pattern - range 60 to 84 degrees Fahrenheit	259200	71.32	84	0
CY7296	Real time diurnal temperature pattern - range 72 to 96 degrees Fahrenheit	259200	83.21	96	0
CY8210	Real time diurnal temperature pattern - range 82 to 106 degrees Fahrenheit	259200	93.32	106	0
DIURBL	Standard temperature rise for 1 hour diurnal (or breathing loss) evaporative emission test	3600	72	84	0
F505	Bag 1 of federal test procedure (25.55mph)	505	25.6	56.67	3.36
FTP	Federal test procedure (19.53mph), also referred to as the UDDP schedule	1877	21.18	56.7	3.3
FWY-AC	Level of service A through C (free flow) freeway simulation inventory cycle (59.7mph)	515	59.72	73.11	3.11
FWY-D	Level of service D freeway simulation inventory cycle (52.9mph)	405	52.9	70.59	3.86
FWY-E	Level of service E freeway simulation inventory cycle (30.5mph)	455	30.49	63.01	8.14

SCHED_ID	SCHED_NAME	SCHED_LEN	SCHED_AVG	SCHED_MAX	SCHED_ACC
FWY-F	Level of service F freeway simulation inventory cycle(18.6mph)	441	18.62	49.9	6.15
FWY-G	Level of service G freeway simulation inventory cycle(13.1mph)	389	13.11	35.73	4.23
FWY-HI	High-speed freeway cycle(63.18mph)	609	63.17	75	3
HWFET	Highway fuel economy test(48.14mph)control cycle	764	48.2	59.9	3.3
IM240	Inspection/maintenance 240(29.38mph)	239	29.5	56.7	3.5
IM386	Inspection/maintenance 386(31.31mph)	385	31.39	56.7	3.5
IA4	Bags 1 and 2 of the FTP, also referred to as the UDDP schedule	1372	19.55	56.7	3.3
IA92	California unified cycle(areawide driving simulation inventory cycle	1435	24.6	67.17	14.98
LOCAL	Urban local facility driving simulation inventory cycle(12.9mph)	524	12.87	38.27	5.91
LSP1	Low speed 1(2.51mph)	601	2.51	10	2.5
LSP2	Low speed 2(3.54mph)	718	3.54	14	3
LSP3	Low speed 3(4.11mph)	555	4.11	16	3
NONFRW	Areawide non-freeway cycle(19.35mph)	1347	19.36	52.32	8.33
NYCC	New York city cycle(7.04mph)	602	7.05	27.7	5.9
RAMP	Freeway ramp simulation inventory cycle(34.58mph)	265	34.71	60.21	5.72
REM01	EPA weighted 'FTP-like' cycle	1493	18.58	54.9	6.76
REP05	EPA weighted aggressive driving(non-FTP) cycle	1399	51.57	80.3	7.14
SC03	SFTP air conditioning compliance cycle(EPA and ARB)	595	21.66	54.8	6.1
SCC12	Speed correction cycle12(11.67mph)	360	11.7	29.1	3.3
SCC36	Speed correction cycle36(36.47mph)	978	36.5	57	3.3
ST01	EPA start cycle - first 1.4 miles of SC03	263	18.99	40.99	5.4
UNCFTP	Uncut federal test procedure(21.25mph)	1874	21.25	56.3	8
UNIF01	EPA unified cycle	1929	25.56	74.06	6.89
US06	SFTP aggressive driving compliance cycle(EPA and ARB)	600	48.04	80.3	6.9
40_MPH	40 mile per hour steady state driving	0	40	40	0
45_MPH	45 mile per hour steady state driving	0	45	45	0
50_MPH	50 mile per hour steady state driving	0	50	50	0
55_MPH	55 mile per hour steady state driving	0	55	55	0
60_MPH	60 mile per hour steady state driving	0	60	60	0
65_MPH	65 mile per hour steady state driving	0	65	65	0
70_MPH	70 mile per hour steady state driving	0	70	70	0

SCHED_ID	SCHED_NAME	SCHED_LEN	SCHED_AVG	SCHED_MAX	SCHED_ACC
75_MPH	75 mile per hour steady state driving	0	75	75	0
80_MPH	80 mile per hour steady state driving	0	80	80	0
85_MPH	85 mile per hour steady state driving	0	85	85	0
90_MPH	90 mile per hour steady state driving	0	90	90	0
95_MPH	95 mile per hour steady state driving	0	95	95	0
CY8484	Real time diurnal temperature pattern - temperature range 72 to 96 degrees Fahrenheit	259200	83.21	96	0
AGRIC	Agricultural tractor cycle	629	78.64	98.91	34.65
BAKHO	Backhoe-loader cycle	515	25.2	99.05	85.18
CRAWL	Crawler tractor cycle	744	60.29	100	99.47
DIURB2	Temperature rise for 1 hour diurnal evap	3600	84	96	0
DIURB3	Emission test at elevated temperature 72- 96	3600	94	106	0
CY84	Temperature rise for 1 hour diurnal evap	0	84	84	0
CY96	Emission test at elevated temperature 82-106	0	84	84	0
CY96	Shed temperature pattern - nominally constant at 84 degrees F.	0	96	96	0
CY106	Shed temperature pattern - nominally constant at 96 degrees F.	0	106	106	0
3LA4	Shed temperature pattern - nominally constant at 106 degrees F.	4116	19.53	56.7	3.6
6NYCC	Three IA4 schedules, run in succession	3606	7.04	27.7	6
5HWFET	Six NYCC schedules, run in succession	3825	48.14	59.9	3.2
CRLOS	Five HWFET schedules, run in succession	0	0	0	0
NA	Light duty vehicle certification running loss emission test schedule	0	0	0	0
WELHSP	No schedule is applicable to this RESULT	1198	21.79	100.15	38.45
WEL_T1	Arc Welder High Speed Transient Duty Schedule	1198	19.03	74.45	22.7
WELHTQ	Arc Welder Typical 1 Duty Schedule	1198	25.71	100.42	29.66
WEL_T2	Arc Welder High Torque Transient Duty Schedule	1198	18.96	79.64	30.39
RTLHSP	Arc Welder Typical 2 Duty Schedule	1198	45.35	99.12	107.17
RTL_T1	Rubber Tire Loader High Speed Transient Duty Schedule	1198	34.41	97.73	105.8
RTLHTQ	Rubber Tire Loader Typical 1 Duty Schedule	1198	48.49	98.9	109.71
RTL_T2	Rubber Tire Loader high Torque Transient Duty Schedule	1198	39.01	99.04	107.22
SSLHSP	Rubber Tire Loader Typical 2 Duty Schedule	1198	38.83	99.89	78.11
SSL_T1	Skid Steer Loader High Speed Transient Schedule	1198	29.83	99.79	75.49
SSLHTQ	Skid Steer Loader Typical 1 Duty Schedule	1198	32.84	100	79.67
SSLHTQ	Skid Steer Loader High Torque Transient Duty Schedule	1198			

SCHED_ID	SCHED_NAME	SCHED_LEN	SCHED_AVG	SCHED_MAX	SCHED_ACC
SSL_T2	Skid Steer Loader Typical 2 Duty Schedule	1198	18.44	96.98	71.06
X_CAV	Excavator Schedule	1198	69.43	100	92.23
UDDS_D	Urban Dynamometer Driving Schedule for Heavy-Duty Vehicles	1060	18.86	58	4.63
20_MPH	20 mile per hour steady state driving	0	20	20	0
30_MPH	30 mile per hour steady state driving	0	30	30	0
20_40	drive first half at 20 miles per hour, second half at 40 mph steady state driving	0	30	40	0
WVUCBD	West Virginia University Central Business District	850	9.88	20	1
5PEAK	West Virginia 5 Peak Route	820	20.42	40	1
UDDSF2	EPA's Engine Dynamometer Schedule for Heavy-Duty Diesel Engines.	1195	9.13	100	183.91
CBD	Central Business District	568	12.74	20	4.6
3IM240	Triple Inspection/Maintenance 240 (29.38mph)	717	29.38	56.7	3.3
NULL	NULL RECORD per EPA XERRFIX2	0	0	0	0
COLD	Vehicle test cycle used by CARB				
2-5MIL	The 5MILE heavy duty drive cycle performed twice.	1798	20.04	39.9	1.4
2CSHVR	The CSHVR drive cycle performed twice.	3358	14.32	43.8	3.5
5MILE	Heavy Duty vehicle drive cycle over 5 miles.	898	20.06	39.9	1.4
CSHVR	Heavy Duty vehicle drive cycle.	1678	14.33	43.8	3.3
H5D289	Modified Unified Cycle H5D-289	2337	16.94	67.2	6.9
IM147	Inspection and maintenance 147 total seconds	146	34.26	56.7	3.3
MEC5	Modal Emission Cycle (MEC) version 5 Created by CE-CERT for the development of the NCHRP.	1920	42.57	81	5
MEC6	Modal Emission Cycle (MEC) version 6 Created by CE-CERT for the development of the NCHRP.	1919	42.52	81	5
MEC7	Modal Emission Cycle (MEC) version 7 Created by CE-CERT for the development of the NCHRP.	1980	43.63	80.02	6.52
PCC10	PCC10 - Created by CARB	312	7.59	32.9	11.14
PCC55	PCC55 - Created by CARB	1923	53.43	77.03	7.88
PCC65	PCC65 - Created by CARB	3497	63.25	81.87	9.7
PCC70	PCC70 - Created by CARB	3394	65.11	87.98	6.66
UCC10	UCC10 - Created by CARB	386	7.65	28	5.03
UCC15	UCC15 - Created by CARB	421	13.34	36.5	4.6
UCC20	UCC20 - Created by CARB	835	17.72	43.8	5.7
UCC25	UCC25 - Created by CARB	853	22.94	49.9	5.9
UCC30	UCC30 - Created by CARB	983	26.9	59.1	5.5

SCHED_ID	SCHED_NAME	SCHED_LEN	SCHED_AVG	SCHED_MAX	SCHED_ACC
UCC35	UCC35 - Created by CARB	1350	31.93	68.7	5.6
UCC40	UCC40 - Created by CARB	1333	35.57	72.39	5.51
UCC45	UCC45 - Created by CARB	1303	44.64	71.4	5.7
UCC5	UCC5 - Created by CARB	209	2.2	12.95	3.51
UCC50	UCC50 - Created by CARB	2191	42.86	71.6	7.5
UCC55	UCC55 - Created by CARB	2316	47.11	71.1	5.9
UCC60	UCC60 - Created by CARB	2809	53.4	80.67	6.4
UCC65	UCC65 - Created by CARB	3860	57.07	81.38	5.97
UCC70	UCC70 - Created by CARB	3657	58.8	83	6.6
XUCC50	OLD UCC50 - Created by CARB	2038	48.44	76	8.1
3CBD	Triple Central Business District	1799	12.06	20	4.7
14C	Modified CBD	569	12.72	25	4.7
14R	Modified and routized CBD	569	12.72	25	4.7
ALT1		1721	13.44	51.27	2.06
ALT2		1589	14.2	38.73	3.66
CITY		0	0	0	0
CSCYC		1678	14.33	43.8	3.3
FIGE		0	0	0	0
HIWAY		0	0	0	0
TCDC		0	0	0	0
TEST_D		1099	18.16	58	4.4
WVU_5P	West Virginia University's 5 peak schedule	0	0	0	0
HVDUTY		0	0	0	0
NYBUS	New York Bus Cycle	600	3.69	30.8	4.6
NYGTC3	New York Garbage Truck Cycle run 3 times	1861	2.17	20	1.4
SWEEP3	West Virginia University Street Sweeper Cycle	0	0	0	0
WHM		0	0	0	0
YARD		0	0	0	0
UNIFIE	California Unified Cycle - Created by CARB	1735			
KERN	Kern Cycle	1900	24.74	50	2
SNAP	Snap Test	1900	24.74	50	2
LUG	Lug Down	0	0	0	0
DRT	Test D Route	1098	18.17	58	4.4
NYTRK	New York Truck Cycle	1015	7.57	34	4.1
14PEAK	14 Peak Cycle	0	0	0	0
RT77	Route 77	0	0	0	0

SCHED_ID	ID	SCHED_NAME	SCHED_LEN	SCHED_AVG	SCHED_MAX	SCHED_ACC
RT22		Route 22	0	0	0	0
IDLE		Idle State Cycle	0	0	0	0
CSTDN		Coast Down	0	0	0	0
VFAC		Viking Freight Adhoc Cycle (VIKING_W)	1887	27.85	62.7	1.9
2TESTD		Double Test D with Warmup (TEST_D2W)	2197	18.16	58	4.4
NYGT2		Double Length New York Garbage Truck Cycle	1240	2.17	20	1.4
EC			0	0	0	0
MUC			0	0	0	0
AC5080			0	0	0	0
CARB-I		Idle portion of CARB HHDDT cycle	0	0	0	0
CARB-C		Creep portion of CARB HHDDT cycle	272	1.64	8.2	2.5
CARB-T		Transient portion of CARB HHDDT cycle	687	14.94	47.5	2.9
CARB-R		Cruise portion of CARB HHDDT cycle	2082	39.9	59.3	2.5
MEC						
SMEC5		Special Modal Emission Cycle (MEC) ver 5 Created by CE-CERT for the development of NCHRP	0	0	0	0
SMEC6		Special Modal Emission Cycle (MEC) ver 6 Created by CE-CERT for the development of NCHRP	1454	42.15	81	5
SMEC7		Special Modal Emission Cycle (MEC) ver 7 Created by CE-CERT for the development of NCHRP	1569	42.75	80.02	6.52
IMEC5		Incomplete Modal Emission Cycle (MEC) ver 5 Created by CE-CERT for development of NCHRP	0	0	0	0
IMEC6		Incomplete Modal Emission Cycle (MEC) ver 6 Created by CE-CERT for development of NCHRP	0	0	0	0
IMEC7		Incomplete Modal Emission Cycle (MEC) ver 7 Created by CE-CERT for development of NCHRP	0	0	0	0
SADT		Single Axle Dump Truck Cycle developed by ERG	1295	24.58	59	5
TADT		Double Axle Dump Truck Cycle developed by ERG	1512	25.39	62	6
ART		WVU ART	290	24.84	40	4.5
OCRTC		Orange County Refuse Truck Cycle	0	0	0	0
MANHAT			0	0	0	0
FTPR5		FTP appended with REP05 Schedule	3277	34.15	80.3	7.14
CBD-RT		Routinized CBD	599	12.08	20	4.7
NYCCT		New York Composite Cycle (NY-Comp)	1029	8.77	36	8.7
OCRTC2		OCRTC run 2 times	2323	8.28	46.8	8.9
GRADA		Telescoping Boom Excavator Cycle developed by ERG	1399	38.44	100	100
LOADE		Wheelled Loader Cycle developed by ERG	918	48.82	100	100
UDDS_W		WVU Truncated version of the UDD_S	1039	19.24	58	4.63



**Test Procedure Type Category Table**

TEST_PROC	TEST_PRO_N	TEST_PRO_D	HC_METHOD	HAS_START
FTP	5	Federal Test Procedure	FID (PROPANE EQUIV.)	Y
NYCC	22	New York City Cycle Test	FID (PROPANE EQUIV.)	N
HFET	9	Highway Fuel Economy Test	FID (PROPANE EQUIV.)	N
IM24	52	IM240 Test Data	FID (PROPANE EQUIV.)	N
FACIL	100	Roadway Facility Cycle Test	FID (PROPANE EQUIV.)	N
FLA4	63	Facility cycle LA4	FID (PROPANE EQUIV.)	N
505HR	97	First bag of FTP - engine on	FID (PROPANE EQUIV.)	N
LA9HR	93	California unified cycle test , conducted as a 1 bag test , without start	FID (PROPANE EQUIV.)	N
ST01	96	Engine Start cycle test	FID (PROPANE EQUIV.)	Y
US06	81	High Speed 4th Bag of FTP	FID (PROPANE EQUIV.)	N
HSOAK	68	1 Hour Hot Soak Evap Test	FID (PROPANE EQUIV.)	N
BL_1A	6	1 Hour Breathing Loss Evap Test - Gas Cap Left On	FID (PROPANE EQUIV.)	N
BL_1B	106	1 Hour Breathing Loss Evap Test - Canister As Recd	FID (PROPANE EQUIV.)	N
ASM	98	Acceleration Simulation Mode Test Procedure	NDIR (HEXANE EQUIV.)	N
IDLEI	3	Mechanic's Idle Inspection - usually prior to FTP	NDIR (HEXANE EQUIV.)	N
RSID	17	Restart Idle Test Data (as defined by 40 CFR 85-2210)	NDIR (HEXANE EQUIV.)	N
4MID	10	Four Mode Idle Test (Idle, Idle @2500, Idle again, Idle in Drive	NDIR (HEXANE EQUIV.)	N
PREST	199	Evap System Pressure Check - Done at fuel tank.	NOT APPLICABLE	N
BGID	7	Bag Idle Test	FID (PROPANE EQUIV.)	N
BGDR	23	Bag Idle-in-Drive Test	FID (PROPANE EQUIV.)	N
XRSID	117	Restart Idle Test - No Exhaust Measurements Taken	NOT APPLICABLE	N
XIM24	152	IM240 Test - No Exhaust Measurements Taken	NOT APPLICABLE	N
C226	24	Colorado Dept. of Health 226 Second Test	FID (PROPANE EQUIV.)	N
C226B	58	Colorado Dept of Health 226 Second Test - Restricted Range of Test Weight Values	FID (PROPANE EQUIV.)	N
IM24B	56	IM240 Test - Restricted Range of Test Weight Values	FID (PROPANE EQUIV.)	N
SPEED	20	EPA Speed Correction Cycle Test (Any of Several, e.g. LSP1-3 or SC12, SC36)	FID (PROPANE EQUIV.)	N
CASPD	70	California Speed Correction Cycle Test (any of 10 driving schedules)	FID (PROPANE EQUIV.)	N
UFTP	53	Uncut Federal Test Procedure	FID (PROPANE EQUIV.)	Y
505HS	62	Hot Start 505	FID (PROPANE EQUIV.)	Y
ST0HR	34	Hot Running ST01	FID (PROPANE EQUIV.)	N
TWOSP	101	Two Speed Idle Test	NDIR (HEXANE EQUIV.)	N

TEST_PROC	TEST_PRO_N	TEST_PRO_D	HC_METHOD	HAS_START
STEAD	108	Steady State Driving	FID (PROPANE EQUIV.)	N
PRESC	198	Evap system pressure check - Done at fuel cap.	NOT APPLICABLE	N
STOHS	33	Hot start ST01	FID (PROPANE EQUIV.)	Y
2SOAK	102	2 Hour Hot Soak Evap Test	FID (PROPANE EQUIV.)	N
48RTD	103	48 Hour Real Time Diurnal	FID (PROPANE EQUIV.)	N
IRTD	104	Interrupted 24 hour real time diurnal	FID (PROPANE EQUIV.)	N
HSLA4	105	Hot Start LA4, LA4 is first two bags of FTP	FID (PROPANE EQUIV.)	Y
50MPH	8	50 MPH Cruise Mode Test	NDIR (HEXANE EQUIV.)	N
L2M	11	Loaded 2 mode test, idle and 30mph.	NDIR (HEXANE EQUIV.)	N
NONR1	197	Engine dyno transient test as defined by Contract 68-65-0077; orig. Task 2-2	HFID (PROPANE EQUIV.)	N
NONR2	196	Engine dyno transient test as defined by Contract 68-65-0077; amended Task 2-2	HFID (PROPANE EQUIV.)	N
24RTD	107	24 Hour Real Time Diurnal	FID (PROPANE EQUIV.)	N
28MOD	195	28 mode, steady state engine dyno test as def. by Contract 68-65-0077, Task 2-2	HFID (PROPANE EQUIV.)	N
8M_C1	194	8 mode, steady state engine certification test as defined in CFR .....	HFID (PROPANE EQUIV.)	N
USMOK	190	U.S. Smoke Cycle Test, as def'by 40 CFR 86.884, Subpart I	NOT APPLICABLE	N
SMOKI	191	opacity smoke test procedure as def'by ISO 8178-9	NOT APPLICABLE	N
SIACC	192	Snap-Idle Acceleration test procedure as def'by SAE J-1667	NOT APPLICABLE	N
3REST	64	3 Hour Resting Loss Evap Emissions Test (Follows 1 Hour Hot Soak)	FID (PROPANE EQUIV.)	N
ATD	66	Ambient temp diurnal evap test , shed temp const. , vehicle begins 24 deg cooler	FID (PROPANE EQUIV.)	N
33RTD	109	33 Hour Real Time Diurnal	FID (PROPANE EQUIV.)	N
72RTD	110	72 Hour Real Time Diurnal	FID (PROPANE EQUIV.)	N
IM387	65	IM387 Test Results (3 bag IM240)	FID (PROPANE EQUIV.)	N
IMIDL	111	Official State I/M Idle Emissions Test	NDIR (HEXANE EQUIV.)	N
IM2MO	112	Official State I/M 2 Mode Idle Emissions Test (Idle@2500 plus Idle)	NDIR (HEXANE EQUIV.)	N
ASMTK	113	ASM Performed On LHDTs With Emissions Averaged On Last 10 Seconds Of Each Mode	NDIR (HEXANE EQUIV.)	N
40MOD	193	40 mode, steady state engine dyno test. (1 idle, 3 E3 marine, 36 load matrix)	HFID (PROPANE EQUIV.)	N
HD_DT	189	Heavy Duty Diesel Chassis Dynamometer Transient Test	HFID (PROPANE EQUIV.)	N
MLA4	46	Running loss evap/exhaust emission test, based on repeated runs of LA4 Schedule	FID (PROPANE EQUIV.)	N
MNYCC	50	Running loss evap/exhaust emission test, based on repeated runs of NYCC Schedule	FID (PROPANE EQUIV.)	N
MHFET	51	Running loss evap/exhaust emission test, based on repeated runs of HFET Schedule	FID (PROPANE EQUIV.)	N
CRLOS	188	Vehicle Certification Running Loss Emissions Test	FID (PROPANE EQUIV.)	N
IM2LO	114	Official State I/M 2 Mode Loaded Emissions Test (30mph plus idle)	NDIR (HEXANE EQUIV.)	N
DROVE	185	Vehicle with on-board exhaust instruments, driven on chassis dynamometer	NDIR (HEXANE EQUIV.)	N
SROVE	186	Vehicle with on-board exhaust instruments, driven on schedule-like road route	NDIR (HEXANE EQUIV.)	Y
RROVE	187	Vehicle with on-board exhaust instruments, driven on road route	NDIR (HEXANE EQUIV.)	Y
38RTD	118	38 Hour Real Time Diurnal	FID (PROPANE EQUIV.)	N

TEST_PROC	TEST_PRO_N	TEST_PRO_D	HC_METHOD	HAS_START
ACSUR	184	Air conditioning activity survey as performed in WA_ID = 'AC_ACTIV_A'	NOT APPLICABLE	N
XSI	31	Extended special idle test; Involves 24 steps; Data stored at MODETIME level.	NDIR (HEXANE EQUIV.)	Y
4HD	67	Four Hour Diurnal Test	FID (PROPANE EQUIV.)	N
SC03	200	SC03 Air Conditioning Simulation as specified in 40 CFR 86.160-00 thru 161-00	FID (PROPANE EQUIV.)	Y
SC03A	201	SC03 AC1 Air Conditioning Simulation as specified in 40 CFR 86.160-00 to 162-00	FID (PROPANE EQUIV.)	Y
SC03B	202	SC03 AC2 Air Conditioning Simulation as specified in 40 CFR 86.160-00 to 162-00	FID (PROPANE EQUIV.)	Y
SFTP	203	Calculation (only) of composite SFTP emissions as specified in 40 CFR 86.164	FID (PROPANE EQUIV.)	N
5MILE	204	Chassis dynamometer test using WVU 5 Mile Route, (Routinized form of WVU 5 Peak)	FID (PROPANE EQUIV.)	N
CBD	205	Chassis dynamometer test using the WVU Truck Central Business District Cycle	FID (PROPANE EQUIV.)	N
HD_DR	206	Heavy Duty Diesel Transient Test with driving schedule 'routinized'	FID (PROPANE EQUIV.)	N
HDTHS	207	Heavy Duty Vehicle Transient Chassis Procedure with hot start	FID (PROPANE EQUIV.)	Y
SMELR	208	European Loaded Response Smoke Test Amending Directive 88/77/EEC 12/3/1988	NOT APPLICABLE	N
COLD	209	Vehicle test cycle used by CARB		
IM147	209	IM147 Test Data		
MEC	210	Modal Emission Cycle test created by CE-CERT		
FTPSS	211	FTP with only second by second data. Bag emissions estimated from sbs data		
IM24F	212	Fast Pass for IM240 test		
UCC	213	Unified Corrections Cycle Test created by California Air Resources Board		
IM14F	214	Fast Pass for IM147 test		
EPA74	215	Federal Test Procedure - 1974	FID (PROPANE EQUIV.)	Y
UNIF0	0			
14C	0			
14R	0			
3CBD	0			
CBDRT	0			
HVDUT	0			
NYBUS	0			
NYGTC	0			
OCRTC	0			
SWEEP	0			
WHM	0			
YARD	0			
KERN	0	KERN CYCLE		
SNAP	0	SNAP CYCLE		
LUG	0	LUG DOWN		
DRT	0	TEST D ROUTE		

TEST_PROC	TEST_PRO_N	TEST_PRO_D	HC_METHOD	HAS_START
EC	0			
MUC	0			
LA92	0			
FTPCC	0	FTP with second by second engine out data		
FTP4S	0	FTP with 4th bag & only sec. by sec. data. Bag emissions estimated from sbs data		
CARBI	0	Idle portion of CARB HHDDT cycle		
CARBR	0	Cruise portion of CARB HHDDT cycle		
CARBC	0	Creep portion of CARB HHDDT cycle		
CARBT	0	Transient portion of CARB HHDDT cycle		
AC508	0			
SADT	0	Single Axle Dump Truck Cycle developed by ERG		
TADT	0	Tandem Axle Dump Truck Cycle developed by ERG		
GRADA	0	Telescoping Boom Excavator Cycle developed by ERG		
LOADE	0	Wheeled Loader Cycle developed by ERG		

## Measurement Type Category Table

MEAS_UNIT	MEAS_DESCR	MEAS_ID
Grams/Mile	Methane (CH4) Emissions	METHANE
Liters/Minute	Rate of airflow to evaporative emissions canister	PURGE_RATE
Liters	Volume of air going to evaporative canister	PURGE_VOL
Degrees before (+) or after (	Initial Engine Timing (with Vacuum Disconnected)	TIMING
Percent	Oxygen concentration	C_O2
Grams/Hour	Methane Emission Rate	R_METHANE
Grams/Mile	Nitrous Oxide (N2O) Emissions	N2O
Degrees API	Degrees API	API_GRAVIT
g/cm-03 @ 60 deg F	Density @ 60 deg F	DENSITY
Specific Gravity	Specific Gravity @ 60 Degrees	SPECIFIC_G
Parts Per Million	Sulfur in Fuel by ASTM D 2622	PPM_SULFUR
PSIA	Vapor Pressure by Appendix E Method 3	PSIA_RVP
Volume Percent	Ethanol by OFID	V_ETHANOL
Volume Percent	MTBE by OFID	V_MTBE
Volume Percent	TAME by OFID	V_TAME
Weight Percent	Weight Percent Oxygen	WT%_O2
Seconds	Duration of Test	DURATION
Degrees before (+) or after (-	Initial Engine Timing (with Vacuum Connected)	TIMING2
Revolutions per minute	Engine idle speed specification	RPMSPEC
Degrees before (+) or after (-	Initial timing specification	TIMINGSPEC
Notches lean (-), On index (0)	Choke notch setting observed	CHOKEMEAS
Notches lean (-), On index (0)	Choke notch setting specified	CHOKESPEC
Grams/Mile	Oxides of Nitrogen, Uncorrected for Humidity	NOXU
	Cetane number	CETNUM
%volume	Aromatic Content	AROMATICS
%volume	Olefin Content	OLEFIN
%volume	Saturated Hydrocarbon Content	SATURATES
deg. F	Temperature -- Initial Boiling Point --0% Recovery	T_IBP
deg. F	Temperature -- 10% Recovery	T10
deg. F	Temperature -- 50% Recovery	T50
deg. F	Temperature -- 90% Recovery	T90
deg. F	Temperature -- 95% Recovery	T95
deg. F	Temperature -- End Point --100% Recovery	T_EP
	Cetane Index	CETINDEX
%volume	Benzene Content	BENZENE
%volume	Oxygenate Content	OXYGENATE
deg. F	Flashpoint	FLASHPOINT
deg. F	Cloudpoint	CLOUDPOINT
Centistokes	Viscosity at 40 Degrees C	VISCOSITY
grams	Initial weight of vehicle's evaporative canister	INITCANWGT
grams	Final weight of vehicle's evaporative canister	FINLCANWGT
Micrograms/Mile	Benz(a)anthracene emissions	C000056553
Micrograms/Mile	Benzo(b)fluoranthene emissions	C000205492
Micrograms/Mile	Benzo(k)fluoranthene emissions	C000207089
Micrograms/Mile	Benzo(a)pyrene emissions	C000050328
Micrograms/Mile	Chrysene emissions	C000218019
Micrograms/Mile	Dibenz(a,h)anthracene	C000053703
Micrograms/Mile	Indeno(1,2,3-c,d)pyrene	C000193395
Milligrams/Mile	Formaldehyde	C000050000

MEAS_UNIT	MEAS_DESCR	MEAS_ID
Milligrams/Mile	Ammonia	C007664417
Milligrams/Mile	Acetaldehyde	C000075070
Milligrams/Mile	Inorganic fraction of particulate matter SAE 872136	PMIO_SAE
Milligrams/Mile	Organic fraction of particulate matter SAE 872136	PMHC_SAE
Milligrams/Mile	Dry Sulfate ion fraction of particulate SAE872136	PMSO_SAE
Milligrams/BHP	Inorganic fraction of particulate matter SAE 872136	P_PMIO_SAE
Milligrams/BHP	Organic fraction of particulate matter SAE 872136	P_PMHC_SAE
Milligrams/BHP	Dry Sulfate ion fraction of particulate SAE 872136	P_PMSO_SAE
Milligrams/Mile	Total particulate matter per CFR86.110-94	PMT_CFR110
Grams	Formaldehyde	E000050000
Grams	Ammonia	E007664417
Grams	Acetaldehyde	E000075070
Percent	Fuel tank fill level (100=FULL)	TANK_LEVEL
CATEGORIZED	1= PERFORMED; 2= INNACCESSIBLE; 3= EQUIPMENT DOWN	PURGE_STAT
Brake horsepower-hour	Work performed	BHPH
MINUTES	Soak time, (time since engine turned off)	SOAK_MINS
Milligrams/Mile	Elemental Carbon by Thermal Reflectance (DRI)	PMEC_DRI
Milligrams/Mile	Organic Carbon by Thermal Reflectance (DRI)	PMHC_DRI
Milligrams/Mile	Silver in Particulate	PM_AG
Milligrams/Mile	Aluminum in Particulate	PM_AL
Milligrams/Mile	Gold in Particulate	PM_AU
Milligrams/Mile	Bromine in Particulate	PM_BR
Milligrams/Mile	Calcium in Particulate	PM_CA
Milligrams/Mile	Cadmium in Particulate	PM_CD
Milligrams/Mile	Chlorine in Particulate	PM_CL
Milligrams/Mile	Copper in Particulate	PM_CU
Milligrams/Mile	Iron in Particulate	PM_FE
Milligrams/Mile	Potassium in Particulate	PM_K
Milligrams/Mile	Magnesium in Particulate	PM_MG
Milligrams/Mile	Manganese in Particulate	PM_MN
Milligrams/Mile	Molybdenum in Particulate	PM_MO
Milligrams/Mile	Sodium in Particulate	PM_NA
Milligrams/Mile	Nickel in Particulate	PM_NI
Milligrams/Mile	Nitrates in Particulate	PM_NITRATE
Milligrams/Mile	Phosphorus in Particulate	PM_P
Milligrams/Mile	Lead in Particulate	PM_PB
Milligrams/Mile	Sulfur in Particulate	PM_S
Milligrams/Mile	Antimony in Particulate	PM_SB
Milligrams/Mile	Silicon in Particulate	PM_SI
Milligrams/Mile	Tin in Particulate	PM_SN
Milligrams/Mile	Strontium in Particulate	PM_SR
Milligrams/Mile	Zinc in Particulate	PM_ZN
Milligrams/Mile	Titanium in Particulate	PM_TI
Milligrams/Mile	Gallium in Particulate	PM_GA
Milligrams/Mile	Yttrium in Particulate	PM_Y
Milligrams/Mile	Zirconium in Particulate	PM_ZR
Milligrams/Mile	Palladium in Particulate	PM_PD
Milligrams/Mile	Barium in Particulate	PM_BA
Milligrams/Mile	Lanthanum in Particulate	PM_LA
Milligrams/Mile	Mercury in Particulate	PM_HG

MEAS_UNIT	MEAS_DESCR	MEAS_ID
Milligrams/Mile	Particulate less than 10.0 microns in diameter	PM_<10.0u
Micrograms/mile	naphthalene emissions	C000091203
Milligrams/Mile	benzaldehyde emissions	C000100527
Milligrams/Mile	2-butanone emissions	C000078933
Milligrams/Mile	Particulate less than 2.5 microns in diameter	PM_<02.5u
Milligrams/Mile	methacrolein emissions	C000078853
Micrograms/Mile	6-nitrochrysene emissions	C007496028
Milligrams/Mile	2-propenal (Acrolein) emissions	C000107028
Milligrams/Mile	acetone emissions	C000067641
Micrograms/Mile	1-nitropyrene emissions	C005522430
Micrograms/Mile	3-nitrofluoranthene emissions	C000892217
Micrograms/Mile	acenaphthylene emissions	C000208968
Micrograms/Mile	acenaphthene emissions	C000083329
Micrograms/Mile	fluoranthene	C000206440
Micrograms/Mile	Benzo[ghi]perylene emissions	C000191242
Micrograms/Mile	pyrene emissions	C000129000
Micrograms/Mile	anthracene emissions	C000120127
Micrograms/Mile	phenanthrene emissions	C000085018
Milligrams/mile	n-hexane emissions	C000110543
Milligrams/mile	2,2,4-trimethylpentane emissions	C000540841
Milligrams/mile	1,3-butadiene emissions	C000106990
Milligrams/mile	methanol emissions	C000067561
Milligrams/mile	2-methoxy-2-methylpropane (MTBE) emissions	C001634044
Milligrams/mile	benzene emissions	C000071432
Milligrams/mile	toluene emissions	C000108883
Milligrams/mile	ethylbenzene emissions	C000100414
Milligrams/mile	m&p-xylene emissions	M&P-XYLENE
Milligrams/mile	styrene emissions	C000100425
Milligrams/mile	o-xylene emissions	C000095476
Micrograms/mile	total of benzo(b+j+k)fluoranthene emissions	B&J&K_PAHS
Milligrams/Mile	propionaldehyde emissions	C000123386
None	0 means compressor off, 1 means compressor on	AC_ON_OFF
Watts	AC Compressor Load	AC_LOAD
Percent	Throttle Position	THROTTLE
Degrees F	Vehicle Exhaust Temperature	EXH_TEMP
None	gear that transmission is in -1,0,1, 2, 3,4,5, +	TRANS_GEAR
Inches of Mercury	Intake manifold pressure	INTAKE_MFP
Milligrams/mile	ethylene	C000074851
Milligrams/mile	ethane	C000074840
Milligrams/mile	Ethyl Alcohol	C000064175
Milligrams/mile	Formic Acid	C000064186
Milligrams/mile	Isobutane	C000075285
Milligrams/mile	Octane	C000111659
Milligrams/mile	Methane Emissions	C000074828
Milligrams/mile	Nitric Acid	C007697372
Milligrams/mile	Cyclopropane	C000075194
Milligrams/mile	Sulfur Dioxide	C007446095
Milligrams/mile	Tetrafluoromethene, Carbon Tetrafluoride	C000075730
Milligrams/mile	M-xylene	C000108383
Milligrams/mile	Water	H2O
grams/mile	Non Methane Hydrocarbons	NMHC

MEAS_UNIT	MEAS_DESCR	MEAS_ID
Milligrams/Mile	2M-Octane	C00322161
Milligrams/Mile	3M-1-Hexene	C00340461
Milligrams/Mile	2,2,5-TM-Hexane	C00352294
Milligrams/Mile	3M-t-3-Hexene	C00389936
Milligrams/Mile	2M-ButylBenzene	C00396885
Milligrams/Mile	2,4-DM-Octane	C00403294
Milligrams/Mile	t-2-Hexene	C00405045
Milligrams/Mile	c-2-Heptene	C00644392
Milligrams/Mile	3,4-DM-1-Pentene	C00738578
Milligrams/Mile	c-2-Octene	C00764204
Milligrams/Mile	c-3-Hexene	C00764209
Milligrams/Mile	c-2-Hexene	C00768821
Milligrams/Mile	2,3-DM-2-Pentene	C01057437
Milligrams/Mile	t-3-Hexene	C01326952
Milligrams/Mile	t-2-Octene	C01338942
Milligrams/Mile	t-2-Heptene	C01468613
Milligrams/Mile	t-3-Heptene	C01468614
Milligrams/Mile	t-4-Octene	C01485023
Milligrams/Mile	2,2-DM-Octane	C01586987
Milligrams/Mile	1c,2t,3-TM-CycPentane	C01589040
Milligrams/Mile	tert-1B-2M-Benzene	C02713821
Milligrams/Mile	ETBE	C00063792
Milligrams/Mile	E-Cyclopentane	C00164089
Milligrams/Mile	2,3-DM-Heptane	C00307471
Milligrams/Mile	1M-3E-Benzene	C00062014
Milligrams/Mile	1M-4E-Benzene	C00062296
Milligrams/Mile	t-2-Butene	C00062464
Milligrams/Mile	2M-2-Pentene	C00062527
Milligrams/Mile	c-2-Pentene	C00062720
Milligrams/Mile	c-1,3-DM-CycHexane	C00063804
Milligrams/Mile	t-2-Pentene	C00064604
Milligrams/Mile	4M-t-2-Pentene	C00067476
Milligrams/Mile	4M-1-Pentene	C00069137
Milligrams/Mile	4M-c-2-Pentene	C00069138
Milligrams/Mile	1M-Cyclopentene	C00069389
Milligrams/Mile	3M-1-Pentene	C00076020
Milligrams/Mile	2M-1-Pentene	C00076329
Milligrams/Mile	3E-c-2-Pentene	C00081679
Milligrams/Mile	t-1,2-DM-CycloPentane	C00082250
Milligrams/Mile	1,3-DM-4-E-Benzene	C00087441
Milligrams/Mile	3,5-DM-Heptane	C00092682
Milligrams/Mile	1,2-DM-3-E-Benzene	C00093398
Milligrams/Mile	1,2-DM-4-E-Benzene	C00093480
Milligrams/Mile	3M-c-2	C00099262
Milligrams/Mile	2,3,5-TM-Hexane	C00106953
Milligrams/Mile	1M-2-n-PropBenzene	C00107417
Milligrams/Mile	1M-3-n-PropBenzene	C00107443
Milligrams/Mile	1M-4-n-PropBenzene	C00107455
Milligrams/Mile	Undecane	C00112021
Milligrams/Mile	3M-Cyclopentene	C00112062
Milligrams/Mile	E-CycHexane	C00167891



MEAS_UNIT	MEAS_DESCR	MEAS_ID
Milligrams/Mile	1,4-DM-2-E-Benzene	C00175888
Milligrams/Mile	1c-2-DM-CycloHexane	C00220701
Milligrams/Mile	t-1,3-DM-CycHexane	C00220703
Milligrams/Mile	t-1,4-DM-CycHexane	C00220704
Milligrams/Mile	2,4-DM-Heptane	C00221323
Milligrams/Mile	3M-Octane	C00221633
Milligrams/Mile	c-1,3-DM-CycloPentane	C00253258
Milligrams/Mile	2M-2-Hexene	C00273819
Milligrams/Mile	1,3-DM-2-E-Benzene	C00287004
Milligrams/Mile	3E-Pentane	C00061778
Milligrams/Mile	Propadiene	C00046349
Milligrams/Mile	2,2-DM-Propane	C00046382
Milligrams/Mile	2,2,3-TM-Butane	C00046406
Milligrams/Mile	1,2,3,4-TetMBenzene	C00048823
Milligrams/Mile	Indan	C00049611
Milligrams/Mile	2-Butyne	C00050317
Milligrams/Mile	2M-2-Butene	C00051335
Milligrams/Mile	1,2,3,5-TetMBenzene	C00052753
Milligrams/Mile	1M-2-I-PropBenzene	C00052784
Milligrams/Mile	1M-3-I-PropBenzene	C00053577
Milligrams/Mile	n-PentBenzene	C00053868
Milligrams/Mile	I-ButylBenzene	C00053893
Milligrams/Mile	Cyclopentadiene	C00054292
Milligrams/Mile	3,3-DM-1-Butene	C00055837
Milligrams/Mile	2,3,3-TM-Pentane	C00056021
Milligrams/Mile	3,3-DM-Pentane	C00056249
Milligrams/Mile	3,3-DM-Hexane	C00056316
Milligrams/Mile	3M-1-Butene	C00056345
Milligrams/Mile	2M-1-Butene	C00056346
Milligrams/Mile	2,3-DM-Pentane	C00056559
Milligrams/Mile	2,3,4-TM-Pentane	C00056575
Milligrams/Mile	1,2,3-TM-Benzene	C00057673
Milligrams/Mile	2,3-DM-Hexane	C00058494
Milligrams/Mile	3M-Hexane	C00058934
Milligrams/Mile	2,4-DM-Hexane	C00058943
Milligrams/Mile	4M-Heptane	C00058953
Milligrams/Mile	3M-Heptane	C00058981
Milligrams/Mile	c-2-Butene	C00059018
Milligrams/Mile	2,2-DM-Pentane	C00059035
Milligrams/Mile	2,2-DM-Hexane	C00059073
Milligrams/Mile	2M-Hexane	C00059176
Milligrams/Mile	2,5-DM-Hexane	C00059213
Milligrams/Mile	2M-Heptane	C00059227
Milligrams/Mile	1-Hexene	C00059241
Milligrams/Mile	1-Heptene	C00059276
Milligrams/Mile	1E-2M-Benzene	C00061114
Milligrams/Mile	3M-t-2-Pentene	C00061612
Milligrams/Mile	Cyclopentane	C00028792
Milligrams/Mile	I-PropBenzene	C00009882
Milligrams/Mile	1M-4-I-PropBenzene	C00009987
Milligrams/Mile	Uncalibrated peaks to CBM Olefins	C00010001

MEAS_UNIT	MEAS_DESCR	MEAS_ID
Milligrams/Mile	Uncalibrated peaks to CBM Paraffins	C00010002
Milligrams/Mile	Uncalibrated peaks to CBM Toluene	C00010003
Milligrams/Mile	Uncalibrated peaks to CBM Xylene	C00010004
Milligrams/Mile	Uncalibrated peaks to CBM Aldehydes	C00010006
Milligrams/Mile	Uncalibrated peaks to CBM Non Reactive	C00010012
Milligrams/Mile	n-PropBenzene	C00010365
Milligrams/Mile	1,4-DE-Benzene	C00010505
Milligrams/Mile	Butane	C00010697
Milligrams/Mile	1-Butene	C00010698
Milligrams/Mile	1-Butyne	C00010700
Milligrams/Mile	2,4,4-TM-1-Pentene	C00010739
Milligrams/Mile	2,4,4-TM-2-Pentene	C00010740
Milligrams/Mile	2M-Pentane	C00010783
Milligrams/Mile	2,4-DM-Pentane	C00010808
Milligrams/Mile	1,3,5-TM-Benzene	C00010867
Milligrams/Mile	M-Cyclohexane	C00010887
Milligrams/Mile	Pentane	C00010966
Milligrams/Mile	1-Pentene	C00010967
Milligrams/Mile	Cyclohexane	C00011082
Milligrams/Mile	Cyclohexene	C00011083
Milligrams/Mile	1-Octene	C00011166
Milligrams/Mile	Nonane	C00011184
Milligrams/Mile	Dodecane	C00011240
Milligrams/Mile	Propene	C00011507
Milligrams/Mile	2M-Propene	C00011511
Milligrams/Mile	1-Nonene	C00012411
Milligrams/Mile	Decane	C00012418
Milligrams/Mile	1,2-DE-Benzene	C00013501
Milligrams/Mile	s-ButBenzene	C00013598
Milligrams/Mile	1,3-DE-Benzene	C00014193
Milligrams/Mile	Cyclopentene	C00014229
Milligrams/Mile	Heptane	C00014282
Milligrams/Mile	tert-1B-3,5-DM-Benz	C00009819
grams	Nitrogen dioxide emissions rate	R_NO2
grams	Nitrous oxide emissions rate	R_N2O
grams/mile	Nitrogen oxide	NO
grams/mile	Nitrogen dioxide	NO2
Milligrams/Mile	Catalyst Warmup (0/1, No/Yes)	CAT_WARMUP
mph	Target Speed	TR_SPEED
cc	Fuel use from ECU	FUEL_RATE
percent	engine load from ECU	LOAD
ug/second	Particulate Matter	PM10_SEC
mph	Vehicle Speed from Data Logger	SPEED_DL
rpm	Engine Speed from Data Logger	RPM_DL
percent	Engine Load from Data Logger	LOAD_DL
percent	Accelerator Position from Data Logger	PDL_DL
deg. F	Coolant Temperature from Data Logger	RAD_DL
deg. F	Fuel Temperature right side	FUELTMPR
deg. F	Fuel Temperature left side	FUELTMPL
deg. F	Vapor temperature in fuel tank	VAPORTMP
Milligrams/Mile	Air to fuel ratio	AIRFUEL

MEAS_UNIT	MEAS_DESCR	MEAS_ID
rpm	Engine rpm	ENGRPM
deg. F	Oil temperature	OILTMP
grams/mile	Methanol TOG	MEOHTOG
grams/mile	Non-oxygenated HC	NOHC
grams/mile	Organic matter HC equiv	OMHCE
grams/mile	Total species mass	TOTSPECIES
grams/mile	Non-methane organic gases	NMOG
Milligrams/Mile	Ethyne	C00007486
Milligrams/Mile	Propane	C00007498
Milligrams/Mile	Propyne	C00007499
Milligrams/Mile	2,2-DM-Butane	C00007583
Milligrams/Mile	2M-Buane	C00007878
Milligrams/Mile	2M-1,3-Butadiene	C00007879
Milligrams/Mile	2,3-DM-Butane	C00007929
Milligrams/Mile	1,2,4-TM-Benzene	C0009563
Milligrams/Mile	1,2,4,5-TetMBenzene	C00009593
Milligrams/Mile	3M-Pentane	C00009614
Milligrams/Mile	M-Cyclopentane	C00009637
grams	Nitrogen oxide emissions rate	R_NO
Milligrams/Mile	4M-Octane	C00221634
Milligrams/Mile	1M-4-I-ButBenzene	C00516104
Milligrams/Mile	n-ButBenzene	C00010451
Milligrams/Mile		C00099405
Milligrams/Mile	Hexanaldehyde	C00006625
Milligrams/Mile	p-Tolualdehyde	C00010487
Milligrams/Mile	Pentanaldehyde	C00011062
Milligrams/Mile	n-Butyraldehyde	C00012372
Milligrams/Mile	Crotonaldehyde	C00012373
Milligrams/Mile	DICHLOROACETYLENE	C007572294
Milligrams/Mile	Hydrogen Cyanide	C000074908
Milligrams/Mile	Nitrogen Monoxide	C010102319
Milligrams/Mile	Nitrogen Dioxide	C010102440
Seconds	Total Time	TIME_TOT
Grams/Second	Oxides of Nitrogen by FTIR	R_NOx_FTIR
Grams/Second	Carbon Monoxide by FTIR	R_CO_FTIR
Grams/Second	Carbon Dioxide by FTIR	R_CO2_FTIR
Grams/Second	Total Hydrocarbon by FTIR	R_THC_FTIR
rpm	Target RPM	RPM_TR
ft/lb	Target Throttle	TRQ_TR

# Procurement Method Type Category Table

PROC METH	PROC METH _N	PROC METH _D
3W.PROB	12	3-WAY CLOSED LOOP PROBLEM VEHICLE
COMP	6	EMPLOYEE, FRIEND, RELATIVE OF COMPANY
DEALERSHIP	15	DEALERSHIP
FAIL.INSP	11	FAILED STATE INSPECTION LANE
HIMI	13	REGISTRATION LIST / HIGH MILEAGE
I/M.NOX	19	I/M LANE NOX RECRUITED
I/M.LANE	18	I/M LANE ( USUALLY WITH STRATIFIED SAMPLING )
LYV	1	LAST YEAR'S VEHICLE
MVEL.LOAN	17	MVEL LOANER FLEET VEHICLE
NEWS	3	NEWSPAPER AD
OTH	0	OTHER
PARK	8	PARKING LOT SURVEY
PART	7	FRIEND OR RELATIVE OF PARTICIPANT
REG	2	REGISTRATION LIST
REG.SPEC	14	REGISTRATION LIST / SPECIAL REQUIREMENTS
RELG	9	RELIGIOUS, SOCIAL, FRATERNAL, COMMUNITY GROUPS
RENT	5	RENTAL VEHICLE
STATE.MI	16	STATE OF MICHIGAN VEHICLE FLEET
TVRD	4	TV/RADIO AD
OEM	20	ORIGINAL EQUIPMENT MANUFACTURER
I/M.OBD	21	FROM I/M LANE, WITH OBD FAILURE
RENT.OBD	22	RENTAL VEHICLE WITH OBD FAILURE ( MIL LIGHT ON)
AAMA-AIMA	23	AAMA AND AIMA MANUFACTURER'S OWNER LISTS
I/M.PFAIL	24	FROM I/M LANE; RETEST FOLLOWING FAILURE
I/M.NEWOWN	25	FROM I/M LANE; RETEST DUE TO CHANGE IN OWNERSHIP
I/M.PPASS	26	FROM I/M LANE; RETEST DESPITE RECENT PASS
I/M.WAIVER	27	FROM I/M LANE; WAIVERED
I/M.W.240R	28	FROM I/M LANE; WAIVERED ; IM240 FLOWCHART REPAIR
FLEETOWNER	29	LARGE TRUCK FLEET OWNER SUPPLIES VEHICLE TO SPECS.
PARK_SMOKE	30	SMOKING VEHICLES SELECTED FROM PARKING LOT SURVEYS
BY_MSID	31	PREVIOUSLY TESTED VEHICLE RECRUITED BY VIN
ENGFAM&ODO	32	PREVIOUSLY TESTED ENGINE FAMILY RECRUITED BY ODO
ADVERTISE	33	RECRUITED THROUGH ANY TYPE ADVERTIZEMENT
I/M.PROG	34	GENERAL I/M PROGRAM
STATE.NC	35	STATE OF NORTH CAROLINA VEHICLE FLEET
GOVT_FLEET	36	GOVERNMENT FLEET
PURCHASE	37	PURCHASED FOR TEST PURPOSES
MANUF	38	PROVIDED BY MANUFACTURER

### **Fuel Delivery Category Type Table**

FUEL_DELIV	FUEL_DEL_N	FUEL_DEL_D
CARB	1	carbureted
FI	2	fuel injection
HYBRID	3	

### **Fuel Type Category Table**

FUELTYPE	FUELTYPE_N	FUELTYPE_D
GAS	1	GASOLINE POWERED
DIES	2	DIESEL POWERED
BUT	3	BUTANE
CNG	4	COMP NATURAL GAS
PROP	5	PROPANE
ALC	6	ALCOHOL
DBUT	7	DIESEL-BUTANE
DNG	8	DIESEL-NATURAL GAS
DPRO	9	DIESEL-PROPANE
E85	10	85% ETHANOL 15% GAS
E00	11	100% ETHANOL
GAL	12	GASOLINE - ALCOHOL
GELC	13	GASOLINE-ELECTRIC
GNG	14	GASOLINE-NATURAL GAS
GPRO	15	GASOLINE-PROPANE
LNG	16	LIQUID NATURAL GAS
LPG	17	LIQUID PROPANE GAS
M85	18	85% METHANOL 15% GAS
M00	19	100% METHANOL
MIX	20	MULTI-FUELS
NG	21	NATURAL GAS
PNG	22	PROPANE-NATURAL GAS

## **Category Entity Table and Definitions**

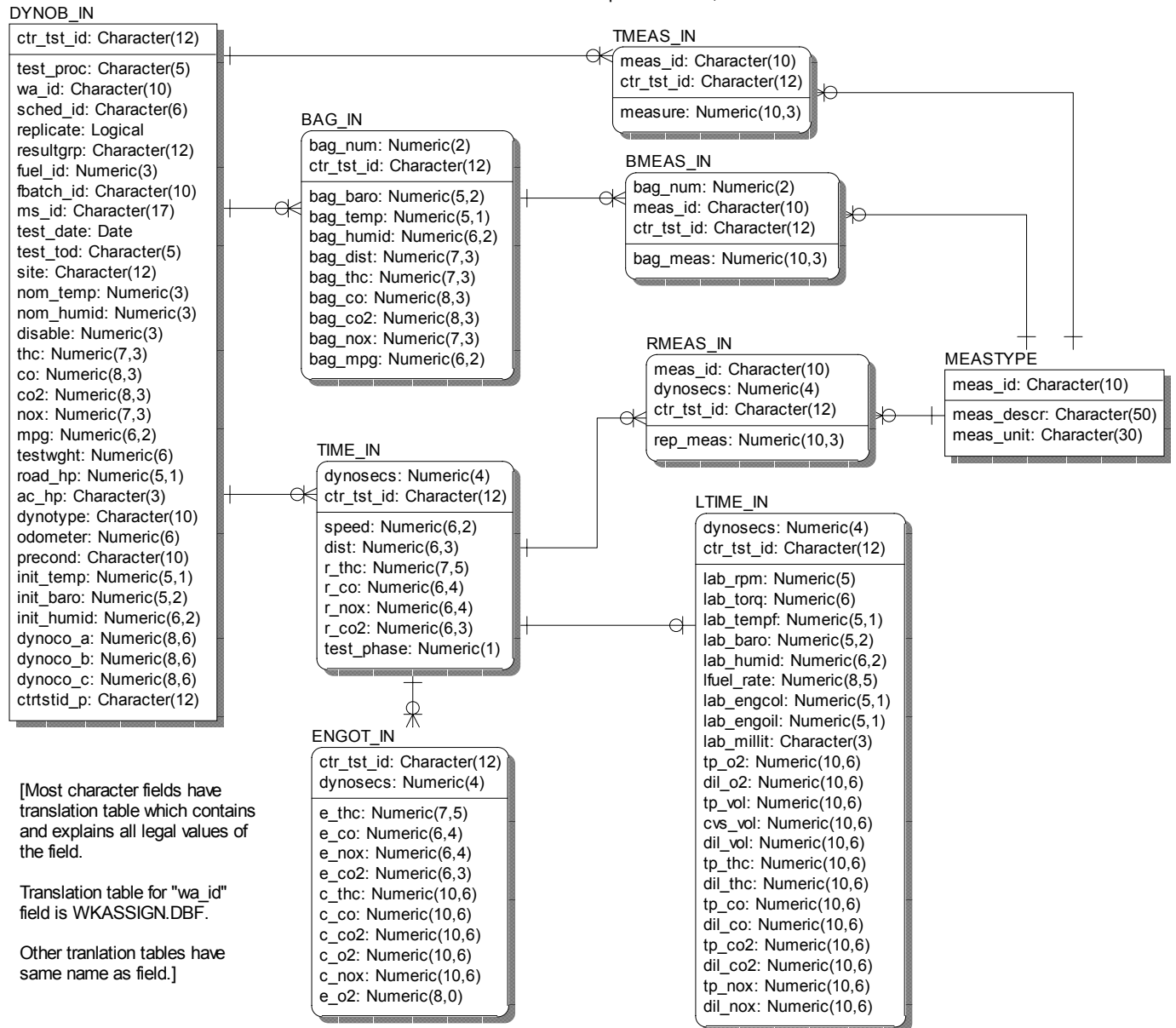
RES_KIND	RES_KIND_N	RES_KIND_D
PROCURE	1	Mobile Source Procurement
INSPECT	2	Emission Component Inspection
OBDSKAN	3	On-board Diagnostic Code Scan
REPAIR	4	Repair (lasting improvement)
DYNOTEST	5	Chassis Dyno, (or Idle) Exhaust Emission Test
EVAPTEST	6	Evaporative Emission Test, e.g. done with SHED
PRESSTST	7	Evaporative System Pressure Check
OWNERQST	8	Vehicle Owner Questionnaire, Short Form
FUELCHM	9	Fuel Analysis
ENGINMAP	10	Engine Maximum Available Power (MAP) Determination
ENGTEST	11	Engine test on engine dynamometer
SMOKETST	12	Smoke test
RUNLOSS	13	Running loss evaporative and exhaust emission test
ROADTEST	14	On Board Instrumented Exhaust Emission Test
ROADTRIP	15	Road trip traveled by an on-road vehicle
ACTIVITY	16	An activity covered by a PEMS/PAMS vehicle.
TRIP	17	A trip traveled by a PEMS/PAMS non-road vehicle.

#### **IV. Detailed Input Data Design Information**

- a. Major Entity – Relationship Diagrams**
- b. Entity and Field Definitions**
- c. Category and Field Definitions**

# **MSOD Input Sturcture - Dynamometer Exhaust Emission Test (GMS/MI)**

DRAFT with new ETIME\_IN  
added on July 12, 2003 by GS  
Changed ETIME\_IN to  
ENGOT\_IN due to conflict with  
EVAP test, updated Oct. 9, 2003  
Last updated Feb. 6, 2004

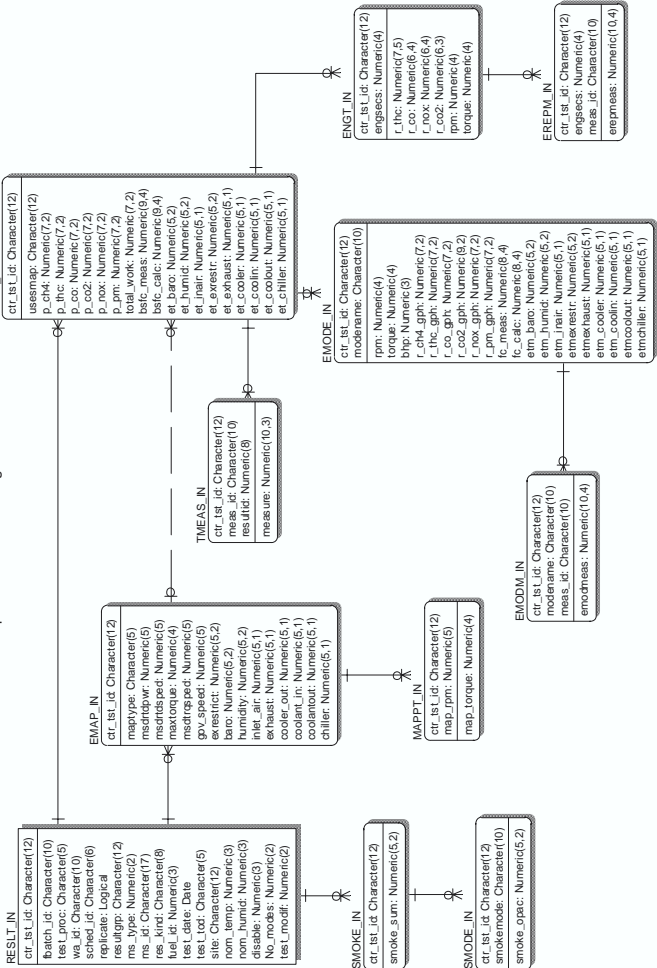




MSOD Input Structure  
for Engine Emission Tests

EQUIP_IN	ctr_is_id: Character(12)
wa_id: Character(10)	
test_date: Date	
test_lot: Character(5)	
site: Character(12)	
veh_ins_id: Character(17)	
veh_ins_id: Character(17)	
exempt: Character(5)	
exempt: Character(5)	
ex.com: Character(20)	
fueltype: Character(4)	
vehcompany: Character(12)	
engcompany: Character(12)	
highway: Character(3)	
so: Character(10)	
model_name: Character(20)	
model_yr: Numeric(4)	
make: Character(12)	
v.bid_date: Date	
disp_cdi: Numeric(4)	
disp_jre: Numeric(4)	
fl_type: Character(6)	
aspirated: Character(7)	
cylinder: Numeric(2)	
injection: Numeric(1)	
cat_type: Character(4)	
alt_in: Character(5)	
test_date: Date	
ignition: Character(3)	
eng_bm: Character(19)	
exp_fm: Character(12)	
overdrive: Character(3)	
lockup: Character(3)	
gears: Character(6)	
ac: Character(3)	
canister: Character(10)	
egr: Character(3)	
fueltanks: Numeric(1)	
tank_car: Numeric(6)	
egr_type: Character(6)	
dr_in: Character(4)	
eng_cycles: Character(20)	
e_bid_date: Date	
eng_mod_yr: Numeric(4)	
cooling: Character(7)	
fl_meth: Character(4)	
fl_press: Numeric(6)	
eng_cycle: Character(1)	
ratedpower: Numeric(7)	
ratedspeed: Numeric(5)	
idle_rpm: Numeric(5)	
tech_conf: Character(50)	
ecs_descpt: Character(50)	
elect_cont: Character(10)	
emissions: Character(10)	
proc_odom: Numeric(8)	
hour_meter: Numeric(8)	
rebuild_ct: Numeric(2)	
rebuild_dt: Date	
rebuildwhy: Character(30)	
modis: Character(10)	
gwr: Character(6)	
gwr: Numeric(6)	
comments: Character(254)	

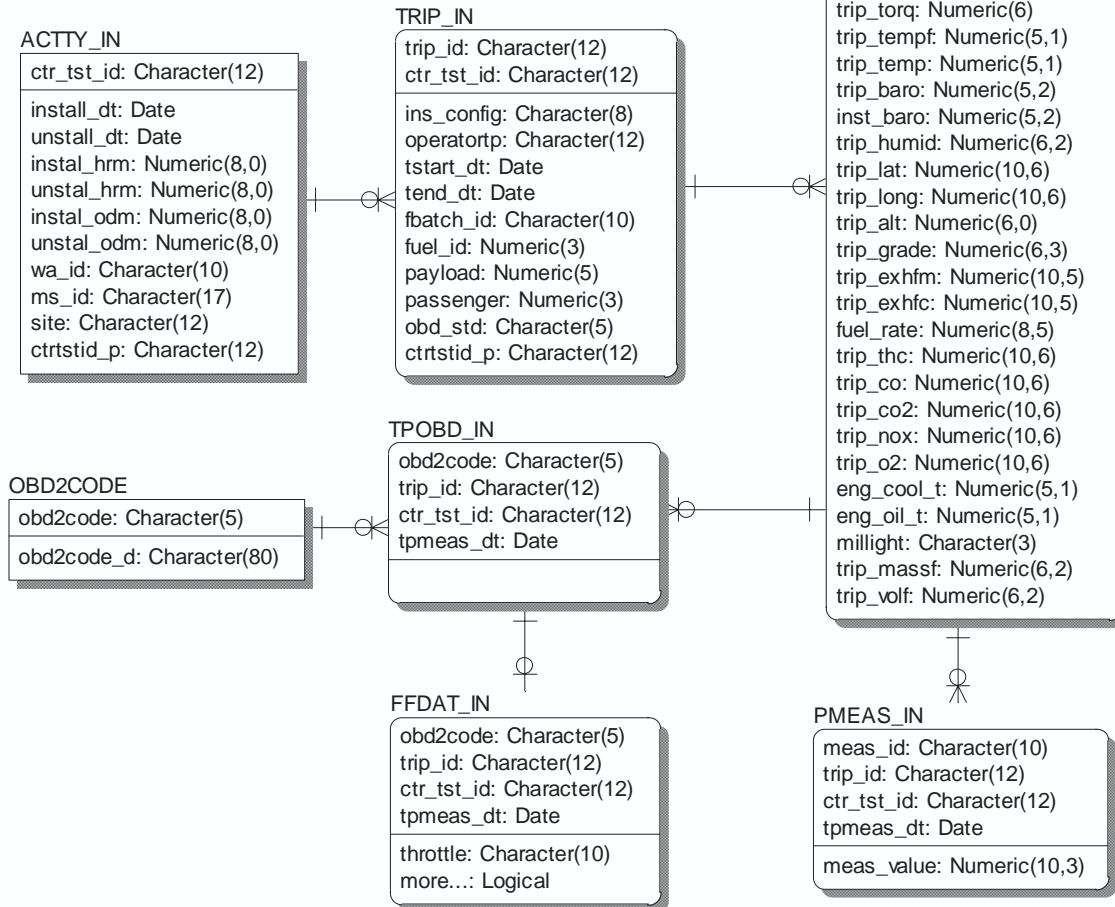
EQUIP\_IN represent procurement  
of an engine in a vehicle.  
RESULT\_IN and ETEST\_IN  
represent a test of the engine.



## Mobile Source Observation Database

### Input Tables of PEMS/PAMS Trip Activity

Aug. 2, 2001 created.  
Dec. 17, 2001 last  
update.



EQUIP_IN
ctr_tst_id: Character(12)
wa_id: Character(10)
test_date: Date
test_tod: Character(5)
site: Character(12)
veh_ms_id: Character(17)
eng_ms_id: Character(17)
vehclass: Character(5)
except: Character(3)
ex_comm: Character(20)
fueltype: Character(4)
vehcompany: Character(12)
engcompany: Character(12)
highway: Character(3)
purpose: Character(100)
scc: Character(14)
model_name: Character(20)
model_yr: Numeric(4)
make: Character(12)
v_bld_date: Date
disp_cid: Numeric(4)
disp_liter: Numeric(4, 1)
fuel_deliv: Character(6)
fi_type: Character(6)
aspirated: Character(7)
cylinder: Numeric(2)
injectors: Numeric(1)
cat_type: Character(4)
air_inj: Character(5)
closedloop: Character(3)
ignition: Character(2)
eng_fam: Character(19)
evap_fam: Character(12)
overdrive: Character(3)
creeper: Character(3)
lockup: Character(3)
gears: Character(6)
curbweight: Numeric(6)
ac: Character(3)
canister: Character(10)
egr: Character(3)
fuel tanks: Numeric(1)
tank_cap: Numeric(3)
egr_type: Character(6)
drv_tm: Character(4)
engseries: Character(20)
eng_class: Character(7)
e_bld_date: Date
eng_mod_yr: Numeric(4)
cooling: Character(7)
fi_meth: Character(4)
fi_press: Numeric(6)
parttrap: Character(3)
eng_cycle: Character(1)
ratedpower: Numeric(7, 1)
ratedspeed: Numeric(5)
idle_rpm: Numeric(5)
tech_conf: Character(50)
ecs_descpt: Character(50)
elect_cont: Character(100)
procmeth: Character(10)
proc_odom: Numeric(6)
hour_meter: Numeric(6)
rebuild_ct: Numeric(2)
rebuild_dt: Date
rebuildwhy: Character(30)
modifs: Character(100)
tran_type: Character(6)
gwr: Numeric(6)
gcwr: Numeric(6)
comments: Character(254)
ownership: Character(7)
depot: Character(12)
peaktorque: Numeric(4)
peakspeed: Numeric(5)
peakrate: Numeric(5, 1)
ratedrate: Numeric(5, 1)
cert_nox: Numeric(6, 3)
cert_pm: Numeric(6, 3)
axle: Numeric(2)
cert_co: Numeric(6, 3)
cert_hc: Numeric(6, 3)
vin8: Character(8)
vin_body: Character(30)
thcstd: Numeric(6, 3)
costd: Numeric(6, 3)
noxstd: Numeric(6, 3)
pmstd: Numeric(6, 3)
veh_lane: Numeric(5)
statetest: Character(8)
cuthc: Numeric(5, 2)
cutco: Numeric(6, 2)
cutnox: Numeric(5, 2)
cutpoints: Numeric(2)
im_station: Numeric(3)
vindcode: Character(12)
cat_age: Numeric(6)

## MSOD Equipment Input Table

Aug. 2, 2001 created

**Input Table Equip\_in that represents procurement of an engine and its vehicle.**

# MSOD Input Data Entry Structure for Evaporative Emission Test

EVAP\_IN

ctr_tst_id: Character(12)
wa_id: Character(10)
test_proc: Character(5)
replicate: Logical
sched_id: Character(6)
fuel_id: Numeric(3)
fbatch_id: Character(10)
ms_id: Character(17)
test_date: Date
test_tod: Character(5)
site: Character(12)
nom_temp: Numeric(3)
nom_humid: Numeric(3)
disable: Numeric(3)
w_evap_thc: Numeric(6,2)
precond: Character(10)

TMEAS\_IN

meas_id: Character(10)
ctr_tst_id: Character(12)
measure: Numeric(10,3)

[Most character fields have translation table which contains and explains all legal values of the field.

Translation table for "wa\_id" field is WKASSIGN.DBF.

ETIME\_IN

evapmins: Numeric(5)
ctr_tst_id: Character(12)
evap_barom: Numeric(5,2)
shed_temp: Numeric(5,1)
fuel_temp: Numeric(5,1)
w_cum_thc: Numeric(6,2)

Other translation tables have same name as field.]

## MSOD Input Structure for Evaporative System Pressure Check

### PRESS\_IN

ctr\_tst\_id: Character(12)

wa\_id: Character(10)

test\_proc: Character(5)

ms\_id: Character(17)

replicate: Logical

test\_date: Date

test\_tod: Character(5)

site: Character(12)

capokstant: Character(3)

press\_init: Numeric(4,1)

press\_2min: Numeric(4,1)

press\_odom: Numeric(6)

[Note: Legal values of "wa\_id" are contained and explained in the translation table WKASSIGN. Legal values of "test\_proc", by the table TEST\_PRO, legal values of "site" by SITE.DBF.]

## MSOD Input Structure for Fuel Batch

Designed: August 28, 2000

### FBAT\_IN

fbatch_id: Character(10)
mfg_batch: Character(18)
cetane_num: Numeric(5,2)
cetane_idx: Numeric(5,2)
cetane_imp: Numeric(5,2)
cetane_typ: Character(1)
sulfur: Numeric(5)
sulf_agent: Character(20)
nitrogen: Numeric(5)
tarom: Numeric(5,2)
marom: Numeric(5,2)
parom: Numeric(5,2)
IBP: Numeric(4)
T10: Numeric(4)
T50: Numeric(4)
T90: Numeric(4)
EP: Numeric(4)
spec_grav: Numeric(6,4)
API_grav: Numeric(5,2)
density: Numeric(5,3)
viscosity: Numeric(4,2)
flash: Numeric(4)
cloud: Numeric(4)
pour: Numeric(4)
hcratio: Numeric(5,3)
oxygen: Numeric(4,2)
oxy_type: Character(20)
additives: Numeric(5,2)
lubric_g: Numeric(5,0)
lubric_mm: Numeric(4,2)
heat: Numeric(6)
ash: Numeric(4,2)
ron: Numeric(5,1)
mon: Numeric(5,1)
fen_c: Numeric(4,0)
wgt_fractn: Numeric(7,4)
recovery: Numeric(4,1)
residue: Numeric(4,1)
loss: Numeric(4,1)
rvp: Numeric(4,1)
comp_olefn: Numeric(4,1)
comp_sat: Numeric(4,1)
wa_id: Character(10)
res_kind: Character(8)
fuel_id: Numeric(3)
comp_aroma: Numeric(4,1)

## MSOD Input Structure for Vehicle Tank Fuel Analysis

### FUEL\_IN

ctr\_tst\_id: Character(12)  
meas\_id: Character(10)

wa\_id: Character(10)  
ms\_id: Character(17)  
test\_date: Date  
test\_tod: Character(5)  
site: Character(12)  
fuelmeas: Numeric(10,4)

[Note: legal values of "wa\_id  
are contained and explained in  
translation table WKASSIGN.DBF,  
of "site" in SITE.DBF, and of "meas\_id"  
in MEASTYPE.DBF.]

## MSOD Input Structure for Vehicle Inspection

[ Fields "site" and "part" have translation tables SITE.DBF and PART.DBF which contain and explain their legal values.

Similar translation table for "wa\_id" is WKASSIGN.DBF.

Table PART\_CODE.DBF contains and explains all legal values of PART\_CODE for particular values of "part".]

07/15/02 GS

(1) Changed insp\_date to test\_date, and insp\_tod to test\_tod.

(2) added a new attribute smokecolor to insp\_in. (3) changed cardinality to zero, one or more for part\_in

(means part\_in is not required by imsp\_in).

INSP\_IN

ctr_tst_id: Character(12)
wa_id: Character(10)
ms_id: Character(17)
site: Character(12)
test_date: Date
test_tod: Character(5)
comments: Character(254)
comments2: Character(254)
insp_odom: Numeric(6)
g_can_init: Numeric(7,1)
g_can_purg: Numeric(7,1)
g_can_load: Numeric(7,1)
smokecolor: Character(6)

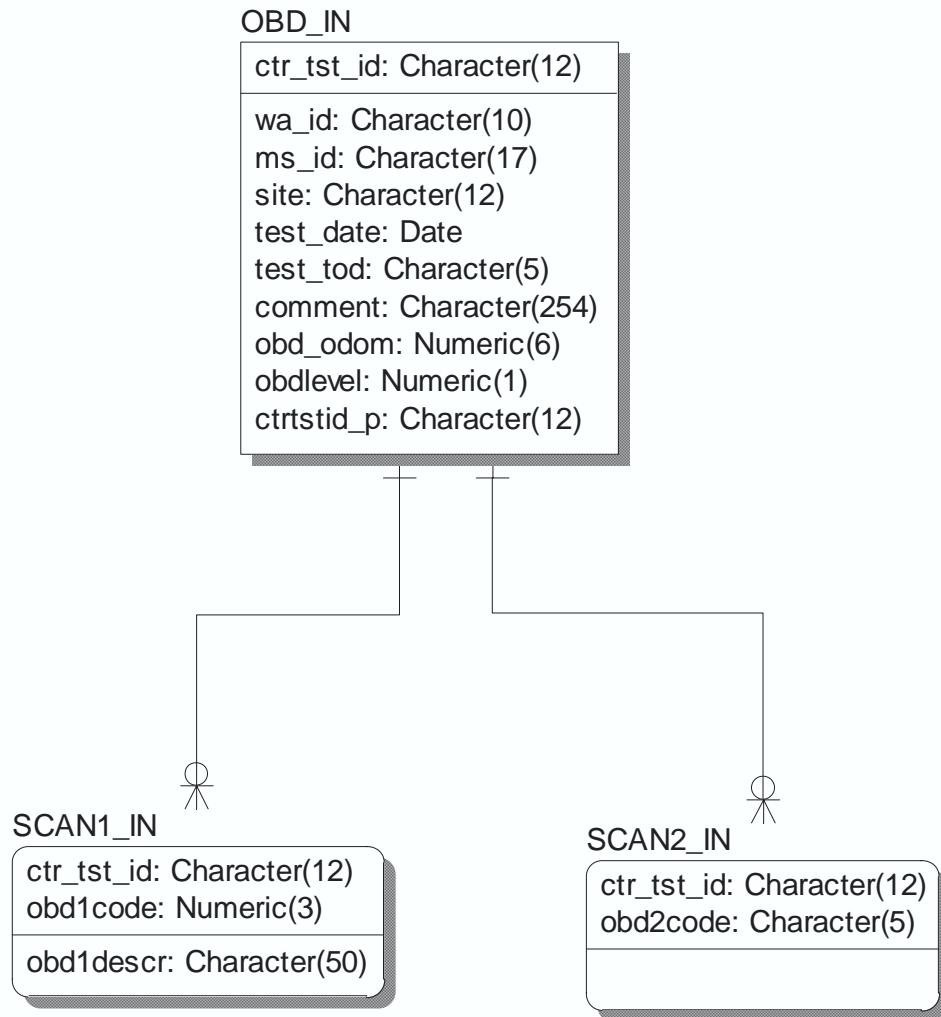


PART\_IN

part: Character(4)
part_code: Numeric(2)
ctr_tst_id: Character(12)



## MSOD Input Structure for On Board Diagnostic System Scan



## MSOD Input Structure for On Board Enhanced Diagnostic System Scan

This version assumes that all OBD scan codes are from vehicles with "enhanced" OBD systems.

OBD\_IN

ctr_tst_id: Character(12)
wa_id: Character(10)
ms_id: Character(17)
site: Character(12)
test_date: Date
test_tod: Character(5)
comment: Character(254)
obd_odom: Numeric(6)
obdlevel: Numeric(1)
ctrstid_p: Character(12)



SCAN2\_IN

ctr_tst_id: Character(12)
obd2code: Character(5)

## MSOD Input Structure for Vehicle Repair

[Fields "site", "rep\_type",  
and "wa\_id" have  
translation table which contains  
and explains all legal values  
of the field.

Translation table for "wa\_id" field  
is WKASSIGN.DBF.

Other translation tables have same  
name as field.]

07/15/02 GS Changed repar\_date  
to test\_date, and repar\_tod to test\_tod.

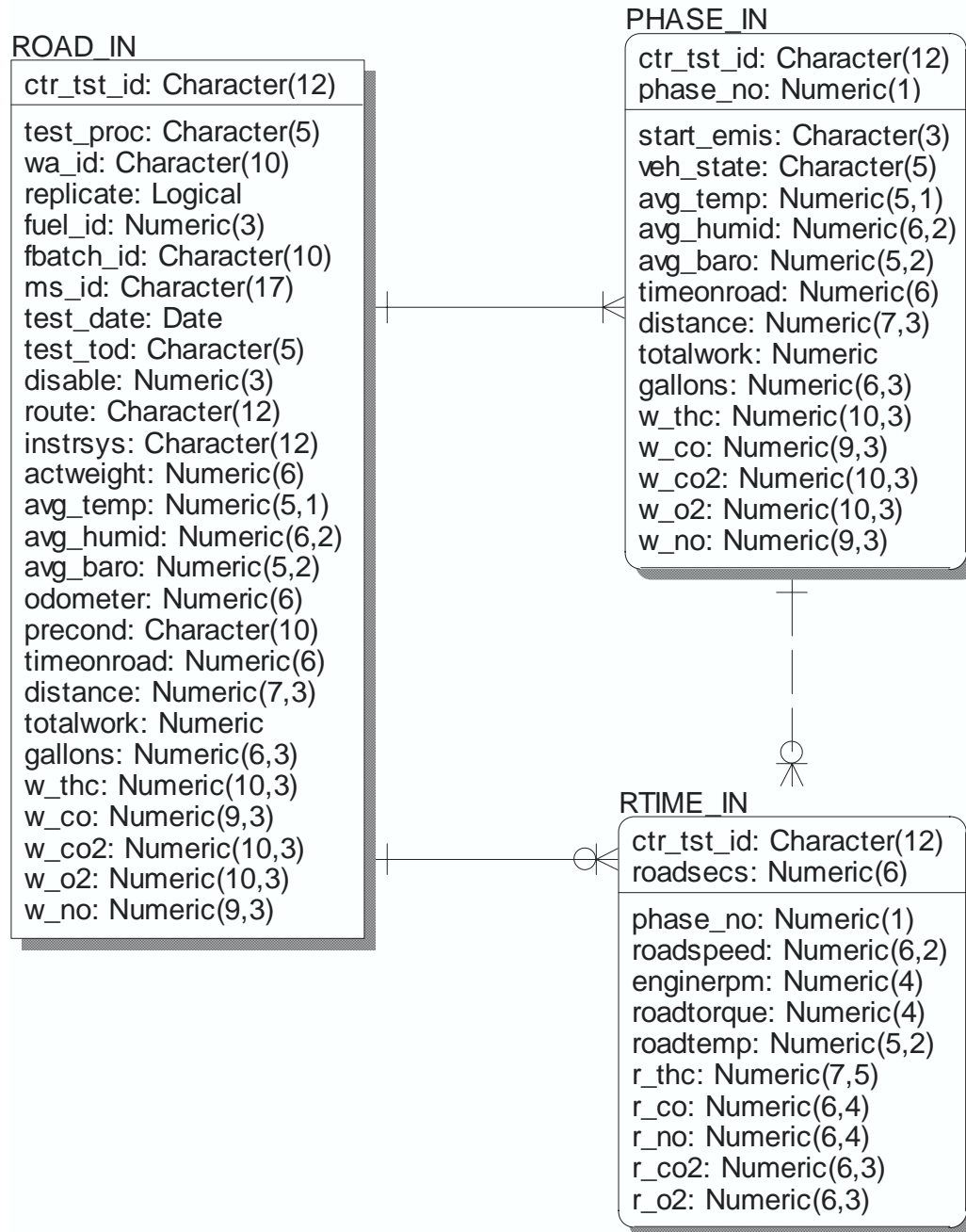
### REPAR\_IN

ms_id: Character(17)
test_date: Date
test_tod: Character(5)

wa_id: Character(10)
site: Character(12)
ctr_tst_id: Character(12)
rep_type: Numeric(3)
repar_hrm: Character(5)
comments: Character(254)
comments2: Character(254)
repar_odom: Numeric(6)

# MSOD Input Structure for On-Road Exhaust Emission Test

May 10, 2000



## MSOD Input Structure for Running Loss Emission Test

### RUNL\_IN

ctr_tst_id: Character(12)
test_proc: Character(5)
wa_id: Character(10)
sched_id: Character(6)
replicate: Logical
fuel_id: Numeric(3)
fbatch_id: Character(10)
ms_id: Character(17)
test_date: Date
test_tod: Character(5)
site: Character(12)
nom_temp: Numeric(3)
nom_humid: Numeric(3)
disable: Numeric(3)
testwght: Numeric(6)
road_hp: Numeric(5,1)
ac_hp: Character(3)
dynotype: Character(10)
odometer: Numeric(6)
precond: Character(10)
tarcanwght: Numeric(4)
norcanwght: Numeric(4)
endcanwght: Numeric(4)
targiftemp: Numeric(3)
obsiftemp: Numeric(3)

### RUNLB\_IN

ctr_tst_id: Character(12)
bag_num: Numeric(2)
bag_baro: Numeric(5,2)
bag_temp: Numeric(5,1)
bag_humid: Numeric(6,2)
bag_dist: Numeric(7,3)
bag_thc: Numeric(7,3)
bag_co: Numeric(8,3)
bag_co2: Numeric(8,3)
bag_nox: Numeric(7,3)
bag_mpg: Numeric(6,2)
w_runl_thc: Numeric(7,2)
targ_ftemp: Numeric(3)
obs_ftemp: Numeric(3)
tank_press: Numeric(5,1)
purg_flow: Numeric(7,1)

[Most character fields have translation table which contains and explains all legal values of the field.

Translation table for "wa\_id" field is WKASSIGN.DBF.

Other translation tables have same name as field.]

## MSOD Input Structure for Vehicle Procurement

[Most character fields have translation table which contains and explains all legal values of the field.

Translation table for "wa\_id" field is WKASSIGN.DBF.

Other translation tables have same name as field.]

### VEHP\_IN

ms_id: Character(17)
wa_id: Character(10)
proc_date: Date
proc_tod: Character(5)
site: Character(12)
ctr_prc_id: Character(12)
procmeth: Character(10)
proc_odom: Numeric(6)
fueltype: Character(4)
company: Character(12)
disp_cid: Numeric(4)
disp_liter: Numeric(4,1)
fuel_deliv: Character(6)
venturis: Numeric(2)
fi_type: Character(6)
aspirated: Character(7)
cylinder: Numeric(2)
air_inj: Character(5)
cat_type: Character(4)
closedloop: Character(3)
ignition: Character(2)
vehclass: Character(5)
model_yr: Numeric(4)
make: Character(12)
model_name: Character(20)
overdrive: Character(3)
tran_type: Character(6)
creeper: Character(3)
lockup: Character(3)
gears: Character(6)
gwr: Numeric(6)
gcwr: Numeric(6)
curbweight: Numeric(6)
ac: Character(3)
bld_date: Date
fueltanks: Numeric(1)
tank_cap: Numeric(3)
canister: Character(10)
eng_fam: Character(19)
evap_fam: Character(12)
drv_trn: Character(4)

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## **MSOD Input Structure**

### **Major Entity Name & Definition Report**

Entity Name	Entity Definition
ACTTY_IN	An activity is a collection of trips traveled by an PEMS/PAMS non-road vehicle.  This result subtype is identified in RESULT by RES_KIND = "ACTIVITY".
BAG_IN	One bag set of a DYNOTEST. (A bag set usually results from two physical bags: one sample and one background, with the background measurements subtracted from the sample measurements to yield the bag set measurements).  A single set of bag test results are stored here, as well as at the summary test level. Many DYNOTESTs involving bagged emission measurements utilize multiple bag sets.
BMEAS_IN	Used to store a MEASTYPE measurement at the test bag level.
DYNOB_IN	This input table stores the results of a vehicle chassis exhaust emission test whose results are expressed in grams per mile. This test is eventually stored as entity DYNOTEST.  This input table stores information pertaining to the test as a whole.  Note: The emission summary result fields in this entity are used only to summarize the results of bagged exhaust emission tests.
EMAP_IN	This result subtype stores an engine "MAP". Maximum available power or torque as a function of RPM.  This result subtype is identified in RESULT by RES_KIND = "ENGINMAP".
EMODE_IN	The results of one steady-state mode of an engine dynamometer test. (Only used to store steady-state results.)
EMODM_IN	Used to store a MEASTYPE measurement at the engine test mode level.
ENGOT_IN	A point in time during a DYNOTEST when measuring engine out emissions.
ENGT_IN	A point in time within an ENGTEST.
EQUIP_IN	This Input Table Represents Procurement of both Equipment and Engine
EREPM_IN	A non-core measurement associated with a point in time in an engine test (i.e. an ENGTIME).
ETEST_IN	This result subtype stores the results of an engine test performed on an engine dynamometer, exclusive of smoke opacity measurement. This subtype is identified by RES_KIND = "ENGTEST".
ETIME_IN	One point in time during an evaporative emission test.
EVAP_IN	This entity stores the results of an evaporative emission test. This table stores information pertaining to the test as a whole.
FBAT_IN	A particular batch of fuel that can be used to power mobile sources during emission tests.  Unlike a FUEL, which is a general kind of fuel, instances of this entity represent a physical batch of fuel that has measured properties.
FF_DATA	Freeze frame data.
FUEL_IN	This result subtype stores the results of an analysis of the fuel being used in the mobile source.
INSP_IN	This input entity is used to store the results of the emission component inspection often referred to as the M1 maintenance inspection, or just M1 maintenance.  This top level entity is used to store information about the inspection as a whole.
LTIME_IN	LTIME_IN is to store measurements used to calculate the mass per unit time measurements found in the input table TIME_IN during a lab test.
MAPPT_IN	A single point within an engine map.
MEASTYPE	A type of numeric, "non-core", emission-related measurement. e.g. methane emissions in grams per mile, not usually performed.  Note: This table does not store a result measurement, but information about a kind of measurement.
OBD_IN	This input entity is used to store summary level information pertaining to a scan of a vehicle's on board diagnostic system. Both level 1 and level 2 on board diagnostic systems scans are supported by this data structure.  This table is used to store information pertaining to the scan as a whole.
OBD2CODE	OBD2 scan code. Contains information about the code itself. e.g. its meaning.
PART_IN	Emission component part code inspection.
PHASE_IN	A portion of a roadtest. This portion must correspond to a single, contiguous period of time within the time period of the complete test.
PMEAS_IN	Used to store a MEASTYPE measurement at the test time point level.
PRESS_IN	This Result Subtype stores the result of an evaporative system pressure check.
REPAR_IN	The type of repair performed on a vehicle.
RESLT_IN	Any observation, measurement, or modification to an M_SOURCE including...  Information pertinent to the procurement of the M_SOURCE.  An outcome of any test procedure performed on an M_SOURCE, such as an exhaust emissions test or an evaporative emissions test.



Entity Name	Entity Definition
	<p>Observations of the M_SOURCE, e.g. a questionnaire about the M_SOURCE submitted by the owner.</p> <p>Repairs or modifications made to the M_SOURCE which could effect future measurements.</p> <p>Additional Notes:  1. This entity is broken down into an incomplete collection of dependent subtype entities based on its RES_KIND field. Additional result subtypes will be added as are needed.</p>
RMEAS_IN	Used to store a MEASTYPE measurement at the test time point level.
ROAD_IN	<p>This entity communicates the results of a vehicle exhaust emission test performed during on-road driving. These results are ultimately stored as a ROADTEST type RESULT. This table stores information pertaining to the test as a whole.</p> <p>The entity name ROAD_IN reflects the fact that the vehicle has been equipped with on board exhaust emission measurement instrumentation and that the emission measurements can therefore be made during actual use rather than in a laboratory.</p>
RTIME_IN	A point in time during an on-road exhaust emission test.
RUNL_IN	The results of a vehicle chassis running loss emission test, eventually stored as entity RUNLOSS. This table stores information pertaining to the test as a whole.
RUNLB_IN	A portion of a "running loss" test, identified by "bag number" within the test.
SCAN1_IN	An individual scan code resulting from a scan of a level 1 on board diagnostic system.
SCAN2_IN	An individual scan code resulting from a scan of a level 2 on board diagnostic system.
SMODE_IN	One mode of a smoke test procedure.
SMOKE_IN	This result subtype stores the results of a smoke opacity test. This subtype is identified by RES_KIND = "SMOKETST".
TIME_IN	A point in time during a DYNOTEST.
TMEAS_IN	Used to store a MEASTYPE measurement at the summary test level.
TRIP_IN	<p>A trip traveled by an PEMS/PAMS non-road vehicle.</p> <p>This result subtype is identified in RESULT by RES_KIND = "TRIP".</p> <p>This result subtype is similar to a ROADTEST. The primary purpose of a ROADTEST is to measure exhaust emissions. The purpose of a ROADTRIP is to measure other aspects of the vehicle's usage or activity.</p>
TRIPOBD_IN	One or more OBD code(s) occurring at a point in time during a trip.
TTIME_IN	A point in time during a trip.
VEHP_IN	A table containing attributes that describes a vehicle.

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# **Entity and Category Attribute Definition Report for Input Structures**

"ACCTY_IN" Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) The RES_KIND of the RESULT record ="ACTIVITY". Note that a ctr_tst_id can have only one activity and vice versa.  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
install_dt	Data and time the unit, e.g., PEMS or PAMS, was installed onto the vehicle.	Yes	No
uninstall_dt	Data and time the unit, e.g., PEMS or PAMS, was uninstalled from the vehicle.	Yes	No
instal_hrm	Hour meter reading at the time the unit, e.g., PEMS or PAMS, was installed.	No	No
unstal_hrm	Hour meter reading at the time the unit, e.g., PEMS or PAMS, was uninstalled.	No	No
instal_odm	Odometer reading at the time the unit, e.g., PEMS or PAMS, was installed.	No	No
unstal_odm	Odometer reading at the time the unit, e.g., PEMS or PAMS, was uninstalled.	No	No
wa_id	Work Assignment (or equivalent for TSD) name.	No	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
site	Location where test was conducted. Legal values defined by SITE translation table.	No	No
ctrstid_p	This will equal the ctr_tst_id field from EQUIP_IN, added to provide a link between tables.	No	No

"BAG_IN" Entity			
Name	Definition	Required	Primary Key
bag_num	Bag number.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
bag_baro	Barometric pressure, expressed in inches of mercury.	No	No
bag_temp	Temperature, expressed in degrees Fahrenheit.	No	No
bag_humid	Humidity, expressed in grains of water per pound of dry air.	No	No
bag_dist	distance traveled, expressed in miles.	No	No
bag_thc	Total hydrocarbon emissions, expressed in grams per mile.	No	No
bag_co	Carbon monoxide emissions, expressed in grams per mile.	No	No
bag-co2	Carbon dioxide emissions, expressed in grams per mile.	No	No
bag_nox	Emissions of oxides of nitrogen, expressed in grams per mile.	No	No
bag_mpg	Fuel economy expressed in miles per gallon.	No	No

"BMEAS_IN" Entity			
Name	Definition	Required	Primary Key
bag_num	Bag number.	Yes	Yes
meas_id	Measurement type identification	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
bag_meas	Bag-level measurement.	No	No

"DYNOB_IN" Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
test_proc	Identifies the specific test procedure used. A more detailed classification than RES_KIND. Based largely upon values of TEST_TYPE in earlier design. Conceptually distinct from the driving or operational schedule used.	Yes	No
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
sched_id	Schedule identification.	Yes	No

<b>"DYNOB_IN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
replicate	TRUE if test is a replicate of one already entered. Otherwise FALSE.	No	No
resultgrp	Contains the ctr_tst_id of any test, e.g. an SFTP test, of which this test is a component part.  A blank value indicates that this test is not part of a higher-level test group.	No	No
fuel_id	Numeric code uniquely identifying the general type of fuel used. (Sometimes referred to as the "gross fuel type")	Yes	No
fbatch_id	Fuel batch identification.	No	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
test_date	Test date. MM/DD/YYYY	No	No
test_tod	Time of day of the start of the test. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted.	No	No
nom_temp	Nominal temperature at which test was to be conducted. Expressed in degrees Fahrenheit.	No	No
nom_humid	Nominal absolute humidity at which test was to be conducted. Expressed in grains of water per pound of dry air.	No	No
disable	Indication of any special conditions or "disablements" performed on the mobile source for particular tests. A value of zero indicates that no special condition or disablement to the vehicle was performed. Positive values indicate a particular disablement or set of disablements as defined in the translation table for this field. e.g. 1 = gas cap removed, 2 = evap canister removed, 3 = both gas cap and canister removed, etc.	No	No
thc	Total hydrocarbon emissions, expressed in grams/mile. (Composite bag result for the entire test)	No	No
co	Carbon monoxide emissions, expressed in grams/mile. (Composite bag result for the entire test)	No	No
co2	Carbon dioxide emissions, expressed in grams/mile. (Composite bag result for the entire test)	No	No
nox	Oxides of nitrogen emissions, expressed in grams/mile. (Composite bag result for the entire test)	No	No
mpg	Fuel economy, expressed in miles/gallon. (Composite bag result for the entire test)	No	No
testwght	Dynamometer inertia weight setting used for this test. Expressed in pounds.	No	No
road_hp	Dynamometer road load horsepower setting used for this test.	No	No
ac_hp	Did dynamometer road load setting for this test include air conditioning load factor? (YES, NO, or NUL)	No	No
dynotype	Type of dynamometer used. Valid values for this field, are contained in the DYNOTYPE code translation table.	No	No
odometer	Odometer reading of vehicle at beginning of test. (Expressed in miles)	No	No
precond	Type of preconditioning performed on the vehicle prior to the test. Legal values defined by translation table PRECOND.DBF	No	No
init_temp	Initial test temperature in degrees F. For bag tests this will often have the null value of 0, since it is reported at the bag level.	No	No
init_baro	Barometric pressure measured at the beginning of the test. Expressed in inches of mercury. This will often have the null value of 0 since it was usually reported at the bag level.	No	No
init_humid	Absolute humidity measured at beginning of test. Expressed in grains of water per pound of dry air. Often assumes null value of zero in this table, since it is often reported at the bag level.	No	No
dynoco_a	The "a" term. Dynamometer road load power absorption coefficient in pounds force.	No	No
dynoco_b	The "b" term. Dynamometer road load power absorption coefficient in (pounds force)/(miles per hour).	No	No
dynoco_c	The "c" term. Dynamometer road load power absorption coefficient in (pounds force)/(miles per hour)^2.	No	No
ctrstid_p	This will equal the ctr_tst_id field from EQUIP_IN, added to provide a link between tables.	No	No

<b>"EMAP_IN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
maptype	Type of Engine Map. Legal values defined by MAPTYPE translation table.	No	No

“EMAP_IN” Entity			
Name	Definition	Required	Primary Key
msdrtdpwr	Measured rated horsepower.	No	No
msdrtdsped	Measured rated speed (rpm)	No	No
maxtorque	Measured peak torque. Expressed in foot pounds	No	No
msdtrqsped	Measured torque speed. Expressed in rpm.	No	No
gov_speed	Governed central speed (rpm)	No	No
exrestrict	Exhaust restriction pressure. Expressed in inches of mercury.	No	No
baro	Barometric pressure. Expressed in inches of mercury.	No	No
humidity	Absolute humidity. Expressed in grains of water per pound of dry air.	No	No
inlet_air	Engine inlet air temperature. Expressed in degrees F.	No	No
exhaust	Exhaust temperature, after emission controls. Expressed in degrees F.	No	No
cooler_out	Air temperature after intercooler. Expressed in degrees F.	No	No
coolant_in	Engine coolant input temperature. Expressed in degrees F.	No	No
coolantout	Engine coolant output temperature. Expressed in degrees F.	No	No
chiller	Chiller water temperature. Expressed in degrees F.	No	No

“EMODE_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
modename	Name of engine test mode. Based on its reference speed, speed fraction, and load fraction. Legal values defined by ENGMODE translation table	Yes	Yes
rpm	Measured engine rpm.	No	No
torque	Measured torque. Expressed in foot-pounds.	No	No
bhp	Brake horsepower.	No	No
r_ch4_gph	Methane emission rate. Expressed in grams per hour.	No	No
r_thc_gph	Total hydrocarbon emission rate. Expressed in grams per hour.	No	No
r_co_gph	Carbon monoxide emission rate. Expressed in grams per hour.	No	No
r_co2_gph	Carbon dioxide emission rate. Expressed in grams per hour.	No	No
r_nox_gph	Oxides of nitrogen emission rate. Expressed in grams per hour.	No	No
r_pm_gph	Total particulate emission rate. Expressed in grams per hour.	No	No
fc_meas	Measured fuel consumption. Expressed in kg. per hour.	No	No
fc_calc	Calculated fuel consumption. Expressed in kg per hour.	No	No
etm_baro	Average barometric pressure during engine test mode. Expressed in inches of Hg.	No	No
etm_humid	Average absolute humidity during engine test mode. Expressed in grains of water per pound of dry air.	No	No
etm_inair	Engine inlet air temperature. Expressed in degrees F.	No	No
etmexrestr	Exhaust restriction pressure. Expressed in inches of Hg.	No	No
etmexhaust	Exhaust temperature, after emission controls. Expressed in degrees F.	No	No
etm_cooler	Air temperature after intercooler. Expressed in degrees F.	No	No
etm_coolin	Engine coolant input temperature. Expressed in degrees F.	No	No
etmcoolout	Engine coolant output temperature. Expressed in degrees F.	No	No
etmchiller	Chiller water temperature. Expressed in degrees F.	No	No

“EMODM_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
modename	Name of engine test mode. Based on its reference speed, speed fraction, and load fraction. Legal values defined by ENGMODE translation table	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
emodmeas	Engine test mode level measurement of this MEAS ID	No	No

<b>“ENGOT_IN” Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
e_thc	Engine-out total hydrocarbon emissions measurement, expressed in grams per second	No	No
e_co	Engine-out Carbon monoxide emissions measurement, expressed in grams per second	No	No
e_nox	Engine-out Oxides of nitrogen emissions measurement, expressed in grams/sec	No	No
e_co2	Engine-out carbon dioxide emissions measurement, expressed in grams/second	No	No
c_thc	Total hydrocarbon emissions in ppm by volume.	No	No
c_co	Carbon monoxide emissions in ppm by volume.	No	No
c_co2	Carbon Dioxide emissions measurement, expressed in weight percent (%).	No	No
c_o2	Oxygen emissions measurement, expressed in weight percent (%).	No	No
c_nox	Oxides of nitrogen emissions in ppm by volume.	No	No
e_o2	Engine-out oxygen emissions measurement, expressed in grams/second	No	No

<b>“ENGT_IN” Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
engsecs	Time within an engine dynamometer test, expressed in seconds, beginning of test has engsecs = 0.	Yes	Yes
r_thc	Total hydrocarbon emissions measurement. Expressed in grams per second.	No	No
r_co	Carbon monoxide emissions measurement. Expressed in grams per second.	No	No
r_nox	Oxides of nitrogen emissions measurement. Expressed in grams per sec.	No	No
r_co2	Carbon dioxide emissions measurement. Expressed in grams per second.	No	No
rpm	Measured engine rpm.	No	No
torque	Measured torque. Expressed in foot-pounds.	No	No

<b>“EQUIP_IN” Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the equipment procurement by a test contractor. (Hopefully uniquely identifies all RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
wa_id	Work Assignment (or equivalent for TSD) name	No	No
test_date	Date the equipment was procured.	No	No
test_tod	Time of day the equipment was procured. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted. Legal values defined by SITE translation table.	No	No
veh_ms_id	Mobile source identifier. For equipment this would be the serial number that best identifies the equipment as a whole.	Yes	No
eng_ms_id	Serial number of the engine.	No	No
vehclass	Vehicle class. Will have a translation table.	No	No
except	YES if something is exceptional about this mobile source that would make it an outlier for most analysis. (e.g. engine has been replaced, etc.)	No	No
ex_comm	Used if except is true. Comment as to why vehicle is exceptional.	No	No
fueltype	Type of fuel mobile source is designed to use. "GAS ", "DIES", etc	No	No
vehcompany	Vehicle manufacturer. Is designed to align with the MFR_ fields in CFEIS. Has extended translation table in which COMPANY_N will contain the same numeric code as CFEIS for this manufacturer.	No	No
engcompany	Engine manufacturer. Is designed to align with the MFR_ fields in CFEIS. Has extended translation table in which COMPANY_N will contain the same numeric code as CFEIS for this manufacturer.	No	No
highway	Yes if mobile source is intended for highway use. No for non-road mobile sources.	No	No
purpose	Purpose or use of the mobile source. (Addition of this field was motivated by the need to describe the function of non-road vehicles and equipment and will likely be	No	No

“EQUIP_IN” Entity			
Name	Definition	Required	Primary Key
	blank for other mobile sources.)		
scc	Source classification code.	No	No
model_name	Model name	No	No
model_yr	Model year	No	No
make	Vehicle make e.g. Buick, as distinct from vehicle manufacturer, GM. Legal values defined by MAKE translation table.	No	No
v_bld_date	Approximate date the vehicle was manufactured. Usually collected to nearest month only with day set to 15.	No	No
disp_cid	Nominal Engine displacement, expressed in cubic inches.	No	No
disp_liter	Nominal engine displacement, expressed in liters.	No	No
fuel_deliv	Kind of fuel delivery system. Legal values defined by FUEL_DEL translation table.	No	No
fi_type	Type of fuel injection PFI (port fuel injection) TBI (throttle body injection) DIRECT (direct fuel injection e.g. as for most diesel engines.)	No	No
aspirated	Indicates how engine is aspirated. CHARGED if turbocharged or supercharged. NATURAL if not	No	No
cylinder	Number of cylinders or rotors.	No	No
injectors	Number of injectors per cylinder.	No	No
cat_type	What type catalyst, if any, is present on the mobile source.  Values are:  3WAY Three-way catalyst OX3W Oxidation plus three-way catalyst OXID Oxidation Catalyst NONE No catalyst NULL Unknown	No	No
air_inj	Represents what method, if any, is used to introduce supplemental air into the exhaust stream. Legal values defined by AIR_INJ translation table.	No	No
closedloop	"YES" indicates a "closed loop" configuration in which the exhaust sensing is used to help control the fuel combustion process. "No means this is not done on the vehicle.	No	No
ignition	Ignition type of engine in mobile source. Legal values defined by IGNITION translation table.	No	No
eng_fam	Exhaust emission certification family to which the engine in this equipment belongs.	No	No
evap_fam	EPA standardized evaporative family name as defined in CFR40 Part 86	No	No
overdrive	Indicates whether vehicle has overdrive gear.	No	No
creeper	Indicates whether vehicle has creeper gear.	No	No
lockup	Indicates whether vehicle has lockup transmission.	No	No
gears	Number of forward gears in vehicle transmission. Legal values defined by GEARS translation table.	No	No
curbweight	Curb weight in pounds. For on-road vehicles this has a precise definition. For other mobile sources, e.g. non-road vehicles, the unadjusted actual weight of the mobile source is used.	No	No
ac	Is vehicle equipped with air conditioning? YES, NO, or NUL Intend to change to logical type field when good tool is available.	No	No
canister	Type of canister on vehicle. Legal values defined by CANISTER translation table.	No	No
egr	Does vehicle have exhaust gas recirculation? YES, NO, or NUL.	No	No
fueltanks	number of fuel tanks on vehicle	No	No
tank_cap	Total fuel tank capacity to nearest gallon. (Includes all tanks.)	No	No
egr_type	Type of exhaust gas recirculation (EGR). Values defined by translation table.	No	No
drv_trn	Represents drive train with the following values (domain); FWD (front wheel drive), RWD (rear wheel drive), 4WDO (optional 4 wheel drive), and 4FWD (full-time 4 wheel drive)	No	No
engseries	Engine series or product line name.	No	No
eng_class	Intended engine service class. (In conjunction with engine type (SI or CI), and model year, this field allows determination of the emission standards to which many engines were certified; for small spark ignition engines, displacement class, which can be determined from displacement, may be used instead.) Legal values to be defined by translation table.	No	No
e_bld_date	Approximate date engine was manufactured.	No	No
eng_mod_yr	Engine model year.	No	No
cooling	Type of after cooling. (Legal values defined by translation table.)	No	No

“EQUIP_IN” Entity			
Name	Definition	Required	Primary Key
fi_meth	Method of fuel injection. ( Legal values defined by translation table.)	No	No
fi_press	fuel injection pressure, expressed in kPa.	No	No
parttrap	Is particulate trap used? "YES", "NO", or "NUL".	No	No
eng_cycle	Engine cycle, 2 = 2-stroke, 4 = 4-stroke. 0 = Unknown.	No	No
ratedpower	Rated horsepower of engine.	No	No
ratedspeed	Rated rpm of engine	No	No
idle_rpm	Idle rpm as declared by the OEM.	No	No
tech_cfg	Description of technical configuration. (Not categorized.)	No	No
ecs_descpt	Description of emission control system.	No	No
elect_cont	Description of electronic control.	No	No
procmeth	Procurement method. Refer to translation table for values and their meaning.	No	No
proc_odom	Approximate odometer reading in miles at time of vehicle recruitment.	No	No
hour_meter	Hours of operation (usually available only for off-road mobile sources). Null value is 0.	No	No
rebuild_ct	Number of times mobile source was rebuilt, generally applicable only to engines. Null value is 99.	No	No
rebuild_dt	Date of last rebuild.	No	No
rebuildwhy	Purpose or reason for last rebuild.	No	No
modifs	Description of significant post-OEM additions or modifications.	No	No
tran_type	Transmission type. Legal values defined by TTRNTRAN translation table.	No	No
gvwr	Gross vehicle weight rating in pounds. The value specified by the manufacturer as the loaded weight of a single vehicle.	No	No
gcwr	The weight rating, expressed in pounds, specified by the vehicle manufacturer as the loaded weight of a combination (articulated) vehicle. In the absence of a value specified by the manufacturer, GCVR will be determined by adding the GVWR of the power unit and the total weight of the towed unit and any load thereon.	No	No
comments	Field used for comments from the data supplier, this field not loaded into database.	No	No
ownership	The relationship between the user and the equipment.	No	No
depot	Depot means site where vehicle is stored when not in use.	No	No
peaktorque	Peak torque in ft-lbs.	No	No
peakspeed	Peak torque speed in rpm.	No	No
peakfrate	Fuel rate @ peak torque in lbs/hr.	No	No
ratedfrate	Fuel rate @ rated speed in lbs/hr.	No	No
cert_nox	Oxides of nitrogen emission level at which vehicle was certified. Expressed in grams per mile.	No	No
cert_pm	Particulate matter emission level at which vehicle was certified. Expressed in grams per mile.	No	No
axle	The number of axles the vehicle has.	No	No
cert_co	Carbon Monoxide emission level at which the heavy duty vehicle or engine was certified. Expressed in grams per mile.	No	No
cert_hc	Hydrocarbon emission level at which vehicle was certified. Expressed in grams per mile.	No	No
vin8	The first eight characters of vehicle Identification Number (VIN).	No	No
vin_body	Vehicle physical attributes as described by VIN decoding software for the first procurement of the vehicle into MSOD.	No	No
thcstd	Total hydrocarbon standard level to which vehicle was certified. Expressed in grams per mile.	No	No
costd	Carbon monoxide standard level to which vehicle was certified. Expressed in grams per mile.	No	No
noxstd	Oxides of nitrogen standard level to which vehicle was certified. Expressed in grams per mile.	No	No
pmstd	Particulate matter standard to which vehicle was certified. Expressed in grams per mile.	No	No
veh_lane	Number historically used to identify procurement of a vehicle from an I/M lane (as compared with VEH_NO which identified a physical vehicle.) Vehicles were recruited for a series of tests, typically a purge-pressure, IM240 and FTP.	No	No
statetest	Indicates whether the vehicle recruited passed or failed a state IM test. Legal values defined by STATETES translation table.	No	No
cuthc	Recruitment "cut point" or threshold value for hydrocarbon emissions. Expressed in terms of grams/mile as measured by an IM240 test. Null value of this field is zero.	No	No
cutco	Recruitment "cut point" or threshold value for carbon monoxide emissions. Expressed in terms of grams/mile as measured by an IM240 test. Null value of this field is zero.	No	No
cutnox	Recruitment "cut point" or threshold value for oxides of nitrogen emissions.	No	No



<b>“EQUIP_IN” Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
	Expressed in terms of grams/mile as measured by an IM240 test. Null value of this field is zero.		
cutpoints	Information pertaining to the set of IM240 emission "cutpoint" values which governed this procurement. These emission cutpoint levels do not generally correspond to the emission standards to which the vehicle was certified. Legal values defined by CUTPOINT translation table.	No	No
im_station	IM program station id.	No	No
vindcode	Version of VIN decoding software used for the procurement.	No	No
cat_age	Age of catalyst if artificially aged.	No	No

<b>“EREPM_IN” Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
Ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
Engsecs	Time within an engine dynamometer test, expressed in seconds, beginning of test has engsecs = 0.	Yes	Yes
Meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
Erepmeas	Engine test time level measurement of this MEAS_ID	No	No

<b>“ETEST_IN” Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
usesmap	ctr_tst_id of engine map result associated with this engine test. Blank value indicates that no engine map in the database is associated with this engine test.	No	No
p_ch4	Methane emissions. Expressed in grams per bhp-hr.	No	No
p_thc	Total HC emissions. Expressed in grams per bhp-hr.	No	No
p_co	CO emissions. Expressed in grams per bhp-hr.	No	No
p_co2	CO2 emissions. Expressed in grams per bhp-hr.	No	No
p_nox	NOx emissions. Expressed in grams per bhp-hr.	No	No
p_pm	Total particulate emissions. Expressed in grams per bhp-hr.	No	No
total_work	Total work performed in test. Expressed in bhp-hrs.	No	No
bsfc_meas	Measured brake-specific fuel consumption. Expressed in grams per bhp-hr.	No	No
bsfc_calc	Calculated brake-specific fuel consumption. Expressed in grams per bhp-hr.	No	No
et_baro	Average barometric pressure during test. Expressed in inches of Hg. Not meaningful for multi-mode steady-state tests.	No	No
et_humid	Average absolute humidity during test. Expressed in grains of water per pound of dry air. Not meaningful for multi-mode steady-state tests.	No	No
et_inair	Engine inlet air temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_exrestr	Exhaust restriction pressure. Expressed in inches of mercury. Not meaningful for multi-mode steady-state tests.	No	No
et_exhaust	Exhaust temperature, after emission controls. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_cooler	Air temperature after intercooler. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_coolin	Engine coolant input temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_coolout	Engine coolant output temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No
et_chiller	Chiller water temperature. Expressed in degrees F. Not meaningful for multi-mode steady-state tests.	No	No

“ETIME_IN” Entity			
Name	Definition	Required	Primary Key
evapmins	Time of measurement, expressed in minutes after start of test.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
evap_barom	Barometric pressure, expressed in inches of mercury.	No	No
shed_temp	Temperature of SHED or air surrounding vehicle, in degrees F.	No	No
fuel_temp	Temperature of vehicle's fuel expressed in degrees F.	No	No
w_cum_the	Cumulative hydrocarbon emissions, since start of test, expressed in grams.	No	No

“EVAP_IN”			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
test_proc	Identifies the specific test procedure used. A more detailed classification than RES_KIND. Based largely upon values of TEST_TYPE in earlier design. Conceptually distinct from the driving or operational schedule used.	Yes	No
replicate	TRUE if this test replicates a previous one, otherwise FALSE.	No	No
sched_id	Schedule identification.	Yes	No
fuel_id	Numeric code uniquely identifying the general type of fuel used. (Sometimes referred to as the "gross fuel type")	Yes	No
fbatch_id	Fuel batch identification.	No	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
test_date	Result date.	No	No
test_tod	Time of day of the start of the result. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted.	No	No
nom_temp	Nominal temperature at which test was to be conducted. Expressed in degrees Fahrenheit.	No	No
nom_humid	Nominal absolute humidity at which test was to be conducted. Expressed in grains of water per pound of dry air.	No	No
disable	Indication of any special conditions or "disablements" performed on the mobile source for particular tests. A value of zero indicates that no special condition or disablement to the vehicle was performed. Positive values indicate a particular disablement or set of disablements as defined in the translation table for this field. e.g. 1 = gas cap removed, 2 = evap canister removed, 3 = both gas cap and canister removed, etc.	No	No
w_evap_the	Total hydrocarbon emissions of test, expressed in grams.	No	No
precond	Type of preconditioning. Values defined by PRECOND translation table. Same field appears in DYNOTEST.	No	No

“FBAT_IN”			
Name	Definition	Required	Primary Key
fbatch_id	Fuel batch identification.	Yes	Yes
mfg_batch	Manufacturer's fuel batch identification	No	No
cetane_num	Cetane number of complete fuel.	No	No
cetane_idx	Cetane index of complete fuel.	No	No
cetane_imp	Amount of cetane improver added, expressed as percentage by volume	No	No
cetane_typ	Type of cetane improver used, e.g. "N" for nitrate type or "P" for peroxide type. Exact set of legal values defined and described by translation table for this field.	No	No
sulfur	Sulfur content, expressed in parts per million.	No	No
sulf_agent	Name of any sulfur doping agent added to the fuel. Value of "NONE" indicates that all sulfur in the fuel was present naturally.	No	No
nitrogen	Nitrogen content, expressed in parts per million.	No	No
tarom	Total aromatics content of fuel, expressed as a percentage by volume. This is a measured value, as opposed as being calculated as the sum of the monoaromatics and polyaromatics fields.	No	No
marom	Monoaromatics content of fuel, expressed as a percentage by volume. This is a measured value, as opposed as being calculated as the difference of the total aromatics	No	No

“FBAT_IN”			
Name	Definition	Required	Primary Key
	and polyaromatics fields.		
parom	Polyaromatics content of fuel, expressed as a percentage by volume. This is a measured value, as opposed as being calculated as the difference of the total aromatics and monoaromatics fields.	No	No
IBP	Initial boiling point expressed in degrees F.	No	No
T10	10% distillation boiling point, expressed in degrees Fahrenheit.	No	No
T50	50% distillation boiling point, expressed in degrees Fahrenheit.	No	No
T90	90% distillation boiling point, expressed in degrees Fahrenheit.	No	No
EP	End point of distillation curve, expressed in degrees Fahrenheit.	No	No
spec_grav	Specific gravity.	No	No
API_grav	API gravity, expressed in degrees API	No	No
density	Measured density of the fuel, expressed in pounds per gallon.	No	No
viscosity	Viscosity, expressed in centistokes.	No	No
flash	Flashpoint temperature, expressed in degrees Fahrenheit.	No	No
cloud	Cloudpoint temperature, expressed in degrees Fahrenheit.	No	No
pour	Pourpoint temperature, expressed in degrees Fahrenheit.	No	No
hcratio	Ratio of hydrogen to carbon	No	No
oxygen	Amount of oxygen in the fuel, expressed as a percentage by weight.	No	No
oxy_type	Type of oxygenate. "NONE" if no oxygenate was added to the base fuel. Values defined by translation table for this field.	No	No
additives	Total amount of additives, other than cetane improvers, in the fuel, expressed as a percentage by weight.	No	No
lubric_g	Fuel lubricity, expressed in grams. As measured by ASTM D6078 or comparable method.	No	No
lubric_mm	Fuel lubricity, expressed in millimeters of scar wear. As measured by ASTM D6079 or comparable method.	No	No
heat	Net heating value of the fuel, expressed in btu/pound.	No	No
ash	Ash content of fuel, expressed as a percentage.	No	No
ron	Research Octane Number conducted in accordance with ASTM D2699	No	No
mon	Motor Octane Number conducted in accordance with ASTM D2700	No	No
fen_c	Fuel Economy Numerator/C Density conducted in accordance with ASTM E191 (g carbon/gal)	No	No
wgt_fractn	Weight fraction carbon conducted in accordance with ASTM D3343	No	No
recovery	The amount of distillate recovered measured in volume percent.	No	No
residue	The amount of residue matter remaining after distillate has been boiled off and is measured in volume percent.	No	No
loss	The amount of loss measured in volume percent.	No	No
rvp	The Reid Vapor Pressure of the fuel measured in pounds per square inch (psi) in accordance with ASTM D323 or D5191.	No	No
comp_olefn	Olefin composition measured in volume percent of the fuel in accordance with ASTM D1319.	No	No
comp_sat	Saturates Composition measured in volume percent of the fuel in accordance with ASTM D1319.	No	No
wa_id	Work Assignment (or equivalent for TSD) name.	No	No
res_kind	RESULT kind. Used to identify which subtype this result belongs to. Overall intent is to aggregate RESULT instances into as few different subtypes as practical. E.g. all vehicle dynamometer tests may be one subtype, all SHED tests another. Legal values defined by RES_KIND translation table.	No	No
fuel_id	Numeric code uniquely identifying the general type of fuel used. Sometimes referred to as the "gross fuel type".	No	No
comp_arma	Volume % Aromatics in fuel by ASTM D1319	No	No

“FF_DATA” Entity			
Name	Definition	Required	Primary Key
obd2code	Character string code resulting from a scan of a level 2 on board diagnostic system.	Yes	Yes
trip_id	Identifier assigned to each TRIP instance.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) The RES_KIND of the RESULT record = "ACTIVITY". Note that a ctr_tst_id can have only one activity and vice versa.	Yes	Yes
	Not used for analytical purposes. But could help locate contractor's records pertinent		

“FF_DATA” Entity			
Name	Definition	Required	Primary Key
	to this RESULT.		
tpmeas_dt	Time within trip, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
throttle		No	No
add_more		No	No

“FUEL_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  In this case, functions as a sample_id for the fuel of the mobile source.  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
meas_id	Measurement type identification	Yes	Yes
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
test_date	Result date.	No	No
test_tod	Time of day of the start of the result. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted.	No	No
fuelmeas	Test level fuel measurement	No	No

“INSP_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
site	Location where test was conducted.	No	No
insp_date	Date of the inspection.	No	No
insp_tod	Time of day of the beginning of the inspection. Expressed as a 5 character string HH:MM	No	No
comments	Inspection comments, first portion	No	No
comments2	Inspection comments, second portion	No	No
insp_odom	Approximate odometer reading, in miles, at time of mechanics M1 emission component inspection. 0 represents NULL. (This item not collected prior to FY98).	No	No
g_can_init	Weight of evaporative emission canister as vehicle was received. Expressed in grams. If vehicle has multiple canisters weight entered is total of all canisters present. Zero if null.	No	No
g_can_purg	Weight of evaporative emission canister after canister purge. Expressed in grams. If vehicle has multiple canisters weight entered is total of all canisters present. Zero if null.	No	No
g_can_load	Weight of evaporative emission canister after full loading. Expressed in grams. If vehicle has multiple canisters weight entered is total of all canisters present. Zero if null.	No	No
smokecolor	Result of visual observation of smoke emission. Whether and what color smoke was observed. Legal values defined by translation table.	No	No

“LTIME_IN” Entity			
Name	Definition	Required	Primary Key
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to	Yes	Yes

“LTIME_IN” Entity			
Name	Definition	Required	Primary Key
	this RESULT.		
lab_rpm	Engine's rpm for each second.	No	No
lab_torq	Engine's torque (calculated or measured) per second in ft-lbs.	No	No
lab_tempf	Ambient air temperature in degrees F per second.	No	No
lab_baro	Ambient air's barometric pressure measured for each second in inches of mercury.	No	No
lab_humid	Absolute humidity measured each second expressed in grains of water per pound of dry air.	No	No
lfuel_rate	in lbs/sec.	No	No
lab_engcol	Engine coolant temperature (degrees F).	No	No
lab_engoil	Engine oil temperature (degrees F).	No	No
lab_millit	Yes - if millight is on; No if off.	No	No
tp_o2	Oxygen in volume percent (%) as measured at the tailpipe.	No	No
dil_o2	Oxygen in volume percent (%) as measured after mixed with dilution air.	No	No
tp_vol	Tailpipe volume in standard cubic feet per second.	No	No
cvs_vol	cvs flow in standard cubic feet per second.	No	No
dil_vol	Dilution air in standard cubic feet per second.	No	No
tp_thc	Total hydrocarbon in ppm by volume as measured at the tailpipe.	No	No
dil_thc	Total hydrocarbon in ppm by volume as measured after mixed with dilution air.	No	No
tp_co	Carbon monoxide in ppm by volume as measured at the tailpipe.	No	No
dil_co	Carbon monoxide in ppm by volume as measured after mixed with dilution air.	No	No
tp_co2	Carbon dioxide in volume percent (%) as measured at the tailpipe.	No	No
dil_co2	Carbon dioxide in volume percent (%) as measured after mixed with dilution air.	No	No
tp_nox	Nitrogen oxides in ppm by volume as measured at the tailpipe.	No	No
dil_nox	Nitrogen oxides in ppm by volume as measured after mixed with dilution air.	No	No

“MAPPT_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
map_rpm	Speed. Expressed in rpm.	Yes	Yes
map_torque	Torque. Expressed in foot pounds	No	No

"MEASTYPE" Entity			
Name	Definition	Required	Primary Key
meas_id	Measurement type identification	Yes	Yes
meas_descr	Measurement description	No	No
meas_unit	Engineering units applicable to this measurement type.	No	No

“OBD_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
site	Location where test was conducted.	No	No
test_date	Result date.	No	No
test_tod	Time of day of the start of the result. Stored as a 5 character string HH:MM.	No	No
comment	Comment associated with scan of vehicle's on board diagnostic system.	No	No
obd_odom	Approximate odometer reading, in miles, at time of OBD scan. 0 represents NULL value.	No	No
obdlevel	Type of on board diagnostic system. Level 1 systems are present on many older vehicles and produce 2 digit numeric codes particular to the vehicle manufacturer and model year. Level 2 system produce 5 character codes some of which have industry standardized significance.	No	No

“OBD_IN” Entity			
Name	Definition	Required	Primary Key
	The legal values of this field are defined by its translation table.		
ctrstid_p	This will equal the ctr_tst_id field from EQUIP_IN, added to provide a link between tables.	No	No

“PART_IN” Entity			
Name	Definition	Required	Primary Key
part	Identification of emission component usually a field name from the emission component worksheet e.g. E101	Yes	Yes
part_code	Numeric code which can be used to describe the status of an emission component	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes

“PMEAS_IN” Entity			
Name	Definition	Required	Primary Key
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
trip_id	Identifier assigned to each TRIP instance.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) The RES_KIND of the RESULT record = "ACTIVITY". Note that a ctr_tst_id can have only one activity and vice versa.  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
tpmeas_dt	Time within trip, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
meas_value	The measurement.	No	No

“PRESS_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
test_proc	Identifies the specific test procedure used.	Yes	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
replicate	TRUE if this test replicates one done earlier, FALSE otherwise.	No	No
test_date	Result date.	No	No
test_tod	Time of day of the start of the result. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted.	No	No
capokstant	Did gas cap pass the Stant test? ("YES", "NO", or "NUL")	No	No
press_init	Initial pressure reading (expressed in inches of water).	No	No
press_2min	Pressure reading after two minutes (expressed in inches of water). Null value is 99.9.	No	No
press_odom	Approximate odometer reading, in miles, at time of pressure test. 0 represents NULL value. (This information item was not collected prior to FY98.)	No	No

“REPAR_IN” Entity			
Name	Definition	Required	Primary Key
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	Yes
repar_date	Repair date	Yes	Yes
repar_tod	Time of day of the start of the repair. Stored as a 5 character string HH:MM.	Yes	Yes
wa_id	Work Assignment name	Yes	No

<b>"REPAR_IN" Entity</b>			
site	Location where test was conducted.	No	No
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	No	No
rep_type	Type of repair performed. Valid repair type codes and their descriptions can be found in the REP_TYPE translation table.	No	No
repar_hrm	Approximate hour meter reading at time repair was made. Expressed in hours. Zero represents NULL value. This information item was not collected prior to FY2001.	No	No
comments	Repair description - first portion	No	No
comments2	Repair description - second portion	No	No
repar_odom	Odometer reading, in miles, at time repair was made. 0 represents NULL value.	No	No

<b>"RESLT_IN" Entity</b>			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
fbatch_id	Fuel batch identification.	No	No
test_proc	Identifies the specific test procedure used. A more detailed classification than RES_KIND. Based largely upon values of TEST_TYPE in earlier design. Conceptually distinct from the driving or operational schedule used.	No	No
wa_id	Work Assignment (or equivalent for TSD) name.	No	No
sched_id	Schedule identification.	No	No
replicate	TRUE is this test is a replicate of one already entered, otherwise false.	No	No
resultgrp	Contains the ctr_tst_id of any test, of which this is a component part. A blank value indicates that this test is not part of a higher-level test group.	No	No
ms_type	General kind of mobile source: 1 = Vehicle 2 = Engine.	Yes	No
ms_id	Mobile source identifier. For vehicles their VIN would be used. For engines, their serial number, probably in conjunction with their manufacturer code.	Yes	No
res_kind	RESULT kind. Used to identify which subtype this result belongs to. Overall intent is to aggregate RESULT instances into as few different subtypes as practical. E.g. all vehicle dynamometer tests may be one subtype, all SHED tests another. Legal values defined by RES_KIND translation table.	No	No
fuel_id	Numeric code uniquely identifying the general type of fuel used. Sometimes referred to as the "gross fuel type".	No	No
test_date	Result date.	No	No
test_tod	Time of day of the start of the result. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted. Legal values defined by SITE translation table.	No	No
nom_temp	Nominal temperature at which test was to be conducted. Expressed in degrees Fahrenheit.	No	No
nom_humid	Nominal absolute humidity at which test was to be conducted. Expressed in grains of water per pound of dry air.	No	No
disable	Indication of any special conditions or "disablements" performed on the mobile source for particular tests. A value of zero indicates that no special condition or disablement to the vehicle was performed. Positive values indicate a particular disablement or set of disablements. Legal values defined by DISABLE translation table.	No	No
No_modes	Number of test modes involved in this result. Data for individual chassis test modes is stored in the DYNOMODE table; data for individual engine dynamometer test modes is stored in the ETSTMODE table.	No	No
test_modif	Identifies any minor deviation from normal test procedure indicated by "test_proc". Legal values defined by TEST_MOD translation table.	No	No

<b>"RMEAS_IN" Entity</b>			
Name	Definition	Required	Primary Key
meas_id	Measurement type identification	Yes	Yes
rep_meas	Repeated measurement.	No	No

<b>"RMEAS IN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes

<b>"RUNL IN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
test_proc	Identifies the specific test procedure used. Conceptually distinct from the driving or operational schedule used.	Yes	No
wa_id	Work Assignment (or equivalent for TSD) name	Yes	No
sched_id	Schedule identification.	Yes	No
replicate	TRUE if test is a replicate of one already entered. Otherwise FALSE.	No	No
fuel_id	Numeric code uniquely identifying the general type of fuel used. (Sometimes referred to as the "gross fuel type")	Yes	No
fbatch_id	Fuel batch identification.	No	No
ms_id	Mobile source identifier. For vehicles their VIN would be used.	Yes	No
test_date	Test date	No	No
test_tod	Time of day of the start of the test. Stored as a 5 character string HH:MM.	No	No
site	Location where test was conducted.	No	No
nom_temp	Nominal temperature at which test was to be conducted. Expressed in degrees Fahrenheit.	No	No
nom_humid	Nominal absolute humidity at which test was to be conducted. Expressed in grains of water per pound of dry air.	No	No
disable	Indication of any special conditions or "disablements" performed on the mobile source for particular tests. A value of zero indicates that no special condition or disablement to the vehicle was performed. Positive values indicate a particular disablement or set of disablements as defined in the translation table for this field. e.g. 1 = gas cap removed, 2 = evap canister removed, 3 = both gas cap and canister removed, etc.	No	No
testwght	Dynamometer inertia weight setting used for this test. Expressed in pounds.	No	No
road_hp	Dynamometer road load horsepower setting used for this test.	No	No
ac_hp	Did dynamometer road load setting for this test include air conditioning load factor? (YES, NO, or NUL)	No	No
dynotype	Type of dynamometer used. Valid values for this field, are contained in the DYNOTYPE code translation table.	No	No
odometer	Odometer reading of vehicle at beginning of test. (Expressed in miles)	No	No
precond	Type of preconditioning performed on the vehicle prior to the test. Legal values defined by translation table PRECOND.DBF	No	No
tarcanwght	Target canister weight, expressed in grams	No	No
norcanwght	Normalized canister weight, expressed in grams	No	No
endcanwght	Observed canister weight at end of test, expressed in grams.	No	No
targiftemp	Target initial fuel tank temperature, expressed in degrees Fahrenheit.	No	No
obsiftemp	Observed initial fuel tank temperature, expressed in degrees Fahrenheit.	No	No

<b>"RUNLB IN" Entity</b>			
<b>Name</b>	<b>Definition</b>	<b>Required</b>	<b>Primary Key</b>
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
bag_num	Bag number.	Yes	Yes
bag_baro	Barometric pressure, expressed in inches of mercury.	No	No
bag_temp	Temperature, expressed in degrees Fahrenheit.	No	No
bag_humid	Humidity, expressed in grains of water per pound of dry air.	No	No



“RUNLB_IN” Entity			
Name	Definition	Required	Primary Key
bag_dist	distance traveled, expressed in miles.	No	No
bag_thc	Total hydrocarbon exhaust emissions, expressed in grams per mile.	No	No
bag_co	Carbon monoxide emissions, expressed in grams per mile.	No	No
bag_co2	Carbon dioxide emissions, expressed in grams per mile.	No	No
bag_nox	Emissions of oxides of nitrogen, expressed in grams per mile.	No	No
bag_mpg	Fuel economy expressed in miles per gallon.	No	No
w_runl_thc	Total hydrocarbon evaporative emissions, (for this portion of the test), expressed in grams. Often termed "running loss" emissions.	No	No
targ_ftemp	Target fuel tank temperature, expressed in degrees Fahrenheit.	No	No
obs_ftemp	Observed fuel tank temperature, expressed in degrees Fahrenheit.	No	No
tank_press	Fuel tank pressure, expressed in pounds per square inch.	No	No
purg_flow	Purge air flow volume during this portion of the test, expressed in liters.	No	No

“SCAN1_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
obd1code	Numeric code resulting from a scan of level 1 on board diagnostic system.	Yes	Yes
obd1descr	Narrative explaining significance of individual code resulting from scan of a level 1 on board diagnostic system.	No	No

“SCAN2_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
obd2code	Character string code resulting from a scan of a level 2 on board diagnostic system.	Yes	Yes

“SMODE_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
smokemode	Name of the smoke test mode. Legal values defined by translation table.	Yes	Yes
smoke_opac	Percent smoke opacity measured during one mode of a smoke test.	No	No

“SMOKE_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
smoke_sum	Single number representing the overall result of the smoke test, in units of percent opacity. For smoke test procedures that do not have such a summary result this field will be null.	No	No

“TMEAS_IN” Entity			
Name	Definition	Required	Primary Key
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
meas_id	Measurement type identification. Legal values defined by MEASTYPE translation table.	Yes	Yes
resultid	Unique number sequentially assigned to each RESULT instance (including all	Yes	Yes

“TMEAS_IN” Entity			
Name	Definition	Required	Primary Key
	RESULT subtype instances) as it is entered into this database. Number has no other significance.		
measure	Test level measurement.	No	No

"TIME_IN" Entity			
Name	Definition	Required	Primary Key
dynosecs	Time within dynamometer test, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.)  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
speed	Measured speed in miles per hour.	No	No
dist	Distance traveled in miles, cumulative from beginning of test phase.	No	No
r_thc	Total hydrocarbon emissions measurement, expressed in grams per second	No	No
r_co	Carbon monoxide emissions measurement, expressed in grams per second	No	No
r_nox	Oxides of nitrogen emissions measurement, expressed in grams/sec	No	No
r_co2	Carbon dioxide emissions measurement, expressed in grams/second	No	No
test_phase	Phase of the test to which this measurement belongs. This might be used for example to divide a repeated measurement test into time periods corresponding to bag samples, even though no bag samples were taken.	No	No

“TRIP_IN” Entity			
Name	Definition	Required	Primary Key
trip_id	Identifier assigned to each TRIP instance.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) The RES_KIND of the RESULT record = "ACTIVITY". Note that a ctr_tst_id can have only one activity and vice versa.  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
ins_config	Instrumentation Configuration.	No	No
operator_id	Type of operator that is using the vehicle. (Owner, Experienced Operator, etc.)	No	No
tstart_dt	Date and time at the start of each trip.	No	No
tend_dt	Date and time at the end of each trip.	No	No
fbatch_id	Fuel batch identification.	No	No
fuel_id	Numeric code uniquely identifying the general type of fuel used. Sometimes referred to as the "gross fuel type".	No	No
payload	Total weight of passengers in the vehicle in pounds.	No	No
passenger	Number of passengers in the vehicle.	No	No
obd_std		No	No
ctrtstid_p	This will equal the ctr_tst_id field from EQUIP_IN, added to provide a link between tables.	No	No

“TRIPOBD IN" Entity			
Name	Definition	Required	Primary Key
obd2code	Character string code resulting from a scan of a level 2 on board diagnostic system.	Yes	Yes
trip_id	Identifier assigned to each TRIP instance.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) The RES_KIND of the RESULT record = "ACTIVITY". Note that a ctr_tst_id can have only one activity and vice versa.  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
tpmeas_dt	Time within trip, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes

“TTIME_IN” Entity			
Name	Definition	Required	Primary Key
trip_id	Identifier assigned to each TRIP instance.	Yes	Yes
ctr_tst_id	Identification number assigned to the RESULT by a test contractor. (Hopefully uniquely identifies RESULT instances within a given contractor.) The RES_KIND of the RESULT record = "ACTIVITY". Note that a ctr_tst_id can have only one activity and vice versa.  Not used for analytical purposes. But could help locate contractor's records pertinent to this RESULT.	Yes	Yes
tpmeas_dt	Time within trip, expressed in seconds, beginning of test equals dynosecs = 0, first measurement is usually at dynosecs = 1.	Yes	Yes
trip_speed	Vehicle speed (miles per hour) for each second.	No	No
trip_rpm	Engine's rpm for each second.	No	No
trip_torq	Engine's torque (calculated or measured) per second in ft-lbs.	No	No
trip_tempf	Ambient air temperature in degrees F per second.	No	No
trip_temp	Ambient air temperature in degrees C per second.	No	No
trip_baro	Ambient air's barometric pressure measured for each second in inches of mercury.	No	No
inst_baro	Ambient air's barometric pressure measured for each second in kPa.	No	No
trip_humid	Absolute humidity measured each second expressed in grains of water per pound of dry air.	No	No
trip_lat	Latitude of the vehicle measured for each second.	No	No
trip_long	Longitude of the vehicle measured for each second.	No	No
trip_alt	Altitude of the vehicle measured for each second.	No	No
trip_grade	Grade measured for each second expressed in %.	No	No
trip_exhfm	Measured exhaust gas flow rate in cubic feet per minute (SCFM).	No	No
trip_exhfc	Calculated exhaust gas flow rate in cubic feet per minute (SCFM).	No	No
fuel_rate	in lbs/sec.	No	No
trip_thc	Total Hydrocarbon in grams/sec.	No	No
trip_co	Carbon Monoxide in grams/sec.	No	No
trip_co2	Carbon Dioxide in grams/sec.	No	No
trip_nox	Nitrogen Oxides in grams/sec.	No	No
trip_o2	Oxygen in grams/sec.	No	No
eng_cool_t	Engine coolant temperature (degrees F).	No	No
eng_oil_t	Engine oil temperature (degrees F).	No	No
millight	Millight on/off.	No	No
trip_massf	Grams of exhaust per second	No	No
trip_volf	Standard cubic feet per minute of exhaust	No	No