

SUPPORTING STATEMENT FOR THE MOBILE SOURCE EMISSION FACTOR RECRUITMENT

PART A

1. Identification of the Information Collection

1(a) Title and Number of the Information Collection

ICR: Mobile Source Emission Factor On-Highway Recruitment
OMB Control Number 2060-0078

1(b) Short Characterization

The EPA, Office of Transportation and Air Quality (OTAQ), Assessment and Standards Division (ASD) administers a nationwide effort to collect data on emission levels from in-use vehicles recruited from the general public voluntarily. ASD carries out this effort through the Emission Factor Program (EFP). EFP gathers activity and emissions measurements either by sampling a vehicle's emissions and activity during normal operation or alternatively during a driving simulation developed for laboratory testing using a chassis dynamometer.

The purpose of the EFP is to collect a representative sample of in-use emissions and activity data to assure that EPA's current vehicle emission model, MOBILE6, can accurately predict the impact of past, current, and future vehicle emission control policies and standards on air quality. MOBILE6 currently performs the task of three historical EPA models, its predecessor, Mobile 5, for gaseous emissions, PART5 for particulate emissions, and MOBTOX for air toxic compounds. MOBILE6 is a required product provided by EPA to support federal, state, and local air pollution agency decisions that mitigate mobile source emissions and make transportation policy. Furthermore, the data in this information collection shall be used to develop MOBILE6's replacement, the Multi-scale Motor Vehicle & Equipment Emission System (MOVES). MOVES will be a more efficient, data driven model using second-by-second emission and activity data collected from in-situ sampling of vehicles in the real world and second-by-second emissions test data obtained in laboratory testing.

All suitably collected, documented, and quality-assured data is stored in the EFP data base, the Mobile Source Observation Data Base (MSOD) and is available on request to interested parties and individuals on Compact Disc. The data in MSOD is then used by ASD modeling staff to develop, create, edit, and test the algorithms that are used in both MOBILE 6 and MOVES.

MOBILE6 and MOVES require EFP to obtain by either in-situ sampling or testing vehicle exhaust emission data for volatile organic compounds (VOCs), carbon monoxide (CO), oxides of

nitrogen (NO_x), and particulate matter (PM). Other pollutants that are required by EFP to assess and model are vehicle VOC emissions from evaporative losses, species of VOCs, exhaust and evaporative, and PM that are considered air toxics. These latter pollutants are only directly assessed using laboratory procedures.

The aggregation of emissions across a population of vehicles to produce their emission inventory requires that either the model or model users have knowledge of vehicle use (activity). In the past this was entirely based on data derived from vehicles that were not part of the emission measurement process. The activity data was based on either chase car data for speed in traffic vehicle behavior and contractor analysis of Department of Transportation data to obtain vehicle mileage accumulation and vehicle trips. For this information collection, activity data shall be sampled with and without emissions data in the field.

The vehicle types needed to meet the goals of this information collection are the three major emission classes: light duty vehicles (cars), light duty trucks (pickups, vans, and sport utility vehicles) and heavy duty vehicles (vehicles with gross vehicle weight rating greater than 8500 pounds) that operate on either gasoline or diesel fuel. These types shall be stratified in model year groups that correspond to major changes in vehicle class emission standards.

The sample size for these strata shall be based on their contribution to the emission inventory, the uncertainty in their average emission level, and the precision requirement of 20% of the average emission level or the Tier 2 BIN light duty emission standard whichever is greatest. The emission inventory shall be that projected in 2007 from Mobile 6 and the uncertainty in each stratum shall be calculated using the emissions data stored in MSOD. This method will result in a stratified sample that will be efficient, meet the program requirements, and be within the means of the resources available to EFP. The actual and random selection of participants shall be either from state vehicle registration lists or from a state inspection and maintenance test lane.

Uncertainty within strata is believed driven by vehicles that have emissions that exceed the mean emission factor for the strata by a large margin, high-emitting vehicles. EFP shall target these vehicles for recruitment to determine their effect on the uncertainty of their sample stratum, improve the sampling plan's sample efficiency, and adjust the strata's sample size accordingly to improve the precision of the modeled emission rate estimates. The targeting shall be done using either remote sensing devices or tail pipe process analyzers on recruited vehicles.

Initially, the information collection shall be done in two specific localities that have or will have the capability of collecting emission test data for pollutants not yet within the capabilities of in-situ sampling, namely PM, VOCs from evaporative emissions, and air toxics. One of the areas, Kansas City, was chosen for the first major effort by EFP because it is an area where in-use vehicle emissions have not been sampled and where they are not subject to a state Inspection and Maintenance program. This is in response to Office of Management and Budget and the Department of Energy's comments on EFP practices. Furthermore, emission and activity

sampling shall be done in association with all in-use testing programs. This assures that emissions and activity affected by local factors like climate, topography, operator behavior, fuels, road conditions, and traffic are assessed for those areas. This data shall prove useful in the national emission and activity sampling program that shall be executed in the last two years of the information collection.

The national sampling program shall select areas of the country using random proportional sampling, proportional to the area's contribution to the national vehicle population. This proportional random sample shall result in a list of sample areas, participants, their vehicles and vehicle-specific national weighting factors, based on the vehicle type's frequency in the national population. The weighting factor shall be used to scale the vehicle's sample emissions and activity to national estimates of that vehicle's stratum.

In the national and area specific to vehicle testing the program participants shall be selected randomly from area-specific pools of possible participants. The methods of recruitment shall be: the use of postal cards or letters sent to the random sample of vehicle owners identified through State motor vehicle registration lists or from the random selection of owners solicited from an I/M test lane.

During this information collection, EFP shall obtain by competitive procurement, vehicle recruitment services apart from the emission sampling and testing contractor. The contractor shall be required to have expertise in the sampling. Their charge is to identify the pool of possible participants, determine important demographic data within the pool, and use the demographic data to increase the programs' saliency, identify appropriate incentives, and assure rates of participation that are greater than 80%. In both the testing and sampling programs, EFP will require the recruitment contractor to contact negative responders, identify why they choose not to participate, and make reasonable attempts to get them to be willing volunteers.

The owner will not be asked any operational perspective or prospective questions concerning their vehicle for either the testing or sampling programs. Participants in the sampling program, however, will be asked to fill out a log to record certain tasks and conditions that occur during the sampling period in which they will be directly involved, have full knowledge of, and directly affect vehicle emissions

The information collection will involve 420 number of respondents at total cost of 1.2 million dollars per year for three years.

2(a) Need/Authority for the Collection

The Agency requires States to submit certain air quality reports to EPA. The information gathered by the EFP is required for the development of State Implementation Plans (SIPs), Reasonable Further Progress (RFP) reports, attainment status assessments for the National Ambient Air Quality Standards (NAAQS), etc.

The legislative basis for the Emission Factor Program is Section 103(a)(1)(2)(3) of the Clean Air Act:

Sec. 103. (a) The Administrator shall establish a national research and development program for the prevention and control of air pollution and as part of such program shall - (1) conduct, and promote the coordination and acceleration of, research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects (including health and welfare effects), extent, prevention, and control of air pollution; (2) encourage, cooperate with, and render technical services and provide financial assistance to air pollution control agencies and other appropriate public or private agencies, institutions, and organizations, and individuals in the conduct of such activities; (3) conduct investigations and research and make surveys concerning any specific problem of air pollution in cooperation with any air pollution control agency with a view to recommending a solution of such problem, if he is requested to do so by such agency or if, in his judgment, such problem may affect any community or communities in a State other than that in which the source of the matter causing or contributing to the pollution is located;

Section 103(b)(1) of the Clean Air Act authorizes the Administrator to "collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities."

2(b) Practical Utility/Users of the Data

The emission data collected through the mobile source Emission Factor Program provides the basis and updates for the mathematical on-highway vehicle emission model MOBILE6. Additionally, the data collected under this information collection shall be used in the new model, MOVES. MOVES, unlike MOBILE6, shall be based more on in-situ sampled emission and activity data than on emission data collected by vehicles tested using one-to many-drive cycles simulating vehicle activity. The data is also published in a series of volumes known as AP-42, the compilation of both mobile source and stationary source emission factors.

MOBILE6 is and MOVES will be a tool of Federal, State, and local government agencies, academic institutions, commercial entities, and private citizens who are responsible for or interested in identifying highway vehicle contributions to current and future inventories of air pollutants. A list of current users is found in Appendix A.1

MOBILE6 and its replacement MOVES are essential tools for a number of Federal air pollution monitoring and control activities:

- National air quality policymakers need to assess current and future trends in the attainment of National Ambient Air Quality Standards. These assessments cannot

be made without use of MOBILE6. For this reason, MOBILE6 plays and MOVES will play a key role in discussions of air quality strategy within both the executive and legislative branches of the Federal government, the states, regional air quality authorities, local governments, and other organizations that have an interest in rulemaking required by the Amendments to the Clean Air Act. This is a critical use of MOBILE6 and MOVES.

- EPA's national motor vehicle pollution control program effectiveness relies on analyses provided by MOBILE6. Past and present emission standards must be evaluated with in-use data to determine how well those programs meet their air pollution mitigation goals. These assessments determine whether the agency should revise present and/or adopt new policies and rules concerning vehicle emissions.
- State and local government bodies are responsible for the development of State Implementation Plans aimed at assuring that national ambient air quality goals are met. These plans must incorporate a balance of mobile source and stationary source compliance measures adequate to assure that air quality standards are attained and maintained into the future. For areas requiring more stringent measures to control motor vehicle-related pollutants, use of MOBILE6 is essential for determining what vehicles and regions are best targeted to specific policies and programs to mitigate air pollution. Examples of local policies and programs are public transportation subsidies, special fuel programs, traffic mitigation, and motor vehicle inspection and maintenance (I/M) programs.

3. Nonduplication, Consultations, and Other Collection Criteria

3(a) Nonduplication

In 2002 EPA had Eastern Research Group identify all suitable data sources available to populate the data set to create the emission model MOVES¹. The data identified as meeting the specifications of the statement of work is to be incorporated in the prototype version of MOVES. The data, all of it collected on a second-by-second basis, was judged for quality and appropriateness for MOVES. In general the data is useful. There is a rich source of on-highway, heavy duty diesel vehicle data that addresses past deficiencies in the EFP program. However, there remain sampling problems with the delivered data sets. The chief deficiencies are:

- On a quantity basis most of the data is from several I/M areas and from local I/M

¹Mobile Source Observation Data (MSOD) Database Update, October 31, 2002, Eastern Research Group, Inc

tests. These tests are of limited use and ²quality.

- The programs using multi-drive cycles in their testing were small and were performed in California on California vehicles. This has limitations concerning its application to the national fleet. This same limitation also applies to the air toxics data collected
- Many of the vehicles tested were lease, state fleet, or research staff vehicles. It is not to say that these vehicles do not represent in-use vehicles, but they may not contain a significant number of high-emitting vehicles.

In 2001 EPA had Sierra Research Institute review the literature to identify and determine the quality of test data measuring air toxic compounds and PM from all mobile sources including highway vehicles³. The discovered data covering highway vehicles have been incorporated into the air toxics module of MOBILE6. None of that data is collected on a second-by-second basis, chiefly because it is not technically feasible. The data in the report that pertains to highway sources is over “x” years old and the volume is small. Along with high-emitting vehicles, and spark ignition vehicle particulate matter, emission data for air toxics is a major emission data gap that this information collection is to address

One major source for vehicle in-use emission and activity data is the Coordinating Research Council (CRC) Real World Highway program. This organization does test in-use vehicles with the view to using a suitable sample. Much of CRC’s data has been incorporated in Mobile 6 and has directed recent EFP research. EFP is, in fact, partnering with CRC to develop and manage test programs as they apply to current and future EPA emission data needs. This is being done to pool and leverage the resources needed to carry out large national emission programs. Furthermore, CRC and EPA have had their differences on how best to select vehicles for testing. EPA has favored sequential procurement of a stratified random sample where CRC tended to use targeted selection of certain vehicle types, especially high-emitting vehicles. The proposed vehicle recruitment methods for this information collection are the product of the EFP and CRC collaboration. The result shall be a more efficient and representative sample of real world vehicle emissions.

The first and major test program covered by this information collection shall be done in concert with CRC. That program will provide emission data from a randomly

²P 153-155, Modeling Mobile-Source Emissions, National Research Council, 2000, National Academy Press

³A List of Compounds Emitted from On-Road and Non-Road Mobile Sources, Report No. SR01-02-01, Sierra Research, Inc, February 21, 2001.

selected representative sample of gasoline powered vehicles for all the gaseous emissions covered in this ICR, particulate matter, and the major air toxics.

Similar information is collected in the Recall program also conducted by OTAQ. However, in that program, data are collected only from properly maintained recent model year vehicles that are likely to be still under warranty. The vehicle sample is not meant to be representative of the vehicle fleet. The program's intent is to enforce the warranty that is part of a Federal emission standard. The testing is confined to the Federal Test Procedure used for the certification of new vehicles and engines. No other testing or sampling were done and no second-by-second or air toxics emissions data were collected. The vehicle sample is confined to recent model years that are likely to be still under the emission equipment warranty and is tightly targeted at vehicles suspected of not meeting the in-use standard. EFP requires a sample of vehicles that represent all maintenance conditions and model years. EFP requires in the least a test cycle that is more severe in its operation than the FTP to capture the larger scope of emission rates vehicles are capable of generating than that found in that test procedure and drive cycle.

The California Air Resources Board (ARB) conducts an emission test program similar to the Emission Factor Program. EPA accepts the ARB data as representative of California vehicles. However, California vehicles are subject to their own unique emission standards. Therefore, data collected from California vehicles are not representative of vehicles in the other 49 states.

3(b) Public Notice Required Prior to ICR Submission to OMB

The notice that this ICR is up for renewal and soliciting comment was published in the Federal Register on January 24, 2003 (FR Vol.68, No.16 pp. 3524-3526). A copy of the notice is attached here. There was a single request for information concerning the ICR. All available planning and draft documentation was forwarded to the interested party.

3(c) Consultations

Opportunities for public comment on the EFP and MOBILE6 models are provided during public workshops. The workshops are held periodically to present results of EPA analysis, status of current test programs, and public discussion of MOBILE6 model issues. A list of former workshops is⁴;

Mobile6 Workshop #4 November 5-7, 2002

⁴The subjects and agendas of the various workshops can be found at <http://www.epa.gov/otaq/model/mobile6/m6wksshop.htm>

Mobile6 Workshop #3 June 29-30, 1999

Mobile6 Workshop #2 October 1-2, 1997

Mobile6 Workshop #1 March 19-20, 1997

Furthermore, EPA data gathering and modeling efforts are presented at the annual CRC On-Road Vehicle Emission Workshop, of which EPA is a contributing member.

Historically there have been three significant reviews of the EFP data gathering process above and beyond this information collection review process. In 1982 the University of Michigan's Survey Research Center (SRC) conducted a study, under EPA contract, to identify areas where sampling methodology could be improved. The work, entitled Evaluation of the Survey Methods Used in the Emission Factors Program (1982), was undertaken under the recommendation of EPA's Information Management Branch to improve overall response rates from versions of the EFP program. EFP followed guidance and recommendations made by SRC and positive response rates and record keeping improved. The increased response is attributed to the increased frequency and degree of resources applied to successive efforts to contact sequentially selected, recruited, or eliminated potential participants.

Viking Energy Corporation (McLean, Virginia) conducted a review of the EFP under contract to EPA's Office of Policy, Planning and Evaluation (OPPE). The report entitled, Review of the Mobile Sources Emission Factors Program was completed in February 1986. The study reviewed the purpose of the MOBILE models, the usefulness of that purpose, how well the models accomplish their goal, and whether the model results can be improved. The findings of the study were listed in 1989's ICR. As a result of the Viking Study recommendations, EPA reviewed and changed the linearity assumption used in the MOBILE model and have more complete documentation of MOBILE than was true for past models.

Following 1993's ICR submission, EPA was requested by the Office of Management and Budget to:

“conduct additional research to measure and correct any biases arising from selection artifacts. In addition, EPA should examine the magnitude of the effect these potential biases may have on EPA modeling results. The results of this research and any corrective action taken or proposed should be described fully in the next request for approval of this collection.”

EFP's response was to increase the rate of positive responses to its recruiting efforts. EFP began recruitment of in-use vehicles at I/M facilities in Hammond, IN (pre-1996), Dayton, Ohio (1997-98) and Mesa, Arizona (1997-2000). The effect of that

activity was a much larger percentage of positive responders. An added benefit to that process was that all participants had a laboratory test, minimally a Federal Test Procedure (FTP), and a state inspection test, typically an I/M240 a truncated and less rigorous emission test based upon a hot running version of the third phase of the Federal FTP. These paired tests were then used to establish correlations with the emission factors developed with the FTP with the much larger data set represented by the I/M240 performed at the state I/M lane. This leveraging of the laboratory data with the population subject to state inspections resulted in higher predicted emission factors with MOBILE6 than with MOBILE. This is believed due to correcting laboratory tests' under-predictions caused by a 'good volunteer effect'.

EFP's second response to the Viking Energy report was to address a selection bias due to the use of only the FTP for vehicle testing. The FTP is a procedure developed for new vehicle certification and does not represent the universe of loads, speeds, and ambient conditions that in-use vehicles are exercised in. EFP, therefore, developed from chase car data collected under a large variety of conditions, other driving schedules that were used to test vehicles in different and often more severe driving conditions than the FTP⁵. This resulted in more accurate traffic and speed-based corrections for MOBILE and better precision in its predictions.

In 1998 Congress asked the National Research Council to review and evaluate MOBILE, its inputs, assumptions, structure and predictive accuracy. The review resulted in the report "Modeling Mobile Source Emissions" published in 2000. Members of the committee, their affiliations and their recommendations are found in the publication. The recommendations that directly affect this information collection are⁶;

1. "EPA should develop a program to enable more accurate determination of in-use emissions"
2. "EPA should design and undertake a large-scale testing program that will better assess real-world emissions from heavy-duty vehicles."
3. "EPA should promptly update PART5 with the best available data on PM emissions and incorporate it into a subsequent revision of MOBILE6."
4. "EPA should begin a substantial research effort to characterize high exhaust and

⁵Carlson, T.R., et al., "Development of Speed Correction Cycles," MOBILE6 Stakeholder Review Document (M6.SPD.001). Prepared for EPA by Sierra Research, Inc., 1997.

⁶P 7-12, Modeling Mobile-Source Emissions, National Research Council, 2000, National Academy Press

evaporative emitting vehicles.”

5. “The best available data should be used to update MOBTOX, which should be merged into MOBILE6.”

EFP’s response to the first recommendation is to use better sampling methodology for vehicles and testing. Programs under this information collection shall use a stratified random sample instead of the more traditional random sample used under the last information collection.

EFP also will use in-situ sampling methods for all vehicle types covered by this information collection. This will provide real world emission data free from the artifacts of laboratory testing. The on-onboard instrumentation that shall perform this work is currently available to EFP. It correlates well with current laboratory methods⁷ and is sufficiently rugged to be used in the field for on-highway vehicles.

EFP shall also collect emission data using remote sensing devices (RSD). Though the precision and specificity of RSD data is controversial it does have the advantage of identifying gross emitters, acquire very large samples, and is free from recruitment issues. The use of RSD shall be part of at least one joint EFP and CRC test program in 2003.

The second recommendation is currently being addressed by a large test program started in late 2002 and to be finished in 2003, CRC test program E-55 Heavy Duty Vehicle Testing For Emission Inventory which produced emission data for 75 in-use heavy duty diesel vehicles. Furthermore, EPA has obtained from West Virginia University emission data on ‘x’ number of in-use heavy duty vehicles collected in several regions across the country using a portable testing facilities. Emission and activity sampling of heavy duty vehicles shall be done both EPA’s Ann Arbor test facility.

EFP’s response to the NRC’s recommendation of improving EPA’s estimate of particulate emissions, as a member of CRC, is to develop a test program to obtain new particulate emission estimates from a representative sample of 480 in-use gasoline fueled vehicles from the Kansas City Metropolitan Area (KCMA)⁸. This program is designed to address those issues that past EPA and CRC test programs have been criticized for, recruitment bias due to recruitment from an I/M area, poor rates of participation in non-I/M areas, the lack of cold start emission data, and the selection of the most appropriate

⁷On-Road Emissions Testing of 18 Tier 1 Passenger Cars and 17 Diesel Powered Public Transport Busses, Final Report, V 1.4, Carl Ensfield, Sensors, Inc. October 22, 2002

⁸“Characterizing Exhaust Emissions form Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area”, Statement of Work, March, 2003

drive cycle for the testing.

The recruitment and testing of high-emitting vehicles, both exhaust and evaporative, is a primary goal for all EFP test programs and is in direct response to the NRC report. While sample size is estimated by current measurement uncertainties within each stratum and EFP precision requirements, participants are selected at random from state registration lists. Participants shall each initially have their vehicle screened by either a remote sensing device, tail pipe shop analyzer, or onboard instrumentations to determine if its exhaust emissions are likely to be considerably greater than is considered normal for its stratum. The vehicles shall also be inspected for liquid leaking fuel systems to determine the vehicle's likelihood of being an evaporative emission high-emitter. Vehicles that are identified as being high-emitters shall be selectively recruited into either an appropriate sampling or a testing program to have their emission levels determined. The belief is that these vehicles contribute greatly to a stratum's uncertainty. If that is the case EFP shall increase a stratum's sample size to increase the certainty in the stratum's modeled emission rates. Furthermore, as these high-emitting vehicles are identified, sufficient demographic and vehicle data may be available to produce new strata for these vehicles apart from the emission standard driven strata used for this information collection.

Air toxics measurements are have become part of all present and future EFP emission testing programs. When the capability becomes available air toxics will also become part of the in-use sampling programs that are part of this information collection.

3(d) Effects of Less Frequent Collection

This information collection does not require periodic reporting or record keeping. Information is gathered on occasion. Each individual is contacted and asked to lend his/her vehicle if the program involves vehicle testing. If the participants are being asked to participate in a sampling plan they will be asked to fill out a vehicle operation log which they will provide to EFP at the end of the sampling period.

3(e) General Guidelines

Participation in either a test of sample program by each owner is on a voluntary basis. Vehicle owners do not have to plan or retain any records or information if they are involved in a testing program. If the owner/operator is to participate in a sampling program, however, he/she will be asked to keep a log of certain events and actions that affect the vehicle's emissions during the sampling period. Those events and actions shall be immediately apparent to the participant and are not subject to prospective or perspective judgment. Once the sampling period is over and the onboard board equipment is removed from the vehicle, the log is collected from the owner. The participant has ended the need to record any information.

3(f) Confidentiality

The only personal information collected in this information collection is the name, address and phone number of the owner of individual vehicles. This information is not used for any purpose other than contacting the owner schedule the vehicle for testing or sampling. This information is not stored in the database, but on CD and in data packets which are kept in secured files. The operation log used for vehicle sample will not record locations only activities and events that affect vehicle emissions, vehicle fueling, number of passengers, vehicle payload, and vehicle maintenance.

Vehicle registration information is received from either the State or from a contractor who has agreements with States on maintaining the confidentiality of vehicle owners. This information is received on a CD or computer tape and used by EPA personnel and/or contractor to randomly screen vehicles to develop mailings. The CD is locked in a secured filing cabinet with other paper files. The computer is password secured and known only by the Project Officer and contractor personnel doing the screening. Both the computer files and paper packets which includes the personal information are destroyed in 3 years.

Contractors (as listed in part B 1(c)) are involved in contacting the owner for participation in EFP. They will instruct the owners in how to fill out the vehicle logs for those who participate in the sampling program. These contractors are monitored by two project officers. All the contracts that deal with vehicle recruitment have confidentiality clauses that the contractors must adhere to.

3(g) Sensitive Questions

The only personal information involved in this information collection is the name, address and phone number of the owner of individual vehicles. All that information shall be kept in secured paper files. The vehicle information number of the vehicle (VIN) shall be kept in MSOD, but in a non-public, password protected table that shall not be published to general and non-EFP EPA users of the information. The purpose of this information is to request answers to the participated in either an emission and activity sampling or emission testing program schedule vehicle testing. None of the vehicle log entries are of a sensitive nature and the log does collect any data that can be traced directly to the owner or the vehicle operator.

4. The Respondents and the Information Requested

4(a) Respondents/SIC Codes

Respondents to the EFP are members of the general public that own motor vehicles. While some businesses may be asked to participate because they have a certain

type of vehicle, only the registered owner of the vehicle or their representative will be asked to respond to a solicitation. There are no SIC codes that correspond to an individual vehicle owner.

4(b) Information Requested

4(b)(i) Data Items, Including Record keeping Requirements

Any vehicle owner's response to a solicitation to participate in the program is on a voluntary basis. Vehicle owners do not have to plan, generate, or retain any records or information if they are participants in a testing program. If they are participants in a sampling program they will be asked to keep a vehicle operating log for as long as the vehicle is being sampled. Exhibit A is a copy of that log.

4(b)(ii) Respondent Activities

EPA shall solicit the general public for participation in Emission Factor Program (EFP) through the random selection of vehicle owners using State motor vehicle owner registration lists (may be derived from several sources). Potential participants have no obligation or burden other than responding to the keeping of the vehicle log if they are participants in a sampling program. Participation in the program by each owner is on a voluntary basis. When EPA or its contractor returns a loaned vehicle or the sampling of the vehicle is completed, the owner's role in the program ends. Positive respondent activities in the program are to: read materials or discuss the program with an EPA representative, keep a vehicle log if they are participants in a sampling program questionnaire, make the vehicle available for testing, and return any loaner vehicle to EPA.

Initial contact with individuals identified on a State vehicle owner registration list is by means of introductory letters (Exhibit B.) Respondents reply by returning a preprinted card which indicates their willingness to participate in the program (Exhibit C). If there is no response to the initial mailing, a follow-up letter (Exhibit D) is sent, and attempts are made to contact the potential participants by telephone. Failing this, any further attempts to solicit the individual are halted. In any case, solicitation of an individual stops immediately if there is unwillingness to participate in the program.

A positive response may result in an additional contact. At this time, vehicle descriptive questions (e.g., length of vehicle, air conditioning, etc.) are asked either over the phone or in person, in accordance with the participant's wishes.

Willing participants deliver their vehicles to the testing facility or where the sampling equipment is to be installed, or, at their preference arrange for program representatives to pick up. While the vehicle undergoes emissions testing by EPA (a period of less than one week), the owner has the option of using a loaner vehicle plus

receiving a small compensation of \$200 or, if they choose not to use a loaner vehicle, they will receive a higher compensation, \$275 day for the use of their vehicle. If the participant is in a sampling program they shall receive an additional \$50. Their vehicle shall also be washed and the tank filled with fuel.

The solicitation process for vehicles that arrive at state inspection lanes is a two-step process. First, qualifying vehicles entering the lane are identified and approached by EPA representatives. Vehicle owners are then asked if they would like to participate in the EFP and a cash incentive (up to \$250/week) and a loaner vehicle are offered to the vehicle owner. If the owner agrees to participate in the program, he/she is asked vehicle descriptive questions (e.g., length of vehicle, air conditioning, etc.). Generally the participant exchanges their vehicle for a loaner vehicle while they are at the inspection lane. The vehicle is then taken to the test lab to undergo testing by the EPA contractor over a one week period. A count of all vehicle owners responses is kept, as well as, the number of vehicles using the emission lanes. (part B, section 3 provides some more detail on the purpose and analysis methodology for the inspection lane type of program.)

5. The Information Collected: Agency Activities, Collection Methodology, and Information Management

5(a) Agency Activities

The EFP is required to identify and quantify the effects of changing trends in vehicle populations and use that affect emission inventories. The methods of determining the effects on inventories are developed following, in order, the first suitable method.

- EFP first determines if the data can be developed by using theory and engineering principles. This applies to phenomena based on physical laws, such as the effect of vehicle mass on fuel economy. This method does not require this information collection request.
- The second tier of data collection is that obtained from past empirical studies. This is data previously collected by EPA, vehicle and engine manufacturers, academia, and other investigating organizations. For some segments of the vehicle fleet there is a great deal of historical data that can be and is exploited by EFP to provide data to update and develop EPA's emission models. This does not require this information collection request.
- The third possible source of information is to develop emission data based on the laboratory testing of leased vehicles or engines at EPA or EPA contractor test facilities. This type of work is applicable when one is determining the effects of specific factors where the vehicle's membership in the in-use fleet is not desirable or necessary. This research, generally called A to B comparisons, are done to

isolate the effect of one or two variables under carefully controlled conditions. This type of information collection is not subject to information collection request.

- The fourth method, requiring this ICR, is to develop new data from in situ sampling of in-use vehicle emission and activity. This is relatively new to EFP, but has the advantage of collecting real world data as opposed to laboratory emission testing which is the measurement of vehicle emissions based on a simulation of prescribed operating conditions. This method is ideal for vehicle activity data collection. However, there are limitations to sampling; not all pollutants can be measured in the field.
- The last method of data collection and also subject to this ICR, is to measure vehicle emissions by the testing of in-use vehicles in a laboratory setting using facilities and protocols to imitate a variety of traffic, operating, and road conditions. This has been the traditional track for the data collected under this ICR.

The methods selected are built around issues that data is to address. In the case that in-use emission data is needed EFP shall identify a population of vehicles to be sampled, a sample size, an area or region in which the work is to be done, the emissions to be measured, a method in which the data is to be collected, and resources needed to complete the work. In general EFP programs subject to this ICR will be both sampling and testing programs performed concurrently.

5(b) Collection Methodology and Management

All phases of the EFP, including vehicle procurement, vehicle emission and activity sampling, emission testing, and data analysis, are guided by quality assurance plans.

The development of a statement work for all aspects of the work is the first step. Current EFP programs involve consultation with stakeholders such as CRC whose members are from the vehicle manufacturers, academic organizations, the US Department of Energy, US Department of Transportation, and other offices within EPA. This level of consultation is required because CRC members are providing considerable funding to the project, have fundamental interest that the data generated by EFP programs is rigorous and useful to all members, and have the necessary expertise to design and manage these type of programs.

The statement of work is required to meet basic quality assurance requirements from the agency's contracts rules. EPA and EPA contractors must document all aspects of any testing program such that the data meets minimal QA requirements for accuracy and precision. The SOW therefore relies on prescribed measurement procedures that are specified in the Code of Federal Register, the use of consensus test methods set by the

Association Standards for Testing of Materials

Participants and their vehicles shall be recruited randomly from the a stratified sample from either an I/M lane or state vehicle owner's list. Specific procurement criteria and quality assurance procedures for their implementation are the subject of each work assignment. However, in all cases sample size for each stratum shall be based on the precision requirement of this information collection and uncertainty in the emission measurement for each stratum. This is to assure that an adequate and efficient sample is used for all EFP test programs.

Vehicle sampling and testing shall use quality assurance procedures described in detail in CFR 86 subpart B, C, D, M, N, and O. In the case of vehicle sampling where new methods are to be used or developed, extensive lab testing to sampling instrumentation correlation shall be done as part of the sampling program. This shall be done to establish a precision and accuracy statements associated with the data the program produces.

Specific test requirements and quality assurance steps are outlined in the individual work assignments. Furthermore, all significant changes in the work are documented and reviewed by stake holders before their execution.

Data to be produced by all EFP programs are those specified in its statement of work. Examples of and the specified format for the information collected for sampling and testing programs is found in Exhibit E. The data, once placed into the specified formats, is reviewed by the testing or sampling contractor, delivered to EFP staff, where the data is reviewed by the principal investigator, then processed through program-specific preprocessing and quality assurance programs before it is loaded into the database MSOD. The data checking programs, loading programs, and the design of MSOD are being reviewed and subject to continuous improvement to increase data quality and allow for new data types to be stored.

The following type and format for the information collected for sampling programs is found in Exhibit E and that collected for emission testing programs in Exhibit F. The data, once placed into the specified formats, is reviewed by the testing or sampling contractor, delivered to EFP staff where the data is reviewed by the principal investigator, then processed through program-specific preprocessing and quality assurance programs before it is loaded into the database MSOD. Once in the format is subject to review by database users and ASD modeling staff and contractors.

The vehicle owner may receive his vehicle's sampled or tested emission results upon request. EFP staff will help the owner interpret the results and answer any questions concerning them or the program in which they participated. Access to the database, MSOD is available to the public upon request. The only section of the database that is

confidential is a table of Vehicle Identification Numbers (VINS). There is no names or addresses of participants in the MSOD. Auto manufacturers, the oil industry, and other pollution control agencies including state and local governments are the main users of the database.

The results of most of EPA's analyses of the data are published in the form of updates to the current emission model MOBILE6 and as input to the MOVES. The data is also used in the document AP-42, the compilation of mobile source emission estimates, or various technical reports on specific analyses. Further, EPA holds public workshops periodically to present the results of analyses and their potential impact on the EPA emission models.

5(c) Small Entity Flexibility

The information collection does not involve small businesses or small entities. The information collection solicits individual vehicle owners. When selecting vehicles from vehicle registration lists, EFP shall limit mailings of materials to owners of vehicles targeted for testing. In addition, the vehicle log is only requested from active participants in EFP emission and activity sampling programs.

5(d) Collection Schedule

The EFP is an ongoing program. The current schedule is being set to address issues brought to EFP from the report "Modeling Mobile Source Emissions" by the NRC and the development the model MOVES. The immediate EFP projects are to address particulate emissions, high-emitting vehicles, heavy duty vehicles, and air toxins with the most current and accurate emission and activity data possible. The EPA emission models must be revised periodically to reflect the changing current mix of vehicle types, technologies, and operating conditions.

6. Estimating the Burden and Cost of the Collection

6(a) Estimating Vehicle Owner (Respondent) Burden and Inquiry Burden

The attached materials represent those items required to be filled in by the vehicle owners. First, for the traditional EFP, a random selection of owners are mailed an introductory letter (Exhibit B) which includes a question and answer sheet that is mailed back to us in a postage paid envelop. This "package" is mailed only to those owners, selected from State motor vehicle registration lists, who have registered vehicles of interest to the program. If there is no response to the first package a follow-up letter (Exhibit D) is sent.

For individuals solicited from an inspection lane, an EPA representative explains

the

program and asks the vehicle owner to participate. This process replaces the steps outlined for contacting vehicle owners by mail.

In either case, when the participant is part of a sampling program they shall be asked to enter data into the vehicle operation log, an example of which follows below. program and asks the vehicle owner to participate. This process replaces the steps outlined for contacting vehicle owners by mail.

In either case, when the participant is part of a sampling program they shall be asked to enter data into vehicle operation log, an example of which (Exhibit A - Vehicle Log) is shown below.

Item	Key On Date	Key On Time	Key Off Date	Key Off Time	Check Box for Fuel Level				Number of Passengers >16 years	Number of Passengers 11 - 16 years old	Number of Passengers 1 - 10 years old	Trip Type			Payload
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
Units	Date	Time	Date	Time	1/4	1/2	3/4	Full	Number	Number	Number	Commute	Shopping	Errands	Items in Vehicle
Example	2-Apr	11:50 AM	2-Apr	12:20 PM	1/4	1/2	3/4	Full		1	2	Commute	Shopping	Errands	Gas costs
Example	2-Apr	3:10 PM	2-Apr	3:20 PM	1/4	1/2	3/4	Full	1		1	Commute	Shopping	Errands	Day Cleaning
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	
					1/4	1/2	3/4	Full				Commute	Shopping	Errands	

Tables 1-2 list the inquiry burden hours for both types of vehicle solicitation utilized in the EFP. The burden hour estimates were determined based upon in-field experience of both solicitation types and an estimate on the time necessary make entries into the vehicle log. The mileage figures of 15 miles for the trip to the test site or inspection lane was calculated from past programs and grown to account for a measured trends of increasing commuting distance. It was assumed that 25 mph represents an average speed in an urban area. The trip mileage and speed were combined to determine the length of time the vehicle owner spends returning the loaner vehicle. The estimated annual burden in hours and costs for the two recruitment schemes are summarized in Tables 1 and 2. The total program annual burden in hours and costs is summarized in Table 3.

Table 1 - Estimating Hours Burden and Cost to Vehicle Owner at I/M Lane

6(a) and (b): Estimating Burden and Cost to Vehicle Owner at I/M Lanes

Annual Labor Hours and Cost to Vehicle Owner

	Vehicle Owner Hours	Number of Contacts/ Respondents	Total Hours	Owner Costs \$31.88 per hour
Program Discussion/Invitation (1)	0.25	120	30	\$956
Exchanging Vehicles and Paper Work with Contractor (2)	0.5	100	50	\$1,594
Return Owners Car from Test Site (3)	0.6	100	60	\$1,913
Sampling Program Participant Vehicle Log Training (4)	0.17	25	6	\$179
Fill Out Vehicle Log (4)	0.82	33	27	\$863
Total (Hours)			172.7	
Total (Cost)				\$5,505

(1) Total Approaches by Vehicle Recruiters

(2) Owners are provided remuneration and free loaner vehicle

(3) Assumes an average one way trip length of 15 miles at an average speed of 25 mph

(4) Assumes 100 positive responses from owners and 33 owners will participate in a sampling program.

Vehicle log is provided by EPA

**Table 2 - Estimating Hours Burden and Cost to Vehicle Owners
from Registration List**

6(a) and (b): Estimating Burden and Cost to Vehicle Owner from
Registration Lists

Annual Labor and Cost to Vehicle Owner

	Vehicle Owner	Number of Mailings	Total Responden t Hours	Vehicle Owner Costs (4) \$31.88 per hour
Read Information in Mailing (1)	0.03	300	9	\$287
Fill Out and Return Post Card	0.083	50	4	\$132
Follow Up Phone Calls and Visits to Respondents	1	240	240	\$7,651
Exchanging Vehicles and Paper Work with Contractor	0.5	240	120	\$3,826
Drive To and From Test Site (2)	1.2	240	288	\$9,181
Sampling Program Participant Vehicle Log Training (3)	0.17	50	9	\$271
Fill Out Vehicle Log (3)	0.82	50	41	\$1,307
Total (Hours)			710.7	
Total (Cost)				\$22,656

(1) Assumes 1200 mailings

(2) Assumes an average one way trip length of 15 miles at an average speed of 25 mph

(3) Assumes 240 positive responses from owners and 50 owners will participate in a sampling program.

(4) No Capital costs, EFP provides vehicle log

The total annual respondent burden is reported below in Table 3.

Table 3 - Total Respondent Burden for EFP (Hours and Costs)

	Contacted	Participants	Hours	Costs
I/M Lane Recruitment Totals	120	100	172.7	\$5,505
Registration List Recruitment Totals	300	240	710.7	\$22,656
Totals	420	340	883	\$28,161

Respondents are provided remuneration for their time and inconvenience (See part A section 4 (b)) and that cost is therefore an Agency cost.

6(b) Estimating Inquiry Costs

The inquiry collection costs are incorporated in Tables 1-2 listed above. The respondents are provided remuneration for their time and inconvenience (See part A, section 3 (b)(iii)) and that cost is therefore an Agency cost.

6(c) Estimating Agency Burden and Cost

The Agency cost burden is determined by the contract dollars spent and the salary paid to EPA personnel and contractors. The contract costs cover inspection, repair and testing of vehicles, as well as, data entry, quality control, and storage. On an annual average, EPA devotes 4 person-years to planning and monitoring the program, processing the data, and design/maintaining the database. The salaries used for the three classification was GS 13 for project manager and Contracts Specialist, GS 9 for technicians, and GS 6 for clerical support. All pay categories were at maximum step for each grade for FY03 Detroit area General Schedule. Contractor costs are based on current costs incurred in typical contractor supplied services to EPA in the same geographic area. The estimate of agency costs are estimated is in Tables 4 for work provided by EPA staffed , Table 5 for contractors, and totals for both in Table 6.

Table 4 -Agency's Estimated Hours and Costs Burden -Agency Activities

6(c) Estimating Annual Agency Hours and Costs Burden - EPA Staff-Supplied Work

	Manager	Contracts Specialist	Technician	Clerical	Capital/ Startup	O & M	Labor Hours	Costs
Hourly Labor Costs per Task	\$70	\$70	\$41	\$30				
Write Statement of Work (SOW) for Test Programs	100	100	10	20	\$0	\$0	180	\$15,060
Vehicle Selection/Recruitment (1)	200	0	0	5	\$0	\$0	205	\$3,663
Expand/Maintain Database	20	0	4500	10	\$10,000	\$0	4530	\$207,731
Vehicle Repair and Maintenance	5	0	5	20	\$0	\$0	30	\$2,208
Testing Vehicles	100	0	200	0	\$0	\$0	300	\$8,501
Quality Control/Quality Assure Data	100	40	200	10	\$0	\$0	350	\$18,287
Monitoring Test Programs	100	0	10	0	\$0	\$0	110	\$7,434
Review Programs and Write Reports	100	5	10	5	\$0	\$0	30	\$7,935
Instrumenting Vehicles for Sampling	10	0	100	0	\$0	\$0	400	\$4,778
Analyze Test Data	300	0	1500	5	\$0	\$0	1505	\$82,355
Totals:							Hours 7460	Costs \$342,892

(1) Assumes vehicle selection by registration lists and I/M lanes as specified in 6(a) & 6(b).

Table 5 -Agency’s Estimated Hours and Costs Burden -Contractor Activities

6(c) Estimating Annual Contractors Hours and Costs Burden - Contractor-Supplied Work

	Manager	Technician	Clerical	Capital/ Startup	O/M	Labor Hours	Costs
Hourly Labor Costs	\$69	\$42	\$27				
Write Statement of Work (SOW) for Test Programs	10	10	0	\$0	\$0	20	\$1,108
Vehicle Selection/Recruitment (1)	300	1000	2500	\$0	\$500	3800	\$130,103
Expand/Maintain Database	5	40	5	\$0	\$0	50	\$2,166
Vehicle Repair and Maintenance	100	3000	20	\$0	\$0	3120	\$134,112
Testing Vehicles	200	9000	0	\$0	\$0	9200	\$393,876
Quality Control/Quality Assure Data	50	500	300	\$0	\$0	850	\$32,564
Monitoring Test Programs	200	10	40	\$0	\$0	250	\$15,207
Review Programs and Write Reports	50	10	10	\$0	\$0	70	\$4,119
Instrumenting Vehicles for Sampling	100	2000	0	\$0	\$0	2100	\$91,338
Analyze Test Data	200	200	0	\$0	\$0	400	\$22,164
Totals:						Hours 19840	Costs \$825,648

(1) Assumes vehicle selection by registration lists and I/M lanes as specified in 6(a) & 6(b).

Table 6 -Agency’s Estimated Burden for the Future - Totals

6(c) Estimating Annual Agency Burden - Totals

	Hours	Dollars
EPA Staff	7460	\$342,892
Contractors	19840	\$825,648
Total Agency Hours	27300	
Total Agency Costs		\$1,168,540

6(d) Estimating Vehicle Owner and Inquiry Universe and Total Burden Costs

There is no universe labor or burden costs associated with the vehicle owner or inquiry other than what has been listed in 6(a) and 6(b). The Agency cost for testing owner’s vehicles has been listed in 6(c).

6(e) Bottom Line Burden Hours and Costs

The total burden hours and costs are provided in Table 7.

Table 7 - Estimated Average Annual Bottom Line Burden and Costs

Item	Respondents	Agency	Totals
Estimated Annual Burden in Hours	883	27,300	28,183
Estimated Annual Burden in Dollars	\$28,160	\$1,168,540	\$1,196,701

6(f) Reasons for Change in Burden

The calculated respondent burden per respondent has increased due to the introduction of the vehicle log for emission and activity sampling programs, longer commutes to and from test sites, and inflation. The overall burden however has decreased for testing programs due to the elimination of the questionnaire since the last submission of the ICR and to budget reductions with a resulting decrease in the number of vehicles to be tested. Some reductions in burden to the Agency have occurred because of more automated data collection methods. All test and field sampling data, save the vehicle log, are collected electronically from the testing contractors.

6(g) Burden Statement

Burden Statement: The annual public reporting and recordkeeping burden for this collection of information is estimated to average 2.6 hours per response. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15.

To comment on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including the use of automated collection techniques, EPA has established a public docket for this ICR under Docket ID No. OAR-2003-0006, which is available for public viewing at the Office of Air and Radiation Docket in the EPA Docket Center (EPA/DC), EPA West, Room B102, 1301 Constitution Ave., NW, Washington, DC. The EPA Docket Center Public

Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Reading Room is (202) 566-1744, and the telephone number for the Office of Air and Radiation Docket is (202) 566-1742). An electronic version of the public docket is available through EPA Dockets (EDOCKET) at <http://www.epa.gov/edocket>. Use EDOCKET to submit or view public comments, access the index listing of the contents of the public docket, and to access those documents in the public docket that are available electronically. Once in the system, select "search," then key in the docket ID number identified above. Also, you can send comments to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW, Washington, DC 20503, Attention: Desk Office for EPA. Please include the EPA Docket ID No. OAR-2003-0006 and OMB control number 2060-0078 in any correspondence.

PART B

1. Survey Objectives, Key Variables, and Other Preliminaries

1(a) Survey Objectives

The primary objective of the EFP is to obtain the national average and variance of the key variables of the study for each stratum in the sample frame. Other EFP objectives are listed below:

- Determine the effect of vehicle-specific attributes like technology and age on emission and activity on a second-by-second basis. These attributes make up the source bins that will be used in the model MOVES.
- Determine the effect of environmental conditions like temperature, road grade, and road conditions on emission and activity on a second by second basis.
- Determine the effect of fuels, inspection and maintenance programs on emission and activity on a second-by-second basis.

1(b) Key Variables

The key variables of the information collection are vehicle emissions VOC, PM, N_x, CO₂, CO, the group of compounds known as the air toxics compounds, and vehicle activity. The emissions are those typically emitted from all motor vehicles. The variable activity are the metrics that describe the frequency, duration, temporal, and spacial use of a vehicle. Activity measurement also includes the ambient conditions and vehicle load under which the vehicle is being used. The emissions are expressed in emission factors on either a gram per mile or gram per second basis. Activity is expressed in miles per hour, time of day, road grade, temperature, barometer, and location on a second by second basis.

1(c) Statistical Approach

A statistical approach is required for the Emission Factor Program. Similar vehicles do not emit pollution at the same rate in the same way under all conditions. It is necessary to identify an appropriate sample of vehicles, sample and test them for emissions using appropriate sampling and testing protocols, and then distribute the emission results to those vehicles in the fleet that the sample, the sampling, and testing protocols are meant to represent, since it is necessary to test vehicles to measure the emission levels. Other sampling types do not provide an accurate measure of emissions for an in-use vehicle fleet. A census would be impractical. Anecdotal collection methods would not produce the data needed, and vehicle emission measurement is not a common practice with the general public.

At present there is a single contractor doing this work for EFP:

EG&G Automotive Research	Solicit vehicle owners and
2565 Plymouth Road	administer questionnaire
Ann Arbor, MI 48105	in Ann Arbor, MI
Headquarters:	
5404 Bandera Road	
San Antonio, TX 78238	

1(d) Feasibility

Respondent obstacles to a successful EFP is sufficient salience and incentives to potential participants to assure participation rates of 80%. A second obstacle is that participants who are members of an emission and activity sampling program will be requested to keep a log of events, activities, and facts that directly affect vehicle emissions.

Funding for EFP's Kansas City testing program in FY 2003 and FY2004 is \$600 k from EPA's Office of

Transportation and Air Quality (EFP's parent office), \$500 K from the EPA's Office of Air Quality Planning and Standards, \$ 400 K from the Department of Energy, \$200 K from the Department of Transportation, and \$405 K from the membership of the Coordinating Research Council. EFP has committed five engineers, two scientist, two contractor employees, and one man year of contract management staff to this program. The parent division has delegated one center director to supervise and direct the engineering and scientists. New sampling equipment has been purchased for the field work at a cost of over \$ 100 K dollars. Sufficient travel funds for 2003 have been allocated to this program for site visits to Kansas City and one to the potential contractors for the work.

Timing of results for decision making -- The results of the EFP are used primarily in the computer model, MOBILE6. The MOBILE models are usually updated every three to five years with the EFP data that has been accumulated. The data from the Kansas City program is projected to be used minimally as a new input to Mobile 6 and more likely as a new input into the model MOVES in late 2004.

2. Survey Design

2(a) Target Population and Coverage

The target population for the EFP consists of on-highway vehicles registered for operation on local, state, and federal road. The registration of those vehicles is subject to the rules established in state within the United States. Motorcycles shall be excluded as a vehicle emission class for this information collection because of their low impact on the total emission burden. They account for 0.193⁹ of the on-road vehicles and less than 1.0 % of the mileage traveled and no more than 1.0 percent of the pollutants from all on-road vehicles. Obtaining in-use emission tests for them is not cost effective. EFP has and shall obtain alternative data sources for EFP

⁹State Motor-Vehicle Registration 2000, R. L. Polk & Co., 26955 Northwestern Highway, Southfield, Michigan 48034

modeling. These alternative sources shall be data from research testing done for regulatory work at EPA and from certification testing.

The target vehicle emission classes that use fuels other than gasoline and diesel fuel shall be excluded from the information collection. Though these vehicles make up an increasing number of the fleet they still represent a small fraction of the total vehicle fleet and contribution to the emission inventory. Emission data for these vehicles have been the subject of research and that data is available to EFP to provide sufficient information upon which to model their emissions in an adequate manner. Resources are best spent to sample those vehicles using the most typical fuels, gasoline and diesel fuel.

The coverage shall be selected counties within the United States. The number of counties shall be greater than 50, but no more than 100. The counties shall be selected based on their representativeness of the national vehicle registration for the key variables and the availability of testing facilities.

2(b) Sample Design

2(b)(i) Sampling frame

In all instances the sampling frame for EFP testing and sampling is a state or some subset of a state vehicle registration list, usually specific to the area where the emission testing or sampling is to take place.

2(b)(ii) Sample size

Sample size is determined by the variability of the emission factor in the EFP database MSOD and required precision of the value desired for modeling a particulate emission for each sample stratum. The desired precision is 20 % of the average emission factor for each stratum, over the course of the data collection or the Tier 2 BIN standard, whichever is larger. This conditional precision is due to very large variances on a percentage basis for very clean vehicles which would result in very large sample sizes that would result in very little increase in the precision of the aggregate inventory for all strata in the sample. Table A.1 shows the relative

contribution of the proposed sample strata to the overall on-highway generated emission inventory.

Table A.1 - Emission Inventory Contribution of EFP Sample Strata

Vehicle Strata	Fuel Strata	Model Year Strata	2007 Mobile VOC Tons	2007 Mobile CO Tons	2007 Mobile NOx Tons	2007 Mobile PM Tons
HDV	Diesel	1980-1990	17643	130012	245594	18314
HDV	Diesel	1991-1995	14878	74315	425493	10309
HDV	Diesel	1996 and Newer	28957	130327	750623	10922
LDT	Diesel	1980-1990	490	856	517	67
LDT	Diesel	1991-1995	0	0	0	0
LDT	Diesel	1996 and Newer	0	0	0	0
LDV	Diesel	1980-1990	208	455	415	49
LDV	Diesel	1991-1995	5	12	11	1
LDV	Diesel	1996 and Newer	23	79	78	6
HDV	Gasoline	1980-1990	15972	59040	26432	271
HDV	Gasoline	1991-1995	27848	120155	56785	529
HDV	Gasoline	1996 and Newer	18287	159962	76725	903
LDT	Gasoline	1980-1990	596512	4595802	172364	986
LDT	Gasoline	1991-1995	411751	3311941	267618	799
LDT	Gasoline	1996 and Newer	426324	5834171	622965	1692
LDV	Gasoline	1980-1990	248671	1386020	109702	236
LDV	Gasoline	1991-1995	394043	2660195	237277	674
LDV	Gasoline	1996 and Newer	282904	3879941	298509	1214

Appropriate sample size for each stratum is found in Table A.2.

Sampling size for activity data is, at this point, unknown. It is believed a sufficient number of vehicles will be sampled in the KC work to develop appropriate statistics to identify an efficient sample and sample size. A target of 100 vehicles across all the strata per year is the sampling goal for this work.

2(b)(iii) Stratification variables

The stratification of the sample is based on the model year group (grouped by similar emission standards), vehicle type, and fuel type). For this information collection the Light Duty Trucks shall be defined for this information collection as all trucks defined in 40 CFR part 86 subpart A as light-duty trucks 1, light-duty trucks

2, light-duty trucks 3, and light-duty trucks 4. Heavy Duty Vehicles shall be for this information collection all those vehicles that meet the definitions for the engines that power them in 40 CFR part 86 subpart B (Otto-Cycle Complete Heavy-Duty Vehicles) and 40 CFR part 86 subpart D. Motor Cycles are those vehicles that conform to that definition found in 40 CFR part 86 subpart E.

The fuel types are those mentioned on the title 40 CFR part 86 subpart A. However, the vast majority of on-highway vehicles operate on gasoline and diesel fuel. Vehicles using these fuels will be the target population of this information collection. Furthermore, fuels used in this information collection shall be either in-use gasolines and diesel fuels or one of several standard test gasoline or diesel fuels used in past emission factor testing.

Vehicle emissions deteriorate as the vehicle ages or accumulates mileage. The vehicle age also encapsulates a vehicle's emission technology and therefore its emission standard. Therefore, the most practical manner to stratify the key variables, emission control technology and age) is to identify model years that capture when emission standards were constant. It also simplifies the sampling frame. The strata for this information collection are summarized in the following Table A.2:

Vehicle Strata	Fuel Strata	Model Year Strata	n used for calculating sample size for VOC, CO, CO2, NOx	ICR Sample Size for VOC	ICR Sample Size for CO	ICR Sample Size for CO2	ICR Sample Size for NOx	n used for calculating sample size for PM	ICR Sample Size for PM	n used for calculating sample size for VOC Evap	ICR Sample Size for VOC Evap
HDV	Diesel	Pre 1980	10	66	19	8	32	10	26		
HDV	Diesel	1980-1990	53	472	28	4	11	53	48		
HDV	Diesel	1991-1995	36	518	11	38	23	32	194		
HDV	Diesel	1996 and Newer	27	5	0	1	7	27	52		
LDT	Diesel	1980-1990	9	270	1	9	25	9	89		
LDT	Diesel	1991-1995	36	35	2	1	18	36	50		
LDV	Diesel	Pre 1980	6	42	0	5	12	6	12		
LDV	Diesel	1980-1990	29	32	1	7	20	29	47		
LDV	Diesel	1991-1995	4	0	0	0	0	4	0		
LDV	Diesel	1996 and Newer	1	0	0	0	0	1	0		
HDV	Gasoline	1980-1990	64	21	22	1	31	0			
HDV	Gasoline	1991-1995	292	443	347	2	31	4	0	70	434
HDV	Gasoline	1996 and Newer	47	131	14	1	36	1	0	17	392
LDT	Gasoline	Pre 1980	54	150	86	5	28	23	131	14	172
LDT	Gasoline	1980-1990	2000	136	112	4	67	184	522	2790	101
LDT	Gasoline	1991-1995	4488	95	8	3	37	132	5	82	6
LDT	Gasoline	1996 and Newer	162	35	1	4	130	9	1	0	
LDV	Gasoline	Pre 1980	507	154	116	6	40	42	215	60	96
LDV	Gasoline	1980-1990	13692	402	109	4	50	296	376	20334	79
LDV	Gasoline	1991-1995	9920	57	14	3	39	220	1	934	207
LDV	Gasoline	1996 and Newer	132	21	16	1	31	13	0	0	

Table A.2 - Sample Strata and Size

What the table does not show are vehicles to be tested and sampled that are selected to correct non-sampling errors (see 2(c)(ii)). These vehicles are chosen because they are high-emitting vehicles, new technology vehicles, and strata in the above table that have been characterized with sample sizes less than 20 observations. The new

technology vehicles are associated with new emission standards. For this information collection new emission standards occurred for light vehicles (cars and trucks) in model year 2000 (addition of Supplemental Federal Test Procedure) and heavy duty vehicles in model year 2004 (primarily for NO_x control).

2(b)(iv) Sampling method

Vehicles shall be selected randomly using two stages and probability proportional sampling at both stages from a particular EPA region. This technique shall be used to produce weighted sample emissions for each stratum that shall be applied to the national vehicle fleet. The first sampling stage, the primary sampling unit (PSU), shall be counties or areas within a particular EPA region. The region selected initially for this ICR is the Kansas City Metropolitan Area (KCMA) in EPA Region 7. It was selected because of its involvement in an ongoing Federally funded transportation congestion mitigation program with Department of Transportation (DOT). Much of the ground work identifying vehicles has already been done and related to possibly pertinent demographic data such as family income, zip codes, and vehicle miles traveled. Another PSU shall be an area 50 miles around the city of Ann Arbor, Michigan. This area was selected because of EPA's test facilities in the city of Ann Arbor and all the special resources that facility has. There is an anticipated national vehicle emission and activity program to begin in the later years of the ICR where counties (PSUs) shall be selected using proportional random samples to deploy onboard emission and activity measurement instrumentation. This approach will free us from the need for having laboratory facilities near by and will allow EFP to develop a national sample of vehicles to monitor and use for modeling purposes.

The value of proportional random sampling is that each PSU shall have sample weights applied to it, and its contribution to the sample will carry those weights along with the emission and activity data. This allows EFP to collect a more efficient sample and scale the data in an appropriate manner.

The actual selection of participants within the PSU will be based on the desired sample size per stratum. However, a participating vehicle shall be assigned a weighing factor much like the PSU to reflect the stratum's relative contribution to the national fleet as reflected by the national distribution of strata at the time of emission test or sampling program.

2(b)(v) Multi-stage Sampling

Multi-stage sampling shall be used in any national vehicle emission and activity sampling program. The first stage shall be the selection of the PSU using proportional random sampling with replacement. The second stage of sampling shall be a stratified random sample of vehicles from vehicle registration. The stratum is based on the three vehicle classes, two fuel types, and model year groups that reflect past, current, and future emission standards.

2(c) Precision Requirements

2(c)(i) Precision targets

The precision target for this information collection is a sample of vehicles that will produce a 95 % confidence interval about the average emission factor of 20 % or the emission rate or the 5th Bin of the Tier 2 standard for Light Duty Vehicles whichever is greater. That target, along with a stratum's emission factor uncertainty, shall be used to determine sample sizes for each stratum.

2(c)(ii) Non-sampling Error

Unusual problems requiring special sampling - MOBILE is most often used to predict future emission estimates for the mobile source fleet and obtain better emission estimates on high-emitting vehicles. These vehicles may not be found in large numbers in the general fleet, but their impact on present may either be disproportionate because of their high emission rates (the high-emitters) or they may be very important in the future, the new technology vehicles. Therefore, special efforts beyond random selection are required to obtain

these vehicles .

2(d) Vehicle Log Design

Vehicle log information is used to interpret vehicle load during emission and activity sampling with onboard instrumentation. Currently, onboard instrumentation can not tell directly how many passengers are onboard, if the vehicle is carrying cargo, the type trip taken, and if any vehicle maintenance preceded a trip. The goal is to use the data to help to characterize load's effect on emission levels. Vehicle load Questionnaire responses help to confirm the emission measurements made on the vehicle.

The log requires three types of information to be collected;

- Key on and key off events are needed to coordinate the log entries with the onboard instrumentation.
- Vehicle load information is collected by identifying how much fuel is onboard, the number of passengers, the type trip taken, and the type cargo that is being carried.
- Short description of any maintenance that preceded a key on event.

The key on and key off events require the recording the time of day and date. The vehicle load information is handled by a check box for fuel level, a number for passengers between the age of 0 and 11, 12 and 17, and adults. Any cargo is characterized by the type trip the vehicle is doing, commuting, shopping, or errands.

3. Pretests and Pilot Tests

A pretest of the vehicle log was performed in spring of 2003 to evaluate how well the form is designed, the accuracy , and usefulness of the data, and saliency of the form to the participant. This will determine if the form needs improvement, is adequate to the task, and whether some incentive may be required to assure that it is filled out in a timely and accurate manner.

4. Collection Methods and Follow-up

4(a) Collection Methods

There are three types of collection in the EFP. The first is the emission measurements conducted in the laboratory. They are needed to characterize a vehicle's emissions, a set of the information collection's key variables.

The second type collection is emission and activity measurements sampled in the field using onboard instrumentation. This is one of two methods of EFP to obtain emission data and the only method of obtaining activity data, both of which are key variables of the information collection.

The third collection method is the vehicle log. It is required to obtain vehicle load information during emission and activity sampling. Currently there is not appropriate instrumentation to measure a vehicle's payload during the trip other than direct weighing of the vehicle before and after loading or by querying the vehicle operator. The former method is not operationally practical so a vehicle log must be kept to obtain that information. The participant shall be instructed and given an appropriate incentive to fill out the log as completely as possible. The log is designed to filled out as the vehicle is operated and will not require that the participant to recall historical information.

4(b) Survey Response and Follow-Up

The response rates for the EFP historically is less than 25 % using vehicle registration lists and 90 % when participants were recruited from an inspection and maintenance test lane.

A summary of registration list response rates since 1995 is:

- Ultimate tested sample size - 520
- Asked to participate - 2361
- Response rate 22 %

In the 1980s, a concern had been raised about the Emission Factor Program regarding the historically low response and participation rate by vehicle owners. This hesitancy to participate by vehicle owners is largely understandable, since the request to borrow a vehicle for several weeks is far from trivial. There has been intensive analysis of this issue by the University of Michigan's Survey Research Center in the early 1980s and by a focus interview/survey conducted early this year. To maximize response rates, a follow-up mailing and phone call to the owner is made, the owner is provided with a new model loaner vehicle and a small monetary incentive, and the owner's vehicle can be picked up and/or delivered by the EPA contractor. Further activities will be tried to improve the solicitation materials and promote the program in the Ann Arbor area.

The participation rate in the EFP for vehicle owners who are solicited from inspection lane is much greater than the rate in the traditional EFP. In the last EFP test program where lane recruitment was used the rates were since 1995:

- Ultimate tested sample size - 195
- Asked to participate - 214
- Response rate 91 %

The participation rates in Hammond is discussed in section 5(b) of part A.

There are probably many reasons that the participation rate is higher in this type of EFP. Some of the reasons may be: personal contact between the EPA representative and the vehicle owner; the owner can observe an emissions test that is similar to those his/her vehicle would be subject to; the specific loaner vehicle that the owner will receive is available for immediate examination; if the vehicle fails the State inspection, EPA agrees to fix the vehicle.

During this information collection, vehicle recruitment using registration lists will be handled by a marketing/research organization, not a vehicle testing organization. The goal is better participation rates and

owner/participant demographics. This process shall be used in the Kansas City ¹⁰study in FY 2003 and FY 2004. The process shall entail a recruitment pilot that will be used to identify appropriate sample frame demographics. The demographics shall then be used to determine what incentives and program descriptions would make the program more appealing and salient to possible participants. This would form the basis of a suitable demographically specific recruitment strategy that would be tested and, once proven, applied to the total program. The contractor would also determine the source of non or negative respondents and formulate methods to recruit them in later stages of the testing and sampling program.

5. Analyzing and Reporting Survey Results

5(a) Data Preparation

The accuracy of the emission rates are ensured by adherence to standard test procedures and the agency requirement that all emission measurements are managed under a quality assurance action plan that is specific for all individual testing and sampling programs performed by EPA. The procedures for emission testing (e.g., Federal Test Procedure and Highway Fuel Economy Test) were developed as part of various regulations and were therefore subject to intensive review by both EPA and the regulated industry. Emission sampling programs, though relatively new to mobile source programs, have gone through two prototype programs and are now under extensive review by CRC. All the test procedures utilized in the EFP are described in the test procedure manuals maintained by the Testing Services Division. The specific procedures applicable to the EFP are referenced in the April 3, 1987 memo, "Revised Memo of Understanding - EFP Test Procedures."

The data for the EFP are entered into the computer data base in several ways. First, the basic vehicle

¹⁰"Characterizing Exhaust Emissions from Light-Duty Gasoline Vehicles in the Kansas City Metropolitan Area", Statement of Work, March, 2003

identification information is coded on data forms. This information is keyed into a computer file through data entry checking program specific for vehicle information. The emissions data are entered in a variety of ways, depending upon the capabilities of the test facility supplying the data. In general, the majority of the emission and activity data is collected and transferred to the EFP data base electronically. All of the emissions data collected at the Ann Arbor test facility is transmitted directly from the measurement equipment to the computer files. The emissions data provided by contractors is done in the same manner. All data is eventually placed in files compatible with MSOD input files.

All input files are checked by the testing contractor using a sequence of EFP quality control computer programs. These programs are systematically tailored for and applied to all EFP emission and activity data. The programs are applied to the test data by the testing contractor and EFP staff before the data is loaded into the database MSOD. Furthermore, MSOD is a fully functional relational database with business rules enforced by relational constraints implied by the database's design.

All aspects of quality control other than data entry and final review are governed by the quality assurance plans referred to in part A, section 4(b).

5(b) Data Analysis

Generally the basic emission rates are estimated by linear or piecewise linear regression of emissions (dependent variable) versus vehicle mileage (independent variable) using all the data collected in past EFPs pertaining to a given vehicle type.

The basic emission rates provide estimates for average urban summer conditions for ambient temperature and vehicle speed. The MOBILE user needs to predict emissions at other than these average test conditions. EFP data are also used to estimate correction factors for nonstandard test conditions. Again in this situation, least

squares regression procedures are used to determine the prediction equation for emissions (dependent variable) as a function of ambient temperature or average speed (independent variables). The regression equation is then normalized to the average urban summer conditions to apply as a correction factor to the basic emission rate equation.

5(c) Data Reporting

The EFP emission results on an individual vehicle are made available to the vehicle owner upon request. All the data recorded on the EFP data base is available upon request on CD-ROM. Eventually it will be available from the EPA Internet website.

The EFP data are analyzed and used in a series of computer models, the MOBILE models. The documentation of MOBILE is a supplement to a series of reports known as AP42. The last formal update to AP42 (Supplement A to the Compilation of Air Pollutant Emission Factors -- Volume II: Mobile Sources) was published January 1991. Portions of this supplement (Appendices G, H, I, J and K) have been updated since that time are available on the EPA Web Site (www.epa.gov). EPA is in the process of updating the MOBILE model itself and technical reports relevant to the analysis are posted on the EPA Website for stakeholder review. Public MOBILE workshops were held in March and October 1997. Completion of the updated MOBILE model is expected in fiscal year 2000.