FHWA-NJ-2014-006

Carbon Footprint Estimator, Phase II
Volume II – Technical Appendices

FINAL REPORT
March 2014

Submitted by:

Robert B. Noland
Christopher S. Hanson

Alan M. Voorhees Transportation Center
Edward J. Bloustein School of Planning and Public Policy
Rutgers University

NJDOT Research Project Manager
Edward Stephen Kondrath

In cooperation with

New Jersey
Department of Transportation
Bureau of Research
And
U. S. Department of Transportation
Federal Highway Administration

DISCLAIMER STATEMENT

TECHNICAL REPORT
STANDARD TITLE PAGE

1. Report No. FHWA-NJ-2014-006	2.Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Carbon Footprint Estimator, Phase II Volume II – Technical Appendices		5. Report Date March 2014 6. Performing Organization Code
7. Author(s) Noland, Robert B. and Christopher S. Hanson		8. Performing Organization Report No.
9. Performing Organization Name and Address Alan M. Voorhees Transportation Center Rutgers University 33 Livingston Ave, New Brunswick, NJ 08901		10. Work Unit No. 11. Contract or Grant No. 49997-30-24
12. Sponsoring Agency Name and Address New Jersey Department of Transportation PO 600 Trenton, NJ 08625	Federal Highway Administration U.S. Department of Transportation Washington, D.C. 20590	13. Type of Report and Period Covered 14. Sponsoring Agency Code

15. Supplementary Notes
University Transportation Research Center, Region 2,The City College of New York
137th Street and Convent Avenue
New York, NY 10031

16. Abstract
The GASCAP model was developed to provide a software tool for analysis of the life-cycle GHG emissions associated with the construction and maintenance of transportation projects. This phase of development included techniques for estimating emissions from induced travel when a project involves a capacity expansion; a life-cycle maintenance module based on recommended procedures for maintaining a road surface over 50 years; an automated method for inputting construction equipment activity associated with selected project types; a method based on the Highway Capacity Manual for estimating emissions associated with project staging and the diversion of traffic around a worksite; methods for more easily updating emissions factors in the model; and, a variety of miscellaneous upgrades to account for SF_6 emissions, upstream electricity emissions associated with asphalt, and incorporation of additional bid-sheet codes in the materials module. Four case studies to demonstrate the models usage were also conducted. These were: a large project case study (reconstruction of rt 35 in Ocean County) that demonstrated the full capabilities of the model; a smaller project (rt 47 resurfacing in Gloucester County) that focused on different staging options and the impact on emissions from traffic; an applied case study conducted in collaboration with NJDOT staff in the South Jersey regional office that focused on maintenance activities; and a demonstration of the relationship between the embodied fuel cost of a project and the GHG emissions. The software and related documentation is available for use on www.gascap.org and users are requested to upload any analysis results to provide information for further development of the software.

17. Key Words life-cycle analysis, greenhouse gases, emissions, construction projects, asphalt, concrete, transit	18. Distribution Statement			
19. Security Classif (of this report) Unclassified	20. Security Classif. (of this page) Unclassified		21. No of Pages Volume I-107 Volume II-251	22. Price

Form DOT F 1700.7 (8-69)

ACKNOWLEDGEMENTS

The following students played an integral role in the development of this project. Jonathan Hawkins was our master programmer whose skill at designing and integrating the information was essential. Mike Benson continued the programming that Jonathan began during phase I of this project. Andrew Kay and Dong Gao also provided vital support with research and programming. Patrick Brennan and Karthik Rao Cavale conducted research during the first phase of this work. Staff from the New Jersey Department of Transportation, Southern Region, Maintenance Department, Larissa Poulber and Scott Oplinger assisted with providing valuable input to one of our case studies and the development of the maintenance module. Many thanks to Edward S. Kondrath, Jamie DeRose and Andy Swords for providing support for this work. We thank all for the guidance and input they provided for this project.

TABLE OF CONTENTS (VOLUME I)

TABLE OF CONTENTS (VOLUME II)

Page

LIST OF FIGURES (VOLUME I)

Page

LIST OF TABLES (VOLUME I)

Page

LIST OF TABLES (VOLUME II)

EXECUTIVE SUMMARY

Volume I of this report summarizes the phase II development of the GASCAP software for analyzing the life-cycle greenhouse gas (GHG) emissions of transportation capital construction projects. GASCAP is a spreadsheet-based tool that has been designed to provide estimates of GHG emissions for the many different components of a construction project. It is designed to be both user-friendly and flexible, allowing the user to specify inputs for a variety of different modules. GASCAP provides life-cycle emissions estimates for the major GHGs. These include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), and black carbon (BC). We also include estimates for the oxidation to CO_2 of volatile organic compounds (VOC) and carbon monoxide (CO).

The primary modules within GASCAP provide estimates of embodied emissions associated with a wide range of materials, construction equipment used on a project site, emissions associated with project mobilization and traffic disruption based on how the project is staged, and life-cycle maintenance over the lifetime of the project. Other modules include procedures for using recycled materials, induced travel effects, and rail capital projects.

This phase of the GASCAP project focused on a variety of tasks. These included the development of the induced travel module, development of a life-cycle maintenance module, automated methods for allocating equipment to project types, development of procedures to estimate emissions associated with traffic disruption during project construction, various miscellaneous upgrades including development of SF_6 emissions factors, upstream asphalt emissions factors associated with electricity, and incorporation of additional bid sheet item codes. Procedures were also included in Volume II of this report which will allow NJDOT staff to update emissions factors derived from the MOVES, NONROAD, and GREET models. This phase also included the development of four case studies that provided a test of the GASCAP software and also provided useful information for decision makers.

Induced Travel Module

The induced travel module was developed to provide GHG estimates based on the traffic generated from new construction. As part of this work, we used New Jersey data to estimate models linking vehicle miles of travel to lane miles for different functional road classifications. These elasticities of travel demand, with respect to lane mileage, were then used to build the induced travel module.

Life-cycle Maintenance Module

A life-cycle maintenance module was developed that provides estimates of emissions associated with road surface maintenance over the lifetime of a project. This module is based upon a maintenance schedule provided by NJDOT engineering staff. Both asphalt and concrete pavements can be modeled. Bridge maintenance activities are not included in the module as information on typical maintenance activities was not supplied by NJDOT. The large variability in bridge types would in any case make generalizations about maintenance activities difficult for modeling purposes.

Upgrades to Equipment Module

The first phase of GASCAP required users to input the equipment types and hours of usage for each project. In this phase of the work we examined various research projects and databases to determine methods for allocating equipment and its usage to a sample of the most common project types. A study conducted in California provided the best estimates for up to seven project types and the phases of construction work associated with each. The allocation method was implemented in GASCAP allowing the user to simply specify the length of the project and what type of project it is, greatly simplifying the task of inputting this information.

Traffic Disruption and Diversion

In the first phase of GASCAP, a module was developed that provided options for staging of construction projects. This module focused on mobilization (i.e., movement of resources to the site) and options for providing project lighting powered by generators or the grid for nighttime work (a separate module developed in phase I can estimate GHG emissions from alternative street lighting options). In this phase we developed procedures that handle traffic disruption and diversion associated with the work site. The user is allowed to specify from seven different staging options, including the specification of a detour route around the work site. This allows the estimation of emissions associated with any disruption and diversion of traffic. Traffic flow equations from the Highway Capacity Manual provide the basis for determining changes in flow speeds, allowing changes in GHG emissions from a base case to be estimated.

Miscellaneous Upgrades

Various minor upgrades of the software were also completed. These include development of SF_6 emissions factors and upstream asphalt emissions factors associated with electricity usage. We also incorporated a large number of additional bid sheet items, primarily electrical components that were not included in phase I of this project.

Case Studies

As part of this project we conducted four case studies, each of varying magnitude and with different objectives. One overall objective was to test the software and provide a demonstration of its capabilities. These case studies include one large comprehensive road reconstruction project (Rt 35 in Ocean County), one focused on the traffic disruption module (Rt 47 in Gloucester County), applied work done in cooperation with the maintenance staff of the South Region NJDOT office, and a fourth which demonstrated the ability to analyze embodied fuel costs associated with projects.

During the course of this work, we found various software bugs which were fixed and various minor omissions to GASCAP, including many item codes which could not be located. These would likely have a minor impact on total emissions calculated but might be worth including in any future update. Overall the case studies demonstrated that GASCAP is generally user-friendly and will provide useful information to project managers and decision makers.

We worked closely with the South Region office to develop a special maintenance module suitable to their needs. This was a useful exercise in that it showed a practical application of the software. Staff in the South Region office input various projects and provided the output of that work. These were for specific road maintenance tasks for crack sealing, manual patching, and a pothole killer. The latter cases may not have been correctly entered, suggesting additional training work may be necessary.

Both the large case study (Rt 35) and the traffic disruption case study (Rt 47) found that the bulk of emissions are associated with materials used in the road project. Many of the smaller components used on a project, when added together, also add non-trivial emissions to a project. The finding that it is mainly embodied emissions associated with materials that accounts for most emissions, limits the ability of NJDOT to influence the GHG emissions of most projects. Equipment emissions are a minor component. Staging procedures do show some variation depending on how a project is staged; in particular, total road closures will increase emissions substantially relative to intermittent closures (as shown with the Rt 47 case study). Nighttime lighting can also contribute substantial emissions to a project, but not enough to offset the emissions from a full road closure during the day.

Our fuel cost analysis showed that total embodied fuel costs may be a good proxy for total emissions. Lower cost projects likely have fewer total emissions than higher cost projects, mainly because fewer materials are used.

Updating Procedures

The emissions factors which GASCAP uses in all phases of its calculations are derived primarily from three models. These are the EPA MOVES and NONROAD models for on-road vehicles and construction equipment, respectively, and the Argonne National Laboratory GREET models, for fuel cycle and vehicle cycle for embodied material emissions. Each of these models is periodically updated to reflect new research and changes in technology and regulations. For this reason, in Volume II of this report, we included our developed procedures and documentation that will allow NJDOT staff to update the output of these models.

Future Research

As part of this work we investigated procedures for including road deterioration and how this affects the GHG emissions of vehicles using the road. This is potentially a large source of emissions that is currently not accounted for in GASCAP. Resources were unavailable to implement a module that would account for this. This should be a priority for any future upgrades to GASCAP.

Various updates to different modules include automating the input of bid-sheet codes, more detailed research on equipment activity, possibly including a large survey of construction sites, and optimal life-cycle bridge maintenance procedures need to be developed by NJDOT and included in GASCAP.

Another issue is that GASCAP is now a fairly large and complex software product. Migration of the software to a platform more suitable to handle its complexities is recommended.

Finally, the case studies we conducted are just a start. We feel that far more work should be done to analyze various projects, both to test the software and to demonstrate its capabilities. Volume II of this report includes a GASCAP User Guide. Ideally NJDOT staff should be trained in how to use the software and policies should be put in place to integrate the use of the software within the planning process.

REFERENCES

1. Argonne National Laboratory. *GREET 1_2011 Fuel Cycle Model.* , Argonne National Laboratory, 2011.

2. Argonne National Laboratory. GREET 2.7 Vehicle Cycle Model. , 2007.

3. M. Wang, H. Lee, and J. Molburg. "Allocation of Energy use in Petroleum Refineries to Petroleum Products." *The International Journal of Life Cycle Assessment*, Vol. 9 No. 1, 2004, pp 34-44.

4. F. Joseck, M. Wang, and Y. Wu. "Potential Energy and Greenhouse Gas Emission Effects of Hydrogen Production from Coke Oven Gas in US Steel Mills." *International Journal of Hydrogen Energy*, Vol. 33 No. 4, 2008, pp 1445-1454.

5. USGS. 2009 Minerals Yearbook: Iron and Steel Scrap. 2011. http://minerals.usgs.gov/minerals/pubs/commodity/iron_&_steel_scrap/, Accessed Oct 22, 2013.

6. Battye, W., K. Boyer, and T. G. Pace. *Methods for Improving Global Inventories of Black Carbon and Organic Carbon Particulates.* Environmental Protection Agency, Washington, DC, 2002.

APPENDIX A:
PROCEDURE FOR UPDATING EMISSIONS FACTORS FROM THE MOVES MODEL

This procedure requires the installation of EPA's MOVES software. Instructions are on EPA's website and these must be followed precisely. Details on how to extract emissions factors for GASCAP and how to update GASCAP are then provided.

Software Installation

Download and install the latest available version of the MOVES software. The latest version is MOVES2010a. The software is published and made available at no cost by the EPA Office of Transportation and Air Quality (OTAQ). The software simulates emissions from on-road vehicles. A new version, currently scheduled for release in 2013 is expected to include non-road equipment as well and will replace the NONROAD procedure documented elsewhere in this users' guide. The MOVES webpage may be found at the following address.

http://www.epa.gov/otaq/models/moves/index.htm

It is recommended that users wanting to update the portions of GASCAP that rely on the MOVES model read the general information, user documents and tools, and downloading instructions carefully. We urgently suggest that you follow the MOVES installation instructions to the letter. It will save considerable frustration. The installation has three components. First a Java platform is installed, followed by an SQL program named MySQL, and the finally the MOVES program itself. Care must taken to install the proper version of each component as recommended because the MOVES will not run otherwise. Please refer any problems you have with the MOVES installation to OTAQ.

Extracting GASCAP Emission Factors from MOVES

The MOVES installation procedure should place three icons on your desktop, including MOVES Master, MOVES Worker, and MOVES Uninstall. Start the application by double clicking first on MOVES Worker and then on MOVES Master. Click OK on the popup dialog box when prompted to finish opening MOVES Master and complete the start up.

The first step is to enter run specifications. On the left column you will find a list of topics that require specification to run the program. A violet exclamation point indicates that a mandatory issue has not been satisfactorily specified and the program will not run until the problem is corrected. A wavy equals sign indicates that an issue that is not required has not been addressed. The program will run with the specification. A green check mark indicates that the specifications in question are satisfactory and the program will run. Begin to enter your specifications.

1. Click on the heading Geographic Bounds. Under Region click the State radial button. Under the States list click New Jersey and click the Add button. New

Jersey is listed under selections and a green check mark replaces the violet exclamation point to the left of Geographic Bounds.

2. Click on the heading Vehicles/Equipment. A subheading On Road Vehicles appears. Click on that as well. This will produce a list of selectable Fuels and Source Use Types (vehicle classifications). Click on Diesel fuel to select it and then while holding down the Control key click on gasoline. This will select diesel fuel and gasoline and none of the other options. Under Source Use Types click Select All. This will select all vehicle classifications and activate the Add Fuel/Type Combinations button. Click that and all of the fuel and vehicle type combinations will populate the Selections column. This will turn the violet exclamation points next to Vehicles/Equipment and On Road Vehicles into green check marks, indicating successful specification of equipment.

3. Next click on the Road Type heading. Select all of the road types except Off-Network. The violet exclamation point next to the heading will turn into a green check mark, indicating successful specification of road types.

4. Click on the Pollutants and Processes heading. This will produce a matrix of check boxes associated with emissions and energy consumption categories and the processes, e.g. running exhaust, that produce them. Click on the following at the far left to include all processes:

    a. Total Gaseous Hydrocarbons

    b. Non-Methane Hydrocarbons

    c. Non-Methane Organic Gases

    d. Carbon Monoxide

    e. Primary PM10 – Elemental Carbon

    f. Primary PM2.5 – Elemental Carbon

    g. Total Energy Consumption

    h. Petroleum Energy Consumption

    i. Fossil Fuel Energy Consumption

    j. Methane

k. Nitrous Oxide

l. Atmospheric CO_2, and

m. CO_2 Equivalent

Uncheck Evap Permeation, Evap Fuel Vapor Venting, and Evap Fuel Leaks for Total Gaseous Hydrocarbons, Non-Methane Hydrocarbons, and Non-Methane Organic Gases. The violet exclamation point to the left of the Pollutants and Processes heading will turn into a green check mark, indicating that the specifications are acceptable.

5. Click the Time Spans heading. This will produce an input table that asks the user to indicate a Time Aggregation Level, Years, Months, Days, and Hours. Click Year as the aggregation level. This automatically selects all months, days and hours. Select a year [one year at a time is recommended by VTC staff] and click Add. The year will appear in the Years: box and the violet exclamation point next to the Time Spans heading will turn into a green check mark.

6. Click the Output heading. Two subheadings will appear: General Output and Output Emissions.

    a. Click General Output. Leave the Server box blank to write the data query results locally. In the Database box, enter a database name that you can remember easily and click the Create Database button. A popup message will tell you “Output Database successfully created.” Click OK in it to dismiss it. Under units select grams for mass units, Million Btu for energy units and miles for distance units. Under Activity select distance traveled to state outputs in vehicle miles traveled (VMT). The General Output heading has a green check.

    b. Click Output Emissions. Select Model Year and Fuel Type, but not emission process. This will allow you to avoid needless aggregation in the post processing and table manipulation phases of this process. Do not make any changes to the Always section. Under the On Road section select only SCC. SCC codes indicate both functional classification of roads and fuel type.

7. Check to make sure that there are no violet exclamation marks showing on the left margin of MOVES. Address any there are by reviewing this protocol.

The second step is to run the specifications. To do this:

1. Under the Action menu of MOVES select Execute. You will be prompted to save your script. Click Yes and enter a text file name for the script. When you save this MOVES starts processing.

2. Wait until the Execute active RunSpec bar crosses the bottom of the screen. This will take some time regardless of the speed of your computer although run times will vary.

3. When the run finishes under the Action menu select MOVES Run Error Log. It should be empty. If not troubleshoot as necessary. Email can be sent to mobile@epa.gov.

4. Under the Post Processing Menu select Run MySQL Script on Database. Select TabbedOutput.spq and click OK. Read the Post-processing Script Documentation and click OK. Another popup will say “Post processing script executed successfully.” Click OK on it.

5. Close MOVES by clicking on the X buttons in the upper right hand corner of MOVES Master and MOVES Worker.

The third step is to open the run results into Excel. The emissions and energy use covered in the MOVES data are complete with the exception of N_2O emissions. These data are provided by SCC codes including gasoline and diesel vehicles. SCC Codes have three components. The first is seven digits long (digits 1-7) and describes the vehicle type including the type fuel used. The seven-digit codes in Table 1are used in the data produced by the MOVES model described above:

Table 1 - Vehicle types in the MOVES model

SCC	Description	Abbreviation
2201001	Light Duty Gasoline Vehicles	LGDV
2201020	Light Duty Gasoline Trucks 1&2	LDGT1
2201040	Light Duty Gasoline Trucks 3&4	LDGT2
2201070	Heavy Duty Gasoline Vehicles 2B--8B and Gasoline Buses	HDGV2B
2201080	Motorcycles	MC
2230001	Light Duty Diesel Vehicles	LDDV
2230060	Light Duty Diesel Trucks 1--4	LDDT12
2230071	Heavy Duty Diesel Vehicles Class 2B	HDDV2B
2230072	Heavy Duty Diesel Vehicles Class 3, 4, and 5	HDDV4
2230073	Heavy Duty Diesel Vehicles Class 6 and 7	HDDV6
2230074	Heavy Duty Diesel Vehicles Class 8A and 8B	HDDV8A
2230075	Heavy Duty Diesel Buses (School and Transit)	HDDBT

The second component has two digits (digits 8-9) and describes the functional class of roads where emissions were produced. These codes are used to assess added emissions from increased use because of additions of lane miles of specific road types in the induced travel component of GASCAP. The two-digit functional class codes shown in Table 2 are taken from the SCCs produced in the MOVES run described above, are used to aggregate the GASCAP functional classifications from the SCCs produced in the MOVES run described above:

Table 2 - Functional classification codes in MOVES and GASCAP usage

SCC	SCC Designation	GASCAP Designation	GC Code
00	Off Network (Exhaust)	Off Network (for deletion)	--
00	All Functional Classes Combined (Evaporation)	All Combined	--
11	Rural Interstates	Interstates and Freeways	_1
13	Rural Principal Arterials	Arterials	_2
15	Rural Minor Arterials	Arterials	_2
17	Rural Major Collectors	Collectors	_3
19	Rural Minor Collectors	Collectors	_3
21	Rural Local Roads	Local Roads	_4
23	Urban Interstates	Interstates and Freeways	_1
25	Urban Freeways and Expressways	Interstates and Freeways	_1
27	Urban Major Arterials	Arterials	_2
29	Urban Minor Arterials	Arterials	_2
31	Urban Collectors	Collectors	_3
33	Urban Local Roads	Local Roads	_4

The third and final component of the SCC codes is a single character in the tenth place. An ‘X’ indicates that the record represents exhaust emissions while a ‘V’ indicates evaporative emissions. The other emission type codes ‘B’ for brake wear and ‘T’ for tire wear are not modeled for GASCAP.

A ten-character SCC code classifies modeled emissions by vehicle type, functional classification of roads, and emission type. For example the SCC code 220100121X indicates exhaust emissions from light-duty gasoline vehicles on rural local roads. The SCC code 22307500V indicates evaporative emissions from diesel buses. Please note that evaporative emissions are not modeled by road functional classification. This makes it necessary to apportion evaporative emissions among functional classifications so that evaporative and exhaust emissions can be combined for the induced travel component of GASCAP. The SCC code 223006000X indicates exhaust emissions from light duty diesel trucks off-network, which are not included in GASCAP and may be deleted. Although SCC codes discriminate completely among fuel types, there is a separate fuel indicator, which is not used in the Excel manipulations described here. In addition, emissions are disaggregated by model year.

Data manipulation conventions in Excel

Microsoft Excel provides a reasonable way to accomplish the data manipulations. Anyone who has ever worked with databases or worked with Excel will find this portion quite familiar. A spread sheet such as Excel is a workable medium for a database because it is composed of cells which can be referenced by row and column. In Excel rows are referenced by integers (whole numbers) from 1 to 1,048,576 and columns are referenced by capital letters alone or in combination from A to XFD (16,384 possible columns). The order of column letters is one-letter, two-letter, and three-letter, each in alphabetical order. Each cell in a database is a member of a row or record, which contains all of the information about a particular instance in the data, such as 223006019X (exhaust emissions for light-duty diesel trucks on rural minor collectors). Each cell in a database also contains a column or variable, which contains a particular piece of information about all of the records in the database, such as CO_2 or grams of CO_2 emissions. Row 1 contains the name of each variable. Each cell below the label cell in Row 1 contains the datum specified by the label name for its particular row. Data are contained in rows 2 through *list*, where *list* refers to the last row in a table for which there are data. When a variable is added or changed usually changes are done in rows from 2 to *list*.

ID variables have names that may be unique within their column or may contain names that are unique in a more highly aggregated database with fewer members. An example might be the concatenation of SCC and model year such as 220102025_1986, which identifies the record as emissions from 1986 light-duty gasoline trucks on urban freeways and expressways. By using an ID variable at a higher level of aggregation so that the contents are not unique, it is possible to access information from other tables that are aggregated at the level of aggregation indicated by the name. Most of the tables where the data manipulations take place have at least two ID variables. One is unique to the table and the other or others are unique to tables of data that are more aggregated or generalized than the table in which they are found.

Some of the Excel worksheets discussed in this documentation contain multiple tables or databases. For the sake of clarity these are referred to as *subtables*. Tables are alone on a worksheet while subtables share a worksheet however they are conceptually independent of each other except in specified ways. Each can have different variables and variable names, usually based on different levels of aggregation because the emissions and energy consumption variables are consistent. This means that there are different numbers of records. To avoid confusing them, subtables are separated by blank columns.

After a formula has been entered in Row 2 under the variable label, it must be copied to the other cells in the column for which there is data. The easiest way to accomplish this is to select those cells and the cell in Row 2 that already has data. Then by pressing the Control and D keys together the formula is copied and the column is *populated*. To do this the last row to receive data must be found. If there is already the correct number of populated cells in the column the bottom may be found by simultaneously pressing Shift-Control-Down Arrow with the cell in Row2 selected. If the column is not populated find a column that is populated--ID variables should always be populated--and press Control-Down Arrow to find the last row. Select the cell in the last row and in the column to be populated and Press Shift-Control-Up Arrow to select the column. Then press Control-D to populate. Multiple columns can be populated simultaneously by selecting the cells in Row 2 or Row *last* and proceeding as just described.

In Excel formulas cell references are relative. If an Excel formula references cell A1 from cell B1 and the formula is copied to cell C1 the formula will reference cell B1 (one cell to the left). If the formula is copied to cell B2 the formula will reference cell A2. If the formula is copied anywhere in Column A an error message is produced because the formula references a column that does not exist. The dollar sign (‘$’) is used before a column letter or a row number to make the reference absolute and independent of movement of the formula to another cell. If an Excel formula references cell $A1 the formula copied to another cell will reference Column A and whatever row the cell is copied to. If the formula references A$1 the copied formula will reference Row 1 and whatever column the cell is copied to. If the formula references $A$1 the formula will reference cell A1 wherever it is copied. This is important to this GASCAP update procedure because cells reference a fixed range of row numbers within columns (Row 2 to Row *last*). The following formulas take the general form that should be used to populate a single column with look up functions:

=vlookup(R2,V$2:AB$*last*, k[1], false)=sumif(Q$2:Q$*last*, R2, S$2:S$*last*)

These formulas will reference the correct row members in the columns they search and read from but will search the correct criterion in each cell because the criteria remain relative references. The following formulas take the general form that should be used to populate multiple columns with look up functions:

=vlookup($R2,$V$2:$AB$*last*, x[2], false)=sumif($Q$2:Q*last*, $R2, S$2:S$*last*)

Vlookup is only used for single variables and is not discussed further. Sumif is used to aggregate multiple emissions and energy consumption variables. The columnar references in the sumif formula above are absolute for the search range and the criterion so that the ID variable and criterion are always referenced. The sum range

[1] k specifies the number of rows. It is situation specific so that there is no need to plan for updating to read data from specific rows.
[2] x also specifies the number of rows. It is must be designed as a variable so that it increases with each column move to the right. Planning is needed for updating to reading data from specific rows.

references are relative so that each variable is added to the correct column in the more highly aggregated subtable, i.e. if Column X references Column G then Column Y should reference Column H and so on.

A final note about how this procedure uses Excel involves copying and pasting cell contents. A simple copy and paste procedure, i.e. Select Contents, Control-C, Select Destination, and Control-V transfers cell contents including formulas with relative and absolute references. This procedure uses more memory than if the cell contents were copied as text, and is prone to unintended and unfortunate consequences. This is unnecessary if the cell contents should be permanent. This can be avoided using Excel's paste special-values procedure, i.e. Alt followed in turn by E, S, V, and entered by pressing the Enter key or clicking the OK button. This procedure is used extensively.

Data manipulation of MOVES output

To prepare the data for incorporation into the GASCAP model evaporative emissions must be combined with exhaust emissions and N_2O, which results from exhaust but is handled separately by MOVES, must be aggregated. Since on-road exhaust emissions, evaporative emissions and N_2O emissions are all aggregated at different levels, it is necessary to separate these into three working tables, then aggregate the component that has the most detailed level of aggregation to the levels of aggregation of the other components. Exhaust emissions are aggregated by vehicle type, fuel type, off-road and on-road use by functional classification, and vehicle model year. To aggregate exhaust emissions to the same level as evaporative emissions, functional classifications and off-road activity must be combined so that aggregation is by vehicle type, fuel type, and model year. To attribute N_2O emissions the exhaust emissions must be further aggregated to match the aggregation level of N_2O emissions. This means that SCC codes must be combined so that aggregation is at the fuel type and model year level.

At this highest level of aggregation N_2O emissions are read from the N_2O table to the matching exhaust emissions subtable using a vlookup formula. N_2O emissions are then disaggregated based on the fraction of total energy consumption for each vehicle type within each fuel type, by model year. N_2O emissions are further disaggregated based on the fraction of total energy consumption for each functional classification (road type) within each vehicle type, by model year.

Three measures of evaporative emissions, i.e. non-methane hydrocarbons (NMHC), non-methane organic gases (NMOG), and total hydrocarbons (TotalHC) are read from the evaporative emissions work sheet, and added with the corresponding categories of exhaust emissions at the stage where final tables are produced. This is done at the vehicle type and model year level.

MOVES will have produced three tab-delimited text files on your desktop assuming that is where the MOVES icons are located, as follows:

- SummaryReportHeader.tab

- SummaryReportDecode.tab, and

- SummaryReportBody.tab

The following steps should then be followed:

1. Move these files to your working directory.

    a. Open all three tab delimited text files into Excel as three separate worksheets. When all three files are open combine them into a single workbook.

2. Create Exhaust, Evaporation and N_2O working files by doing the following:

    a. Right click the SummaryReportBody worksheet at the bottom of the Excel workbook. Select Move or Copy from the pull down menu. Check the Create a Copy box in the Move or Copy popup menu, click Move to End and click OK.

    b. Rename the file to indicate that it is an exhaust emissions working file. Right click its tab at the bottom of the workbook and select rename from the pulldown menu. The text in the tab will be highlighted, which means that it is editable. Type in a name that indicates the purpose of the file such as “Work Exhaust” and press Return.

    c. Duplicate the Exhaust work worksheet using the procedure described in 4a, above. Name the new worksheet to indicate that its purpose is to be a working area for evaporative emissions with a name such as “Work Evap.”

    d. Duplicate the Evaporative work worksheet using the procedure described in 4a, above. Name the new worksheet to indicate that its purpose is to be a working area for N_2O emissions with a name such as “Work N_2O.”

Prepare the N_2O Working File

1. Delete all non-N_2O records from the N_2O work worksheet. N_2O records are aggregated by fuel type (1 for gasoline and 2 for diesel) and do not have SCC data. The remaining records all have valid data in the N_2O column.

2. Delete unnecessary columns in the N_2O worksheet. Select and delete columns labeled Run through CH_4 (six columns).

3. Create a unique ID variable for the N_2O table. Select Column A by clicking on the letter above Row 1. Right click and choose Insert. Type the label “FuelYr” in Cell A1. In Cell A2 type the following formula and press Enter:

   =concatenate([Fuel]2,”_”,[ModelYr]2)

   This will combine a one-digit fuel code with a four-digit model year separated by an underscore, e.g. 1_2000 (which indicates emissions from year 2000 gasoline engines. Populate the column.

4. Save the Workbook.

Prepare the Exhaust Emissions Working File

1. Delete all N_2O records from the exhaust worksheet.

2. Delete all evaporative records from the exhaust worksheet.

   a. Select the three columns to the right of the SCC column.

   b. Right click anywhere in the selection and choose insert. Three blank columns will appear.

   c. Label them by typing “Vehicle Type” in Row 1 of the first new column, “Road Type” in Row 1 of the second new column and “Emissions Type” in Row 1 of the third new column.

   d. In Row 2 of the Vehicle Type column type the following:

      =left([SCC][3]2,7)

   e. In Row 2 of the Road Type column type the following:

      =right(left([SCC]2,9),2)

   f. In Row 2 of the Emission Type column type the following:

      =right([SCC]2,1)

[3] [SCC] references whichever column is labeled SCC. The user should enter the corresponding letter in its place.

g. Select all the cells in the Vehicle Type column, the Road Type column and the Emissions Type column from Rows 2 to *last*. Populate the three columns.

h. Remove the formulas by keep the selection and copying (Control-C) and pasting special with values.

i. Sort the worksheet by Emissions Type. As a result evaporative emissions (‘V’) are sorted ahead of exhaust emissions (‘X’).

j. Delete all records with V as the emission type.

3. Create a unique ID variable for the exhaust worksheet. Select Column A, right-click anywhere in the selection and choose insert. Type VTRTMY (Vehicle Type, Road Type, and Model Year) in Cell A1. This is a label not only for the column but also for the table, which will become a subtable when other subtables are added to the exhaust worksheet. Enter the following formula into Cell A2:

   =concatenate([Vehicle Type]2,”_”,[Road Type]2,”_”,[ModelYr]2)

   The result should be “2201001_00_1982” for emissions for light-duty gasoline vehicles driven off-network assembled in 1982. Select a cell in Column B navigate to the bottom by typing Control-Down Arrow. Populate the column.

4. Save the file.

Prepare the Evaporative Emissions Working File

1. Delete all N_2O records from the evaporative worksheet.

   a. Delete all exhaust records from the evaporative worksheet.

   b. Select the column to the right of the SCC column.

   c. Right click anywhere in the selection and choose insert. A blank column will appear.

   d. Label it by typing “Emissions Type” in Row 1 of the new column.

   e. In Row 2 of the Emission Type column type the following:

=right([SCC][4]2,1)

f. Select all of the cells in the Emissions Type column from Rows 2 to *last* and populate them.

g. Sort the worksheet by Emissions Type. As a result evaporative emissions (‘V’) are sorted ahead of exhaust emissions (‘X’).

h. Delete all records with X as the emission type.

2. Create a unique ID variable. Select Column A, right-click anywhere in the selection and choose insert. Type VTMY (Vehicle Type and Model Year) in Cell A1. This is a label not only for the column but also for the table. In Cell A2 type the following formula:

   =concatenate(left([SCC]2,7),”_”,[ModelYr]2)

   The result would be “2201001_1982” for emissions from a light-duty gasoline vehicle assembled in 1982. Populate the column.

3. Save the file.

Aggregation of the Exhaust Emissions Subtables

Vehicle Type by GASCAP Functional Classification by Model Year

1. Click on the Exhaust worksheet.

2. Create a new variable to allow aggregation to the functional classifications used in the Induced Travel Module of GASCAP. Click on the cell to the right of the blank Distance label (in Row 1). Type GCRT (GASCAP Road Type). Enter the following formula in the cell in Row 2:

   =IF([ROAD TYPE]2="00","0",IF(OR([ROAD TYPE]2="11",[ROAD TYPE]2="23",

   [ROAD TYPE]2="25"),"1",IF(OR([ROAD TYPE]2="13",[ROAD TYPE]2="15",

   [ROAD TYPE]2="27",[ROAD TYPE]2="29"),"2",IF(OR([ROAD TYPE]2="17",

   [ROAD TYPE]2="19",[ROAD TYPE]2="31"),"3",IF(OR([ROAD TYPE]2="21",

[4] [SCC] references whichever column is labeled SCC. The user should enter the corresponding letter in its place.

[ROAD TYPE]2="33"),"4","ERROR")))))

This will convert MOVES detailed Road Types to GASCAP as shown previously in Table 2. Populate the column. Check for errors and correct the formula as necessary.

3. Create an ID variable that is vehicle type by GASCAP functional classification by model year (VTGCMY). In the cell in Row 1 to the right of the GCRT column and type VTGCMY. In the cell in Row 2 of that column type the following formula:

   =concatenate([Vehicle Type]2,"_",[GCRT]2,"_",[ModelYr]2)

   Populate the column.

4. Copy VTGCMY and Paste Special Values and sort to create an ID variable for a new subtable. Change the column label to VTGCMY2.

5. Remove duplicate records from VTGCMY2 to make the ID variable unique. In the cell to the right of [VTGCMY2. VTGCMY2]2 (the cell in Row2 of the ID variable of the new subtable VTGCMY2), type the following formula:

   =if([VTGCMY2. VTGCMY2]2=[VTGCMY2. VTGCMY2]1,0,1)

This formula tests to see if each data cell in the column is the same as the cell directly above it and assigns a 0 if it is a duplicate and a 1 if not. Populate the column with this formula. Copy the selection and paste special values (Alt followed in turn by E, S, V, return) to remove the formulas so that values in the temporary column are not changed by sorting. Select Column [VTGCMY2. VTGCMY2] and the temporary column and sort by the temporary column. Find the first non-duplicated (=1) in the temporary column. Select all duplicate cells in the [VTGCMY2. VTGCMY2] column and the temporary column and delete them. Select and delete the temporary column.

6. Save the file.

7. Create labels for subtable VTGCMY2. From subtable VTRTMY copy the labels for emissions, energy consumption, and VMT ([VTRTMY.CO2]1 through [VTRTMY.Distance]1). Paste one cell to the right of the label for the ID variable in subtable VTGCMY2 (one cell to the right of [VTGCMY2. VTGCMY2]1).

8. Aggregate data from subtable VTRTMY into subtable VTGCMY2. In the cell in Row 2 of the CO_2 column ([VTGCMY2.CO2]2) type the following formula:

=sumif($[VTRTMY. VTGCMY]$2:$[VTRTMY.VTGCMY]$*last*[5], $[VTGCMY2. VTGCMY2]2, [VTRTMY.CO2]$2:[VTRTMY.CO2]$*last*) [6]

This formula will search column [VTRTMY. VTGCMY] for records in subtable VTRTMY from the first (Row = 2) to the last (Row = *last*) data record that match records in column [VTGCMY2. VTGCMY2] and sums the results of the CO_2 emissions variable in matching records. Dollar signs before row references in the search and sum ranges make the row references absolute so that Rows 2 through *last* are consistently referenced as other members of the VTGCMY2.CO2 column are populated. The Dollars signs before the column references in the search range and the specified criterion cell make the column references absolute so that as the formula is moved to other columns comparisons are still made between the ID variables.

9. Populate the VTGCMY2.CO2 column. Click a cell in VTGCMY2.VTGCMY2 and press Control-Down Arrow to navigate to the bottom of the subtable. Click [VTGCMY2.CO2]*last*, press Shift-Control-Up Arrow to select the data cells and press Control D to populate.

10. Populate columns [VTGCMY2.CO2_Equiv] through [VTGCMY2.Distance]. Using Shift-Right Arrow select the columns [VTGCMY2.CO2_Equiv] through [VTGCMY2.Distance]. Press Control-R to populate each column from the CO_2 column.

11. Type VMT into [VTGCMY2.Distance]1 to rename the [VTGCMY2.Distance] column [VTGCMY2.VMT].

12. Type Energy_prop one cell to the right of [VTGCMY2.VMT]1 to name a blank column that will be populated later. This column will hold the proportion of total energy that each record holds and will form a basis for attributing evaporative and N_2O emissions.

13. Type VTMY one cell further to the right (two cells to the right of [VTGCMY2.VMT]1) to name an ID variable for the next level of aggregations. This one is aggregated by vehicle type and model year. It will allow one to one comparison with evaporative emissions and combination of exhaust emissions, except N_2O, with evaporative emissions. Type the following formula into Row 2 ([VTGCMY2.VTMY]2):

=concatenate(left([VTGCMY2.VTGCMY2]2,7),"_",right([VTGCMY2. VTGCMY2]2,4))

Populate the column.

---

[5] In this case the row name *last* refers to the last row of data in the subtable it references, i.e. VTRTMY)

[6] Tip – Use the arrow keys and the Shift and Control keys to enter the cell references. In the parentheses type only the commas. Then add the dollar signs.

14. Save the file.

Vehicle Type by Model Year

1. Copy Column VTGCMY2.VTMY, paste special values and sort to create an ID variable for a new subtable. Change the column label to VTMY3.

2. Remove duplicate records from VTMY3 to make the ID variable unique. In the cell to the right of [VTMY3. VTMY3]2 (the cell in Row2 of the ID variable of the new subtable VTMY3), type the following formula:

   =if([VTMY3. VTMY3]2=[VTMY3. VTMY3]1,0,1)

Populate the column with this formula. Copy the selection and paste special values (Alt followed in turn by E, S, V, return) to remove the formulas so that values in the temporary column are not changed by sorting. Select Column [VTMY3. VTMY3] and the temporary column and sort by the temporary column. Find the first non-duplicated (=1) in the temporary column by selecting the temporary column. Select all duplicate cells in the [VTMY3. VTMY3] column and the temporary column and delete them. Select and delete the temporary column.

3. Save the file.

4. Create labels for subtable VTMY3. From subtable VTGCMY2 copy the labels for emissions, energy consumption, and VMT ([VTGCMY2.CO2]1 through [VTGCMY2.Energy_prop]1]. Paste one cell to the right of the label for the ID variable in subtable VTMY3 (one cell to the right of [VTMY3. VTMY3]1).

5. Aggregate data from subtable VTGCMY2 into subtable VTMY3. In the cell in Row 2 of the CO_2 column ([VTMY3.CO2]2) type the following formula:

   =sumif($[VTGCMY2. VTMY]$2:$[VTGCMY2.VTMY]$*last*[7],$[VTMY3.VTMY3]2, [VTGCMY2.CO2]$2:[VTGCMY2.CO2]$*last*)[8]

As previously, dollar signs before row references in the search and sum ranges make the row references absolute so that Rows 2 through *last* are consistently referenced as other members of the VTMY3.CO2 column are populated. The Dollars signs before the column references in the search range and the specified criterion cell make the column references absolute so that as the formula is moved to other columns comparisons are still made between the ID variables.

[7] In this case the row name *last* refers to the last row of data in the subtable it references, i.e. VTRTMY)
[8] Tip – Use the arrow keys and the Shift and Control keys to enter the cell references. In the parentheses type only the commas. Then add the dollar signs.

6. Populate Column [VTMY3.CO2]. Select any cell in [VTMY3.VTMY3] and navigate to the bottom of the subtable by pressing Control-Down Arrow. Select [VTMY3.CO2]*last* (one cell to the right of [VTMY3.VTMY3]*last*) and press Shift-Control-Up Arrow. Populate by pressing Control-D.

7. Populate columns [VTMY3.CO2_Equiv] through [VTMY3.VMT]. Using Shift-Right Arrow select the columns [VTMY3.CO2_Equiv] through [VTMY3.VMT]. Press Control-R to populate each column from the CO_2 column. Column [VTMY3.Energy_prop] is left blank.

8. Type FTMY one cell to the right of [VTMY3.Energy_prop]1) to name an ID variable for the next level of aggregations. This one is aggregated by fuel type and model year. It will allow one to one comparison with N_2O emissions and combination of exhaust emissions. Type the following formula into Row 2 ([VTMY3.FTMY]2):

   =concatenate(if(left([VTMY3.VTMY3]2,3)=”220”,1,2),”_”,right([VTMY3.VTMY3]2,4))

   Populate the column.

9. Save the file.

Fuel Type by Model Year

1. Copy Column VTMY3.FTMY, paste special values and sort to create an ID variable for a new subtable. Select and copy the whole VTMY3.FTMY column by clicking the letter above the cell in Row 1 is an easy way. Select the column two cells to the right and paste special values (Alt followed in turn by E, S, V, return). While it is still selected sort the column alone. Click on the Sort icon in the Data menu. Make sure the “My data has headers” box is checked and that the Order is A to Z. Click OK. Change the column label to FTMY4.

2. Remove duplicate records from FTMY4 to make the ID variable unique. In the cell to the right of [FTMY4. FTMY4]2 (the cell in Row2 of the ID variable of the new subtable FTMY4), type the following formula:

   =if([FTMY4. FTMY4]2=[FTMY4. FTMY4]1,0,1)

Populate the column with this formula. Copy the selection and paste special values (Alt followed in turn by E, S, V, return) to remove the formulas so that values in the temporary column are not changed by sorting. Select Column [FTMY4. FTMY4] and the temporary column and sort by the temporary column. Find the first non-duplicated cell

(=1) in the temporary column. Delete the duplicate cells. Select and delete the temporary column.

3. Save the file.

4. Create and populate the N_2O and VMT columns of subtable FTMY4. Type N2O into Row 1 of the column one cell to the right of Column [FTMY4.FTMY4] and type TotalEnergy into Row1 of the column one cell to the right of Column [FTMY4.N2O]. In the Row 2 cell of Column [FTMY4.N2O] type the following formula to read from the table in the N2O worksheet:

   =vlookup([FTMY4.FTMY4]2,[N2OWorksheet.Fuel Yr]$2:[N2OWorksheet.N2O]$*last*, columns([N2OWorksheet.Fuel Yr]$2:[N2OWorksheet.N2O]$*last*),false) [9]

   This formula will search the data in first column of the N2O worksheet and assign from the last column. To populate the column click on any cell in Column [FTMY4.FTMY4], press Control-Down Arrow, Right Arrow one cell and press Shift-Control-Up Arrow followed by a Control-D.

   In Row 2 cell of the [FTMY4.TotalEnergy] Column enter the following formula:

   =SUMIF([VTMY3.FTMY]$2:[VTMY3.FTMY]$*last*,[FTMY4.FTMY4]2,[VTMY3. TotalEnergy]$2:[VTMY3. TotalEnergy]$*last*) [10]

   to aggregate total energy at the fuel and model year level from subtable VTMY3. To populate the column click on any cell in Column [FTMY4.FTMY4], press Control-Down Arrow, Right Arrow two cells and press Shift-Control-Up Arrow followed by a Control-D.

5. Save the file.

<u>Disaggregate N_2O Emissions</u>

1. Estimate the share of total energy within fuel type by model year by dividing total energy at the vehicle type and model year level by total energy at the fuel type and model year level. To do this enter the following formula into the cell in Row 2 of the [VTMY3.Energy_prop] Column:

[9] Tip – Use the arrow keys and the Shift and Control keys to enter the cell references. In the parentheses type only the commas. Then add the dollar signs.

[10] Tip – Use the arrow keys and the Shift and Control keys to enter the cell references. In the parentheses type only the commas. Then add the dollar signs.

=[VTMY3.TotalEnergy]2/vlookup([VTMY3.FTMY]2,[FTMY4.FTMY4]$2: [FTMY4. TotalEnergy]$*last*, 3,false)

Populate the column.

2. Disaggregate N_2O to the vehicle type and model year level by multiplying the [VTMY3.Energy_prop] Column by N_2O emissions in subtable FTMY4. Use the following formula in the cell in Row 2 of Column [TOTAL ENERGYMY3.N2O]:

   = [VTMY3.Energy_prop] * vlookup([VTMY3.FTMY]2, [FTMY4.FTMY4]$2: [FTMY4.N2O]$*last*, 2, false)

   Populate the column.

3. Estimate the share of total energy within vehicle type by model year by dividing total energy at the vehicle type, GASCAP functional classification and model year level by total energy at the vehicle type and model year level. To do this enter the following formula into the cell in Row 2 of the [VTGCMY2.Energy_prop] Column:

   =[VTGCMY2.TotalEnergy]2/vlookup([VTGCMY2.VTMY]2,[VTMY3.VTMY3]$2: [VTMY3.TotalEnergy]$*last*, 7,false)

   Populate the column.

4. Disaggregate N_2O to the vehicle type, GASCAP functional classification, and model year level by multiplying the [VTGCMY2.Energy_prop] Column by N_2O emissions in subtable VTMY3. Use the following formula in the cell in Row 2 of Column [VTGCMY2.N2O]:

   = [VTGCMY2.Energy_prop] * vlookup([VTGCMY2.VTMY]2, [VTMY3.VTMY3]$2: [VTMY3.N2O]$*last*, 7, false)

   Populate the column.

5. Save the file.

Final Output Tables

<u>Output Tables for Input to the Staging and Transportation Modules</u>

1. Create a new worksheet. From the exhaust worksheet, right click and select Insert. Click on the worksheet icon, and click OK or press Return. Right click the

new module and select Rename. Type “Transport Module” in the tab at the bottom of the page.

2. Copy and Paste Special Values the VTMY3 subtable to the induced travel worksheet just created. Click on the exhaust worksheet.

3. Aggregate evaporative and exhaust emissions for the [NMHC], [NMOG], and [TotalHC]. Type the following formula into the cell in Row 2 of the [NMHC] Column of the Transport Module table:

   =vlookup([Transport Module.$VTMY3]2,[Evaporative Worksheet.$VTMY]$2:$[TotalHC]$*last*, columns([Evaporative Worksheet.$VTMY]2:[NMHC]2),false)+vlookup([Transport Module.$VTMY3]2,[Exhaust Worksheet.$VTMY3]$2:$[TotalHC]$last, columns([Exhaust Worksheet.$VTMY3]2:[NMHC]2),false)

   Populate the rest of the column. Copy the column and **Paste** (**NOT** Paste Special) into [Transport Module.NMOG]2, and [Transport Module.TotalHC]2. This will populate those columns as well.

4. Divide everything by VMT to express emissions and energy consumption on a per VMT basis. Copy the labels in Row 1 and Paste them to the Row 1 of the second column to the right of [VMT]. Copy and Paste Column VTMY3 into the first column of the new subtable. Type “VTMYperVMT” into Row 1 of the first column in the new subtable. Delete (clear) [VMT] from the new subtable. In Row 2 of Column [VTMYperVMT.CO2] type the following formula:

   =[Transport Module.VTMY3.CO2]2/[Transport Module.VTMY3.$VMT]2

   Navigate to the bottom of the subtable. Press Right Arrow to select the *last* cell in VTMYperVMT.CO2, then press Shift-Control-Up Arrow and press Control-D. Make the Label in Row 1 visible. (Pressing Shift-Up Arrow followed by Shift-Down Arrow works). While holding down the Shift key press Right Arrow to select all columns through [VTMYperVMT.TotalHC] and press Control-R to populate. Copy and Paste Special Values (Alt, E, S, V) to remove formulas. Keep the VTMY3 subtable to add evaporative emissions to the Induced Travel table.

5. Save the file.

Output Table for Input to the Induced Travel Module

1. Create a new worksheet. From the exhaust worksheet, right click and select Insert. Name the worksheet “Induced Travel Module.”

2. Copy and Paste Special Values the VTGCMY2 subtable to the induced travel worksheet just created. Click on the exhaust worksheet. Select subtable VTGCMY2 Columns [VTGCMY2] through [VTMY] (the complete subtable) and copy. Click on the Induced Travel Module worksheet and Paste Special Values.

3. Create a temporary column to remove off-road emissions. In row 2 of the first column to the right of [VMT] type the following formula:

   =if(left(right([VTGCMY2]2,6),1)=”0”,0,1)

4. Populated the temporary column. Copy it and Paste Special Values to remove the formulas.

5. Sort the entire table by the temporary column.

6. Delete off-road records. Select the temporary column and find the first non-duplicate record (=1). Select the last row with a zero value in the temporary column. Delete all records with zeroes in the temporary column.

7. Save the file.

8. Aggregate evaporative and exhaust emissions for the [NMHC], [NMOG], and [TotalHC]. Type the following formula into the cell in Row 2 of the [NMHC] Column of the Induced Travel Module table:

   =vlookup([Induced Travel Module.$VTMY]2,[Evaporative Worksheet.$VTMY]$2: $[TotalHC]$*last*, columns([Evaporative Worksheet.$VTMY]2:[NMHC]2),false) * $[Induced Travel Module.$Energy_Prop]2+vlookup([Induced Travel Module.$VTGCMY2]2,[Exhaust Worksheet.$VTGCMY2]$2: $[TotalHC]$last, columns([Exhaust Worksheet.$ VTGCMY2]2:[NMHC]2),false)

   Populate the rest of the column. Copy the column and **Paste** (**NOT** Paste Special) into [Induced Travel Module.NMOG]2, and [Induced Travel Module.TotalHC]2. This will populate those columns as well.

9. Create a new ID variable to aggregate by GASCAP functional classifications. Type “GC” into the cell in Row 1 of the column immediately to the right of [VTMY]. Type the following formula in Row 2 of that column:

   =if(left(right([VTGCMY2]2, 6),1)=”1”,”Interstates”, if(left(right([VTGCMY2]2, 6),1)=”2”,”Arterials”, if(left(right([VTGCMY2]2, 6),1)=”3”,”Collectors”,”Local”)))

   Populate the rest of the column with this formula.

10. Aggregate the table to GASCAP functional classifications. Copy the labels in Row 1 in the Induced Travel Module to a cell two columns to the right of the last column in the table. Replace the first ID variable (VTGCMY2) with GC5 in the cell in Row 1 in the column. In Rows 2 through 5 of Column [GC5.GC5] type "Interstates", "Arterials", "Collectors", and "Local"

11. In Row 2 of [GC5.CO2] calculate aggregated CO_2 emissions per VMT by entering the following formula:

    = sumif($[VTGCMY2.GC]$2: $[VTGCMY2.GC]$*last*, $[GC5.GC5]2, [VTGCMY2.CO2]$2: [VTGCMY2.CO2]$*last*) / sumif($[VTGCMY2.GC]$2: $[VTGCMY2.GC]$*last*, $[GC5.GC5]2, $[VTGCMY2.VMT]$2: $[VTGCMY2.VMT]$*last*)

    Select the cells in Rows 2 through 5 in Column [GC5.CO2] and press Control-D. Hold down the Shift key and use the Right Arrow to select Columns [GC5.CO2] through [GC5.TotalHC] and press Control-R. Copy and Paste Special Values (Alt, E, S, V) to remove the formulas.

12. Clear (Delete key) the [GC5.VMT] labels and all of the labels to the right of that. Select and delete (Right click, choose Delete from the popup menu) all of the columns to the left of [GC5.GC5].

This completes the updating of per VMT Direct Emissions Factors.

Conversion to Vehicle Types Used in GASCAP

1. Copied and pasted emissions factors from Transport Table into new book by selecting columns Q ('VTMYperVMT') through AD ("TotalHC') pressing Ctrl + c to copy the cells, then inserting a new worksheet and pressing Ctrl + v to paste the cells into this worksheet.

2. Calculated the year for each row by titling a column 'Year' then using the formula =VALUE(RIGHT(A2,4)) (where A is the 'VMTYperVMT' column). This formula takes the first four digits from the VMTYperVMT column (which represents the year). Once the formula has been entered in a cell it can be filled to the rest of the column (as above)

3. Calculate the relevant part of the SCC code (first seven digits) to assign SCC codes to vehicle types.

4. Use the lookup table (Table **3**) to convert SCC codes to vehicle types

Table 3 - Lookup table to convert SCC codes to vehicle types

Applicable Portion of SCC Code	**Description**
2201001	Light-duty gasoline vehicles (passenger cars)
2201020	Light-duty gasoline trucks 1 (0-6,000 lb gross vehicle weight rating [GVWR])
2201040	Light-duty gasoline trucks 2 (6,001-8,500 lb GVWR)
2201070	Heavy-duty gasoline vehicles (> 8,500 lb GVWR)
2201080	Motorcycles (gasoline)
2230001	Light-duty diesel vehicles (passenger cars)
2230060	Light-duty diesel trucks (0-8,500 lb GVWR)
2230071	Class 2b heavy-duty diesel vehicles (8,501-10,000 lb GVWR)
2230072	Class 3, 4, and 5 heavy-duty diesel vehicles (10,001-19,500 lb GVWR)
2230073	Class 6 and 7 heavy-duty diesel vehicles (19,501-33,000 lb GVWR)
2230074	Class 8 heavy-duty diesel vehicles (> 33,000 lb GVWR)
2230075	Diesel buses

(Source: Fleet and Activity Data in MOVES 2010:
http://www.epa.gov/otaq/models/moves/conference2011/fleet-activity-moves-2011.pdf)

5. Then each vehicle is split into one or more MOVES source type using Table **4**.

Table 4 - Vehicle types in the MOVES model

ID	Name	ID	Item	Fraction
1	LDGV	21	Passenger Car	1
2	LDGT1	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
3	LDGT2	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
4	LDGT3	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
5	LDGT4	31	Passenger Truck	0.78
		32	Light Commercial Truck	0.22
6	HDGV2B	31	Passenger Truck	0.63
		32	Light Commercial Truck	0.37
7	HDGV3	31	Passenger Truck	0.63
		32	Light Commercial Truck	0.37
8	HDGV4	31	Passenger Truck	0.06
		32	Light Commercial Truck	0.94
9	HDGV5	31	Passenger Truck	0.06
		32	Light Commercial Truck	0.94
10	HDGV6	43	School Bus	0.04
		52	Single Unit Short-haul Truck	0.69
		53	Single Unit Long-haul Truck	0.03
		54	Motor Home	0.23
		61	Combination Short-haul Truck	0.01
11	HDGV7	43	School Bus	0.04
		52	Single Unit Short-haul Truck	0.69
		53	Single Unit Long-haul Truck	0.03
		54	Motor Home	0.23
		61	Combination Short-haul Truck	0.01
12	HDGV8A	52	Single Unit Short-haul Truck	0.9
		53	Single Unit Long-haul Truck	0.08
		61	Combination Short-haul Truck	0.02
13	HDGV8B	52	Single Unit Short-haul Truck	0.9
		53	Single Unit Long-haul Truck	0.08
		61	Combination Short-haul Truck	0.02
14	LDDV	21	Passenger Car	1
15	LDDT12	31	Passenger Truck	0.42
		32	Light Commercial Truck	0.58

16	HDDV2B	31	Passenger Truck	0.43
		32	Light Commercial Truck	0.57
17	HDDV3	31	Passenger Truck	0.43
		32	Light Commercial Truck	0.57
18	HDDV4	31	Passenger Truck	0.1
		32	Light Commercial Truck	0.9
19	HDDV5	31	Passenger Truck	0.1
		32	Light Commercial Truck	0.9
20	HDDV6	51	Refuse Truck	0.01
		52	Single Unit Short-haul Truck	0.72
		53	Single Unit Long-haul Truck	0.06
		54	Motor Home	0.07
		61	Combination Short-haul Truck	0.11
		62	Combination Long-haul Truck	0.03
21	HDDV7	51	Refuse Truck	0.01
		52	Single Unit Short-haul Truck	0.72
		53	Single Unit Long-haul Truck	0.06
		54	Motor Home	0.07
		61	Combination Short-haul Truck	0.11
		62	Combination Long-haul Truck	0.03
22	HDDV8A	51	Refuse Truck	0.02
		52	Single Unit Short-haul Truck	0.3
		53	Single Unit Long-haul Truck	0.02
		61	Combination Short-haul Truck	0.35
		62	Combination Long-haul Truck	0.31
23	HDDV8B	51	Refuse Truck	0.02
		52	Single Unit Short-haul Truck	0.3
		53	Single Unit Long-haul Truck	0.02
		61	Combination Short-haul Truck	0.35
		62	Combination Long-haul Truck	0.31
24	MC	11	Motorcycle	1
25	HDGB	43	School Bus	1
26	HDDBT	41	Intercity Bus	0.62
		42	Transit Bus	0.38
27	HDDBS	43	School Bus	1
28	LDDT34	31	Passenger Truck	0.42
		32	Light Commercial Truck	0.58

Source: Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity, Table A1 (http://www.epa.gov/otaq/models/moves/420b10023.pdf)

6. Created single list with one row for each year, vehicle, and fuel type summing the emissions factors.

7. Deleted motorcycle, motor homes and intercity buses (not used in GASCAP)

8. Added rows for BD20 (one row for each year/ vehicle type combination). For BD20 Direct Emissions same as for diesel fuel

9. Calculated Upstream emissions factors in g/mmBTU from total energy consumption (MMBTU/mile) and miles per gallon from MOVES.

APPENDIX B:
UPDATING VEHICLE AND FUEL-CYCLE EMISSIONS FACTORS FROM THE GREET MODELS

This section outlines the process to extract values from the latest versions of the GREET Fuel and Vehicle Cycle Models for input into GASCAP. There are four principal groups of values which need to be input into GASCAP:

- Process Fuels
- Electricity Production
- Steel
- Other Materials.

Throughout this report, worksheet tab names are given in SMALL CAPS and table names within these tabs are given in *italics*.

Downloading GREET

The two GREET models (Vehicle Cycle and Fuel Cycle) can be downloaded from the Argonne National Laboratory website: http://greet.es.anl.gov/ (It may be necessary to create an account in order to do this). The most recent versions of the models (as of March 2012) are:

- GREET Fuel Cycle Model: GREET1_2011
- GREET Vehicle Cycle Model: GREET 2.7

GREET Fuel Cycle Model

It is not necessary to actually install the model; rather, there is a link on the website that lets you download the spreadsheets only (under section 3 of the step by step instructions ('To Download GREET') part a http://greet.es.anl.gov/files/greet_1_2011_mac). This downloads a zip file, from which the required GREET Fuel Cycle Model spreadsheet (GREET1_2011.xls) can be extracted and saved in a location of the user's choice.

GREET Vehicle Cycle Model

Similarly, the GREET Vehicle Cycle Model is downloaded as a zip file from the website (http://greet.es.anl.gov/files/greet27). This contains the required GREET Vehicle Cycle

Model (GREET2_7.xls) which can be extracted and saved in a location of the user's choice.

Note that for both of these spreadsheets the default inputs are used (i.e. no changes to these spreadsheets are required) unless specified otherwise.

Process Fuels

Table 5 gives the GHG Emissions of Process Fuels in g/MMBtu. These were extracted from the sources specified in the following sections.

Table 5 - GHG emissions of process fuels in g/MMBtu

Upstream Emissions of Process Fuels (g/MMBtu)									
	Coal[1]	Natural Gas[1]	Conv. Gasoline[1]	Distillate Fuel Oil[1]	Residual Oil[3]	LPG[1]	Coke[2]	Petroleum Coke[3]	Asphalt[3]
CO_2	1,664	12,865	16,249	16,786	7,326	11,766	1,952	22,895	17,276
CH_4	148.3	551.1	132.6	128.4	37.23	320.1	207.0	173.1	128.2
N_2O	0.0308	0.2709	1.1244	0.2220	0.1179	0.1824	0.0340	0.3693	0.2379
Combustion Emissions of Process Fuels (g/MMBtu)									
	Coal[1]	Natural Gas[1]	Conv. Gasoline[1]	Distillate Fuel Oil[1]	Residual Oil[1]	LPG[1] (Propane)	Coke[4]	Petroleum Coke[1]	Asphalt[4]
CO_2	108,266	59,379	75,645	78,169	85,045	68,024	N/A	104,622	N/A
CH_4	4.000	1.100	5.193	0.1800	3.240	1.080	N/A	4.000	N/A
N_2O	1.000	1.100	2.400	0.3900	0.360	4.860	N/A	1.000	N/A
Upstream and Combustion Emissions of Process Fuels Combined (g/MMBtu)									
	Coal[3]	Natural Gas[3]	Conv. Gasoline[3]	Distillate Fuel Oil[3]	Residual Oil[3]	LPG[3] (Propane)	Coke[4]	Petroleum Coke[3]	Asphalt[4]
CO_2	109,930	72,244	91,894	94,954	92,371	79,790	N/A	127,517	N/A
CH_4	152.3	552.2	137.8	128.6	40.47	321.1	N/A	177.1	N/A
N_2O	1.031	1.371	3.524	0.6120	0.4779	5.042	N/A	1.369	N/A

Sources:

1. GREET 1_2011 Fuel Cycle Model (1)
2. GREET Vehicle Cycle Model 2.7 (2)
3. Our Calculations for Crude Extraction and Refining Share - energy basis from Fuel Cycle model and Summation of Combined Emissions.
4. See subsequent sections for asphalt and steel production.

Upstream Emissions of Process Fuels

Upstream emissions of Coal were extracted from the COAL worksheet in the GREET Fuel Cycle Model, table *3) Summary of Energy Consumption and Emissions: Btu or Grams per mmBtu of Fuel Throughput at Each Stage* for CO_2, CH_4 and N_2O. In GREET1_2011 this table is given in cells A60 to G78, and the values for CO_2, CH_4 and N_2O are given in cells B74, B75 and B77 respectively.

Upstream emissions of Natural Gas, Conventional Gasoline, Distillate Fuel Oil and Liquid Petroleum Gasoline (LPG) were extracted from the RESULTS tab in the GREET Fuel Cycle Model, table 1. *Well-to-Pump Energy Consumption and Emissions*. This table presents results as energy in Btu and emissions in grams of CO_2, CH_4 and N_2O per MMBtu of fuel. In GREET1_2011 this table is given in cells A1 to AR25, and the values are given in cells G10 – G12, B10 – B12, E10 – E12 and H10 – H12 respectively.

Asphalt

For asphalt, crude upstream emissions are taken from the PETROLEUM worksheet in the GREET Fuel Cycle Model, table *5) Summary of Energy Consumption and Emissions: Btu or Grams per mmBtu of Fuel Throughput at Each Stage.* In GREET1_2011 this table is given in cells A189 to N207, and the values are given in cells B203, B204 and B206 respectively.

Refinery emissions are based on the relative Product Efficiency (Energy-content based) of Residual Oil and Asphalt:

Table 6 - Product efficiency of residual oil and asphalt

	Product Efficiency (Energy-content based)
Residual Oil	94.2
Asphalt	85.1
Source: [3]	

Refinery emissions for Residual Oil are taken from the PETROLEUM worksheet in the GREET Fuel Cycle Model, table *5) Summary of Energy Consumption and Emissions: Btu or Grams per mmBtu of Fuel Throughput at Each Stage*, column Resi. Oil for CO_2, CH_4 and N_2O. In GREET1_2011 this table is given in cells A189 to N207, and the values are given in cells J203, J204 and J206 respectively.

Refinery emissions for Asphalt are calculated as:

$$\frac{100 - Product\ Efficiency\ (Asphalt)}{100 - Product\ Efficiency\ (Residual\ Oil)} * \ Refinery\ Emissions\ (Residual\ Oil)$$

Upstream and refinery emissions are then summed for input into GASCAP.

Coke

Upstream emissions for coke are calculated in two steps: one for the coking process and the other for the emissions for the coal input.

Step 1: Coking Process

The coking process itself has two stages, upstream emissions of the fuels used and emissions from the burning of fuels and heating of coal:

1. Upstream emissions of fuels (coal, natural gas, residual oil), for which the quantity of fuels used for coke production is obtained from the GREET Vehicle Cycle Model, STEEL worksheet, table *4.1) Energy Use and Emissions Related to Virgin Steel Production*, section ‘Energy Use: mmBtu per ton of intermediate material product and final steel product’, column ‘Coke Production’. In GREET2_7 this table is given in cells A61 to K88, and the values are given in cells D67 – D69. The emissions factors for these fuels are obtained from the GREET Fuel Cycle Model (as in Table **5**). Here, the petroleum component is assumed to be entirely residual oil. Hence the Upstream Emissions factors used are:

Table 7 - Upstream emissions of the fuels used in the coking process

	Coal	Natural Gas	Residual Oil
CO_2	1,664	12,865	7,326
CH_4	148.3	551.1	37.23
N_2O	0.0308	0.2709	0.1179

These factors are then multiplied by the quantity of fuels used for coke production to give total upstream emissions.

2. Burning of fuels and heating of coal is taken from GREET Vehicle Cycle Model, STEEL worksheet, table *4.1) Energy Use and Emissions Related to Virgin Steel Production*, section ‘Total Emissions: grams per ton of intermediate material product and final steel product’, column ‘Coke Production’. In GREET2_7 this table is given in cells A61 to K88, and the values are given in cells D80 and D77 – 78.

Total emissions for the coking process are the sum of these values. This is summarized in Table 8.

Table 8 - Sources for GREET emissions factors

	Model	Worksheet	Table	Cell Range
Quantity of Fuels Used for Coke Production	GREET Vehicle Cycle Model (GREET2_7)	Steel	4.1) Energy Use and Emissions Related to Virgin Steel Production	D67 – D69
Upstream Emissions Factors (Coal)	GREET Fuel Cycle Model (GREET1_2011)	Coal	3) Summary of Energy Consumption and Emissions: Btu or Grams per mmBtu of Fuel Throughput at Each Stage	B74-5, B77
Upstream Emissions Factors (Natural Gas)	GREET Fuel Cycle Model (GREET1_2011)	Results	1. Well-to-Pump Energy Consumption and Emissions.	G10 - 12
Burning of Fuels and Heating of Coal Emissions Factors	GREET Vehicle Cycle Model (GREET2_7)	Steel	4.1) Energy Use and Emissions Related to Virgin Steel Production	D80, D77-8

Step 2: Emissions for the Coal Inputs

Upstream emissions for the coal inputs are taken from the GREET Fuel Model, COAL worksheet, table *3) Summary of Energy Consumption and Emissions: Btu or Grams per mmBtu of Fuel Throughput at Each Stage,* column 'Coal to Coking Plants'. In GREET1_2011 this table is given in cells A60 to G78, and the values are given in cells F77, F74 and F75.

To convert these numbers into g/ton of coke, we use a coal-to-coke conversion ratio obtained from Joseck, Wang and Wu (2008). The heat content of coke obtained from the Energy Information Administration (EIA) is used to convert the upstream emissions for coal inputs into g/ton of coke (Table 9).

Table 9 - Coke upstream emissions: conversion factors

	Conversion Factor	Source
LHV of Coal	25,000	
Coke to Coal Conversion Ratio (Tons of Coke/ Tons of Coal)	0.72	[4]

Upstream emissions for coal inputs (g/mmBTU of coal) are multiplied by the Lower Heating Value (LHV) for coal (25,000) to convert these into emissions in g/ton of coal. This value is then multiplied by the coke to coal conversion ratio (0.72) to convert these into g/ton of coke.

Emissions from the coking process (in g/ton of steel) (step 1 above) are divided by the number of tons of coke needed per ton of steel (0.531) to convert these into g/ton of coke. This value is obtained from the GREET Vehicle Cycle Model, STEEL worksheet table *4.1) Energy Use and Emissions Related to Virgin Steel Production*, row 'Tons of intermediate material needed per ton of steel' column 'Coke Production'. In GREET2_7, this table is given in table A61 to K88, and the value in cell D63.

Final upstream emissions (grams per ton of coke) are then the sum of emissions from the coking process (step 1 above) plus emissions for coal inputs (step 2 above). To convert these to grams per mmBTU these values are divided by 24,800, the LHV of coke. [(2)]

Petroleum Coke

Upstream emissions of petroleum coke consist of two parts: feedstocks and fuels. Emissions for feedstocks were taken from the GREET Fuel Cycle model, PETROLEUM worksheet, table *5.1) Energy Use and Total Emissions* column 'Feedstocks, Crude for use in U.S. Refineries'. In GREET1_2011, this table is given in cells A188 to N215, and the values in cells B206, B203 and B204. Emissions for fuels were taken from the same table, GREET Fuel Cycle model, PETROLEUM worksheet, table *5.1) Energy Use and Total Emissions* column 'Fuels, Pet Coke'. In GREET1_2011, this table is given in cells A188 to N215, and the values in cells N206, N203 and N204. These values are then summed to give the Upstream Emissions for Petroleum Coke.

Combustion emissions of process fuels are taken from the GREET Fuel Cycle Model, worksheet EF (Emissions Factors), table *1) Emission Factors of Fuel Combustion for Stationary Applications (grams per mmBtu of fuel burned)*. In GREET1_2011 this table is given in cells A3 to AY14, and the values are given in cells B12 – 14, J12 – 14, L12 – 14, Q12 – 14, T12 – 14, X12 – 14 and AV12 – 14 respectively. The Upstream and Combustion Emissions are then summed to give combined emissions.

Electricity

Mix of Energy Sources

Energy sources for Electricity Production are taken from the GREET Fuel Cycle Model, INPUTS worksheet table *9.2.b) Electric Generation Mixes: Data Table for Use in GREET (From Annual Energy Outlook 2010),* U.S. Mix for Transportation and N.E. U.S. Mix for transportation respectively (see Table 10). In GREET1_2011 this table is given in cells

A407 to J415, and the values are given in cells C410 to C415 and E410 to E415 respectively.

Table 10 - Mix of energy sources for electricity production in the United States and the Northeast US

	United States	Northeast US
Residual Oil	1.00%	2.08%
Natural Gas	22.87%	49.66%
Coal	46.45%	7.96%
Nuclear Power	20.26%	31.24%
Biomass	0.23%	1.35%
Other Sources*	9.19%	7.71%
* hydro electric, wind, and geothermal energy are offered as examples.		
Source: (1)		

Transmission Loss

Transmission Loss is an input in the GREET Fuel Cycle Model which users can change for their own simulations. It is stored in the ELECTRIC worksheet, table *3) Electric Transmission and Distribution Loss.* In GREET1_2011 this is cell D46. The default value is used in GASCAP; currently (GREET 1_2011) this is set to be 8%.

GHG Emission Factors

The GHG Emission Factors for Energy Production in g/MMBtu are taken from the GREET Fuel Cycle Model, ELECTRIC worksheet, table 9) Fuel-Cycle Energy Use and Emissions of Electric Generation: Btu or Grams per mmBtu of Electricity Available at User Sites (wall outlets). In GREET1_2011 this table is given in cells A134 to DM153, and the values are taken from cells G143, G144 and G149 – G152 (see Table 11).

Note that to change between United States and Northeast US energy mixes the relevant values in the GREET Fuel Cycle Model, INPUTS worksheet, table 9.2.a) Selection of Electricity Generation Mix for Transportation Use of the GREET Fuel Cycle Model must be selected. In GREET1_2011 this table is given in cells A402 to H405. To use the U.S. Mix, cells C403 and C404 have to be set to value '1'; to use the Northeast US Mix, these cells have to be set to value '2'.

Table 11 - GHG emission factors for electricity production in the United States and the Northeast US

	United States g/MMBtu	Northeast US g/MMBtu
VOC	3.567	4.931
CO	44.78	42.43
CH_4	4.023	5.290
N_2O	2.539	2.689
CO_2	200,133	112,882
CO_2 (incl. VOC, CO)	200,214	112,964
Source: [1]		

Steel

Virgin Steel

Emissions factors for virgin steel are calculated from the STEEL worksheet, Table *4.1) Energy Use and Emissions Related to Virgin Steel Production* (see Table 12). In GREET2_7 this table is given in cells A61 to K88. The product of 'Tons of intermediate material needed per ton of steel' and respective emissions in grams per ton of intermediate material product and final steel product is calculated for each stage in the production of steel. In GREET2_7, 'Tons of intermediate material needed per ton of steel' is given in cells A63 – I63, and emissions are given in cells B80 – I80, B77 – I77 and B78 – I78. For rolled steel the overall emissions factors are the sum of the first seven stages (Ore Recovery to Sheet Production and Rolling). For stamped steel, the emissions factors are the sum of all eight stages. Within GASCAP it is only necessary to update the emissions factors for steps 1 – 8 (see below); the calculation of emissions factors for Cast Steel, Rolled Steel and Stamped Steel and the conversion of the factors from g/ton to g/lb are carried out automatically within GASCAP.

Table 12 - Virgin steel emissions factors

	1 Ore Recovery	2 Ore Pelletizing & Sintering	3 Coke Production	4 Blast Furnace	5 Basic O_2 Processing	6 Electric Arc Furnace	7 Sheet Production & Rolling	8 Stamping
CO_2 (VOC, CO, CO_2)	25,957.46	276,672.90	148,068.65	1,363,164.97	1,570,965.56	85,315.20	718,636.70	522,459.99
CH_4	29.47	551.49	390.45	686.36	396.08	217.77	1,730.67	1,179.46
N_2O	0.63	3.80	3.05	0.62	1.01	1.14	11.78	8.33
	Sum of 1-6 Cast Steel g/ton steel	Sum of 1-7 Rolled Steel g/ton steel	Sum of 1-8 Stamped Steel g/ton steel			Sum of 1-6 Cast Steel g/lb steel	Sum of 1-7 Rolled Steel g/lb steel	Sum of 1-8 Stamped Steel g/lb steel
CO_2 (VOC, CO, CO_2)	3,470,145	4,188,781	4,711,241			1,735	2,094	2,356
CH_4	2,271.62	4,002.29	5,181.75			1.14	2.00	2.59
N_2O	10.25	22.03	30.36			0.01	0.01	0.02
Source: GREET Vehicle Cycle Model 2.7								

Recycled Steel

Emission factors for recycled steel were calculated in the same way as for virgin steel, except the values used were taken from the GREET Vehicle Cycle Model, Steel worksheet Table 4.2) Energy Use and Emissions Related to Recycled Steel Production (see Table 13). In GREET2_7 this table is given in cells A90 to G117. 'Tons of intermediate material needed per ton of steel' is given in cells A92 – E92, and emissions are given in cells B109 – E109, B106 – E106 and B107 – E107. In this case, rolled steel is the first 3 stages (Basic O_2 Processing to Sheet Production and Rolling) and stamped steel is all 4 stages. Again, it is only necessary to update the emissions factors for steps 1 - 4; the calculation of emissions factors for Cast Steel, Rolled Steel and Stamped Steel and the conversion of the factors from g/ton to g/lb are carried out automatically within GASCAP.

Table 13 - Recycled steel emissions factors

	1 Basic O_2 Processing	2 Electric Arc Furnace	3 Sheet Production & Rolling	4 Stamping
CO_2 (VOC, CO, CO_2)	99,568.24	593,328.43	718,636.70	522,459.99
CH_4	25.10	1,514.50	1,730.67	1,179.46
N_2O	0.06	7.94	11.78	8.33
	Sum of 1-3 Rolled g/ton	Sum of 1-4 Stamped g/ton	Sum of 1-3 Rolled g/lb	Sum of 1-4 Stamped g/lb
CO_2 (VOC, CO, CO_2)	1,411,533.37	1,933,993.36	705.77	967.00
CH_4	3,270.27	4,449.72	1.64	2.22
N_2O	19.78	28.11	0.01	0.01
Source: [(2)]				

Total steel emissions are then based on the virgin/ recycled mix: 62% recycled steel and 38% virgin steel [(5)].

Other Materials

Emissions factors for plastics, rubber, zinc, virgin and recycled aluminum, glass, lubricating oil and copper are taken directly from GREET Vehicle Cycle Model [(2)]. These are shown in Table 14 and Table 15.

Table 14 - Plastics emissions factors

	Final Polypropylene Product: Combined g / ton	Final Average Plastic Product: Combined g / ton	Final Glass Fiber-Reinforced Plastic Product: Combined g / ton	Final Carbon Fiber-Reinforced Plastic Product: Combined g / ton
CO_2	3,257,690	4,137,271	4,995,743	10,007,762
CH_4	5,271.53	6,236.88	7,629.05	16,027.34
N_2O	38.84	42.57	48.70	96.10

Table 15 - Other materials emissions factors

	Rubber g / ton	Zinc g / ton	Virgin Aluminum g / ton	Recycled Aluminum g / ton	Glass g / ton	Lubricating Oil g / ton	Copper g / ton
CO_2	2,759,383	7,637,808	10,582,916	2,796,398	1,241,784	3,929,319	7,358,381
CH_4	5,122.61	13,894.11	16,319.14	6,483.46	6,600.77	4,039.78	12,162.94
N_2O	29.82	84.46	126.26	44.86	18.79	24.04	88.32

Sources for these emissions factors are listed in Table 16.

Table 16 - GREET2_7 sources for emissions factors for other materials

	Worksheet	Table	GREET2_7 Cell Range
Final Polypropylene Product: Combined	Plastic	4) Summary of Energy Consumption and Emissions Related to Plastic Production	J81 – K81, J78 – K78, J79 – K79
Final Average Plastic Product: Combined	Plastic	4) Summary of Energy Consumption and Emissions Related to Plastic Production	L81 – M81, L78 – M78, L79 – M79
Final Glass Fiber-Reinforced Plastic Product: Combined	Plastic	4) Summary of Energy Consumption and Emissions Related to Plastic Production	N81 – O81, N78 – O78, N79 – O79
Final Carbon Fiber-Reinforced Plastic Product: Combined	Plastic	4) Summary of Energy Consumption and Emissions Related to Plastic Production	P81 – Q81, P78 – Q78, P79 – Q79
Rubber	Rubber	3) Summary of Energy Consumption and Emissions Related to Rubber Production	B66 – C66, B63 – C63, B64 – C64
Zinc	Zinc	3) Summary of Energy Consumption and Emissions Related to Zinc Production	B66 – C66, B63 – C63, B64 – C64
Virgin Aluminum	W.Al	4.1) Energy Use and Emissions Related to Virgin Wrought Aluminum Production	H102 – I102, H99 – I99, H100 – I100
Recycled Aluminum	W.Al	4.2) Energy Use and Emissions Related to Recycled Wrought Aluminum Production	G131 – H131, G128 – H128, G129 – H129
Glass	Glass	4) Summary of Energy Consumption and Emissions Related to Glass Production	D70, D67, D68
Lubricating Oil	Vehi_Fluids	4) Summary of Energy Consumption and Emissions Related to Fluids Production and Disposal	Sum(D51, E51), sum(D49, E49), sum (D50, E50)
Copper	Copper	3) Summary of Energy Consumption and Emissions Related to Copper Production	D66 , D63, D64

Note: For Lubricating Oil, the emission factor is the sum of production and disposal for engine oil. Total emissions for aluminum are based on the virgin/ recycled mix: 62% recycled aluminum and 38% virgin aluminum.

Updating GASCAP

Within GASCAP the orange tabs are used to update the values extracted from GREET. Note that the administrator password is required to update these values (see User Guide). This is entered in the 'Project Info' tab in GASCAP. This password only needs entering once per session. The project manager should be contacted if you do not have access to the password.

Process Fuels

In order to update the Upstream Emissions of Process Fuels, select the orange Process Fuels tab in GASCAP then click on the Update Process Fuels Upstream Emissions button. This will display a form where the values extracted from GREET can be entered (the first section in Table 5). Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

In order to update the Combustion of Process fuels, select the orange Process Fuels tab in GASCAP then click on the Update Process Fuels Combustion Emissions button. This will display a form where the values extracted from GREET can be entered (the second section in Table **5**). Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

Electricity Production

In order to update the Energy Sources for Electricity, select the orange Electricity Production tab in GASCAP then click on the Update Energy Sources for Electricity button. This will display a form where the values extracted from GREET can be entered (Table 10 above). The Region button near the foot of the form allows the region to be switched between the United States Average and the North East. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP. Note that it is necessary to Update Factors separately for US and NE (clicking the Update Factors button will only update the factors for the region currently selected).

In order to update the Transmission Loss, select the orange Electricity Production tab in GASCAP then click on the Update Transmission Loss button. This will display a form where the transmission loss can be entered. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

In order to update the Energy Emissions for Electricity select the orange Electricity Production tab in GASCAP then click on the Update Energy Emissions for Electricity button. This will display a form where the Energy Emissions for Electricity can be entered. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

Steel

In order to update the Virgin Steel Emissions Factors select the orange Steel tab in GASCAP then click on the Update Virgin Steel Emissions Factors button. This will display a form where the Virgin Steel Emissions Factors can be updated. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

In order to update the Recycled Steel Emissions Factors select the orange Steel tab in GASCAP then click on the Update Recycled Steel Emissions Factors button. This will display a form where the Recycled Steel Emissions Factors can be updated. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

Other Materials

In order to update the Plastics Emissions Factors select the orange Other Materials tab in GASCAP then click on the Update Plastics Emissions Factors button. This will display a form where the Plastic Emissions Factors can be updated. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

In order to update the Other Materials Emissions Factors select the orange Other Materials tab in GASCAP then click on the Update Other Materials Emissions Factors button. This will display a form where the Other Materials Emissions Factors can be updated. Enter the updated values in each of the boxes, then click the Update Factors button to update the values within GASCAP.

APPENDIX C:
UPDATING EQUIPMENT DATA

The National Mobile Inventory Model (NMIM) is a program that models direct greenhouse gas (GHG) engine emissions. This software is published and made available at no cost by the EPA Office of Transportation and Air Quality (OTAQ). This guidance was written based on the version of NMIM that was released May 4, 2009. NMIM has two components, MOBILE and NONROAD. MOBILE estimates emissions from vehicles while NONROAD estimates emissions from various types of equipment. MOBILE has been replaced by MOVES and is now obsolete. NMIM is used in this update procedure in order to provide access to the NONROAD component.

This guidance will walk the user through an update procedure for the equipment emission factors included in GASCAP. That procedure includes running the NONROAD component of NMIM using a script that specifies equipment type, power rating in horsepower (HP), year, and usage for equipment types covered in GASCAP. The script specifies 1 hour of running time for one piece of equipment averaged equally across twelve months for each type of equipment, broken down by power rating in HP and fuel type. The script is available in electronic form on the GASCAP CD and is included as an appendix to this guidance. Once run the results are exported as tab-delimited ASCII files. A MySQL script is then used to prepare this data for GASCAP. This outputs a comma-delimited (csv) file, which can be copied and pasted into the appropriate place in GASCAP to update the equipment emission factors.

NMIM / NONROAD Software Installation

This guidance does not cover software installation in depth because that procedure is thoroughly documented on the NMIM website at

http://www.epa.gov/otaq/nmim.htm

Users are strongly advised to read the general information, user documents and tools, and downloading instructions carefully. We urgently suggest that you follow the installation instructions to the letter. It will save considerable frustration. The installation has three components. First a Java platform is installed, followed by an SQL program named MySQL, and finally the NMIM program itself. Care must be taken to install the proper version of each component as recommended because the NMIM will not run otherwise. Please refer any problems you have with the NMIM installation to OTAQ. Unfortunately NMIM and MOVES use different Java and MySQL versions. We were told by OTAQ that it should be possible to load both programs on a single computer. However we were unable to do so in any stable configuration.

Running NONROAD

Access NONROAD by clicking first the NMIM Worker icon and then the NMIM Master icon. Click OK in the AboutNMIM popup. In order to extract data to calculate methane emissions (CH_4) it is necessary to model total organic gases (TOG) and non-methane organic gases (NMOG) and calculate the difference. For NMIM that requires two separate runs.

<u>First Run</u>

The NMIM program receives specifications on the left side. The menu items include:

- Description (Optional)
- Geography
- Time
- Vehicles/Equipment (Expandable)
- Fleet (Expandable) (Optional)
- Pollutants
- Advanced Features (Optional)
- Diesel Retrofit (Expandable) (Optional), and
- Output (Expandable)

NMIM indicates that specifications are workable with a green check mark to the left of each menu item. When NMIM is first started none of the menu items is checked. Mandatory items have violet exclamation marks and optional items have yellow wavy equal signs. Exclamation marks indicate that there is an error or lack of information that will prevent the program from running.

1. Select Geography. Click on the Geography menu item. Under the Region heading click the County radial button if it is not active. Under the States heading click New Jersey. Under the Counties click New Jersey – Middlesex County. Click the Add box. A green check mark should appear to the left of the Geography menu item.

2. Access the script (a copy is saved in NMIM Script). Select the Fleet menu. Select the Nonroad sub menu. Check the Perform Nonroad Fleet Modeling check box. Click the Browse box and navigate to the script file (NMIM script.csv, unless

altered). Click the Open box. Under Diagnostics click the Check Fleet Information File Now box.

3. Select Time. What you enter here will be overridden by the script but NMIM requires that valid input specifications be entered for this menu option. Select all months by clicking the check boxes. Select a year from the Year pulldown menu and click the Add box. A green check mark should appear to the left of the Time menu item.

4. Select Equipment. Again, specifications entered here will be overridden by the script. However, in this case NMIM will gray out the subject matter of this menu item. If it has not yet and a check mark has not yet appeared, click on Vehicles/Equipment menu item to bring up the Onroad and Nonroad sub menu items. Click on the Nonroad sub menu item. Select all fuel types under the Fuels header and construction under the Segments header. Click the Add Fuel/Segment Combinations box. A green mark should appear to the left of the Nonroad sub menu item and the Vehicles/Equipment menu item.

5. Select Pollutants. Select the Pollutants menu item. For the first run check the following boxes:

    - Exhaust PM 10 microns
    - Exhaust PM 2.5 microns
    - CO
    - CO_2, and
    - HC

    Select NMOG from the drop down menu next to HC. A green check mark should appear next to the Pollutants menu. For the second run uncheck all items except HC and select TOG from the dropdown menu.

6. Set output parameters. Select the Output menu item. Select the Geographic Representation sub menu item. Click on the County radial button to activate it. A check mark should appear next to the Geographic Representation sub menu item. Click on the General Output sub menu item. If you are using your local drive leave the Server text box empty. Type a database name in the Database pulldown menu and click the Create Database box. A popup should appear that says “Output Database successfully created. Click OK in it. Uncheck the “Pre-

aggregate nonroad horsepower classes" check box. Check marks should have appeared next to the Output menu item and the General Output sub item.

7. Save your run specifications in the File menu.

8. Under the Action menu [across the top] select Execute. The specifications menu on the left will disappear and a progress bar will be produced.

9. When the run is completed run the error log. Copy the results and save in a text document. The error log will make it possible to identify the months (ERROR_MONTHS) that NONROAD assumes no activity for the particular piece of equipment (see Table **17**).

10. Export Data. Under the Post Processing menu select Aggregate and Export. Choose the database and run from the drop down menus. Under Output Format click on the Wide Tables radial button to activate it. Check the Month aggregation check box. Click the Tab-delimited ASCII Text File radial button and type a file location and file name. The Browse button is useful for that purpose. Click OK or Save.

Table 17 - Example seasonal adjustment file

SCC	ERROR_MONTHS	ADJ_FACTOR
2270004036	9	0.25
2265004036	9	0.25
2260004036	9	0.25

<u>Second Run</u>

11. Do the second run. Click on the Pollutants menu item. Uncheck all check boxes except HC. From the pull down menu next to HC choose TOG. Repeat steps 7, 8 [save as a different file], and 10. The error log does not have to be run because it should be identical to the previous run.

Emissions Calculations

<u>Installing MySQL</u>

A MySQL script has been written to automate the calculation of emissions from the NMIM output files. This script is detailed below. Note that it is necessary to have MySQL installed to run the script. This is installed as part of the installation of NMIM.

Input Files

Before the MySQL script can be run it is necessary to prepare a number of input files the script uses. These are detailed below. Note that the NONROAD output files (Nonroad_nmog and Nonroad_tog) and the Seasonal Adjustment file (see Table **17**) must be prepared each time NONROAD is run, whereas the other input files only need to be created once. With the exception of the NONROAD output files (which are saved as tab delimited files) all of the files should be saved as comma separated (csv) files. These can be created by:

1. Opening Microsoft Excel

2. Copying and pasting the data into a new workbook

3. Saving this as a csv file (File – Save As, then click the drop down arrow next to the 'Save as Type' and choose 'CSV (Comma delimited)'.

Once the CSV file has been created it is necessary to open it in notepad (by right clicking on the file and selecting 'Open With' then choosing 'Notepad'):

The header row of the file should be deleted, as well as any blank rows at the end of the file (Excel sometimes adds blank rows to the end of the file). Once this has been done, save the file, then copy it and put in the relevant MySQL data folder (C:\MySQL\data*database_name* where *database_name* is the name of the database chosen for the MySQL run). Similarly, the output file will be saved in this location.

Files to be Prepared Each Time NONROAD Runs

The following files are output by NONROAD and hence need to be updated each time it is run:

- Nonroad_nmog

- Nonroad_tog

- Seasonal Adjustment File.

Seasonal Adjustment File

Some equipment types, such as snow blowers, are only used seasonally, and hence emissions from NONROAD underestimate such emissions. This can be corrected by looking at the error log NONROAD outputs. There should be two types of errors in the error log. The first is for equipment types at power ratings that were not used during the year in question. These will not be written to the databases and may be ignored. The second type of error is for seasonal equipment types that have zero activity in a given month or months. Snow blowers are the only case of this that appears in the error log in 2011. To correct this, for each equipment type that appears in the error log adjust emissions for each equipment type *i* and each pollutant *j* using the following formula:

$$AdjEmissions_{ij} = \frac{\mathrm{NMIMEmissions_{ij}}}{1 - \left(\frac{\sum \mathrm{Error\_Months_i}}{12}\right)}$$

See Seasonal Adjustment file section for an example of the file that is required. Once created, this needs to be saved as a comma delimited (csv) file named seasonal_adj and saved in the *database_name* folder.

Files To Be Created Once

The MySQL script uses four tables which need to be uploaded:

- Direct_n2o
- Fuel_consumption
- Upstream_ghg_factors
- Equipment_description

These tables are given in the Input Files section (below). In each case the data should be saved as a comma delimited (csv) file with the appropriate name (Direct_n2o.csv, Fuel_consumption.csv, etc.).

Running the MySQL Script

Once MySQL has been installed, the MySQL query browser can be launched in the usual fashion (Start Menu – All Programs – MySQL – MySQL Query Browser). In the Server Host box enter localhost. Leave all other boxes as they are and click ok. An error message stating that ‘No Default Schema Specified’ may appear. This can be ignored (check the box next to ‘Do not show this message any more’ then select Ignore). The MySQL Query Browser interface appears. Select File – Open Script, then browse to the location where the script was saved and select open to display the script window.

Database Names

The name of the database used is set at top of the script, where it says:

```
# Set database name here:
```

Use *database_name*;

Execute the script by clicking on the execute button (the green toolbar button with the lightning symbol). The script carries out the following steps:

1. Uploads files output by NONROAD

2. Combines these two files into one table

3. Adjusts NONROAD output for seasonal equipment (such as snow blowers)

4. Calculates direct emissions from fossil fuels

    a. Calculates direct emissions of CO_2: sum of CO_2 measured by NONROAD, CO_2 from NMOG and CO_2 from the oxidation of CO

    b. Calculates direct emissions of CH_4: Total Organic Gases – Non-Methane Organic Gases

    c. Calculates direct emissions of N_2O: upload table of direct emissions of N_2O by SCC and power class

    d. Calculates direct emissions of Black Carbon: multiply PM2.5 emissions by appropriate speciation factor, as specified in Table 18.

Table 18 - Black carbon speciation factors

Third and fourth digit of SCC	Equipment Type	Factor
< 66	Gasoline powered non-road equipment	0.27
70	Diesel-powered non-road equipment	0.43
Else	Generic factor (applied to CNG and LPG powered equipment)	0.14
Source: [(6)]		

5. Uploads fuel consumption table

6. Adds biofuels

7. Combines fossil fuels and biofuels into one table

8. Calculates upstream emissions

9. Calculates total emissions

10. Formats data for GASCAP

The script saves a comma delimited file called gascap_nonroad_final.csv in the *database_name* folder (C:\MySQL\data*database_name).*

Updating GASCAP

Once the script has been run and the csv file produced GASCAP can be updated. Open the latest version of GASCAP and select the ‘Equipment Year’ worksheet. Enter the year for which the most recent data is available in the text box. As of May 2012 the 2011 data is included in the model. Then click on the update equipment button. This will create a new blank worksheet titled *year* Data (where *year* is the value entered in the textbox). Paste the formatted data as values into this blank worksheet including the headings. Then save and re-open GASCAP. This will automatically populate the selection boxes in the ‘Equipment’ worksheet to include the new data added.

NMIM Script

```
SCC,Hpmax,ModelYear,TechType,Population,Hours/Year
Jan,Feb,Mar,Apr,May,Jun,Jul,Aug,Sep,Oct,Nov,Dec
2260002006,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260002009,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260002021,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260002027,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260002054,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004016,1,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004016,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004021,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004021,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004026,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004026,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004031,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004031,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004036,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004036,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260004071,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260005035,1,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260005035,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006005,1,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006005,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006010,1,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006010,3,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260006015,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2260007005,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002003,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002003,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002003,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002003,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002003,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002003,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002006,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002009,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002009,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002009,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002015,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002021,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002021,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002021,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

2265002021,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002021,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002021,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002024,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002024,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002024,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002024,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002024,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002024,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002027,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002027,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002027,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,1,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,175,2011,All,1,1000

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002033,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002039,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002039,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002039,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002039,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002039,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002042,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002042,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002042,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002042,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002042,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002045,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002045,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002045,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002045,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002045,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002045,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002054,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002054,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

2265002054,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002054,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002057,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002057,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002057,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002057,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002057,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002060,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002060,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002066,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002066,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002066,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002066,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002066,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002072,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002072,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002072,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002072,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002072,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002078,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002078,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002078,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002078,6,2011,All,1,1000

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002078,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002081,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265002081,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003010,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003010,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003020,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003020,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003020,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003020,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003020,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003020,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2265003030,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003040,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003050,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003050,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003050,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003050,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003060,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003060,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265003060,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004011,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004011,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004011,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004016,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004026,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004026,16,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004026,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004026,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004031,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004036,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004036,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004041,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004041,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004041,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004041,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004046,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004046,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004046,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004046,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004051,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004051,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004056,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004056,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2265004056,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004056,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004066,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004071,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004071,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004071,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004071,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004071,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004071,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,1,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,40,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265004076,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005010,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005030,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005030,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005035,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005040,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005040,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005045,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

2265005045,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005055,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005060,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005060,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005060,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005060,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265005060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006005,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006005,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006005,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006005,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,25,2011,All,1,1000

0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006025,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006030,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006030,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083

```
2265006030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006030,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265006030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265007010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265007010,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265007010,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265007015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2265007015,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002003,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002003,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002021,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002021,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002024,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002024,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002033,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002033,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002033,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002039,40,2011,All,1,1000
```

0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002039,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002045,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002045,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002045,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002054,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002057,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002057,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002057,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002057,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002060,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002060,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002066,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002066,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002066,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002072,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002072,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002072,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267002081,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003020,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083

```
2267003020,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003020,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003020,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003020,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003020,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003030,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003030,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003030,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003040,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003040,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003040,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003040,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003040,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003050,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267003050,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267004066,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267004066,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267004066,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267004066,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267005055,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,100,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006005,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006010,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006010,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006025,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006025,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006025,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2267006030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268002081,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268003020,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268003030,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2268003040,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268003060,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268003060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006005,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006010,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006010,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006020,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006020,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006020,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006020,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2268006020,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,175,2011,All,1,1000
```

0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002003,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002006,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002009,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002009,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002009,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002009,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002018,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083

2270002018,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002018,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002018,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002018,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002018,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002021,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,40,2011,All,1,1000

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002024,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002027,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2270002030,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002030,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002033,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,2000,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,3000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002036,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002039,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

2270002042,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002042,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002045,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002048,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,1200,2011,All,1,1000

0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,3000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002051,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002054,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083

```
2270002057,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002057,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,3000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002060,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002066,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,100,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002069,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002072,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,3000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002075,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2270002078,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002078,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270002081,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,16,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003020,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003030,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

2270003030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003040,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003050,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003050,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003050,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003050,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003050,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003050,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003060,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003060,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003060,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003060,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003060,50,2011,All,1,1000

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270003060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004031,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004031,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004036,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004036,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004036,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004046,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004056,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004056,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004056,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004056,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004056,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004056,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2270004066,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004066,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004071,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004076,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004076,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004076,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004076,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004076,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270004076,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005010,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,175,2011,All,1,1000
```

0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005035,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005045,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005045,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005045,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005045,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083

```
2270005055,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005055,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270005060,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006005,75,2011,All,1,1000
```

```
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

```
2270006025,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006025,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270006030,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,300,2011,All,1,1000
```

0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270007015,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270008005,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,1000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,1200,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,2000,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083

```
2270010010,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2270010010,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,100,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,175,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,300,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,50,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,600,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,75,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285002015,750,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285004015,11,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285004015,16,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285004015,25,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285004015,3,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285004015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285004015,6,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
2285006015,40,2011,All,1,1000
0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083,0.084,0.083,0.083
```

MySQL Script

```
# Script to prepare NONROAD data for GASCAP
# Written by M Benson 06/29/2012

# Database: nonroad
Use nonroad;

#############################################
# STEP 1: UPLOAD FILES OUTPUT BY NONROAD
# nonroad_nmog
# nonroad_tog

/*
Drop table if exists nonroad_nmog;

Create table nonroad_nmog (RunId tinyint(3), SCC char(10), Year smallint(4), FIPSStateId tinyint(2),
FIPSCountyId tinyint(2), County char(17), PowerClass smallint(3), PolNMOG double, PolCO double,
PolPM10_Pri double, PolCO2 double, PolPM25_Pri double);

load data infile 'nonroad_nmog.csv' into table nonroad_nmog fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';

Drop table if exists nonroad_tog;

Create table nonroad_tog (RunId tinyint(3), SCC char(10), Year smallint(4), FIPSStateId tinyint(2),
FIPSCountyId tinyint(2), PowerClass smallint(3), PolTOG double);

load data infile 'nonroad_tog.csv' into table nonroad_tog fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';
*/

# Tab separated
Drop table if exists nonroad_nmog;

Create table nonroad_nmog (RunId tinyint(1), SCC char(10), Year smallint(4), FIPSStateId tinyint(2),
FIPSCountyId tinyint(2), County char(17), PowerClass smallint(3), PolNMOG double, PolCO double,
PolPM10_Pri double, PolCO2 double, PolPM25_Pri double);

load data infile 'nonroad_nmog.txt' into table nonroad_nmog fields terminated by '\t'
```

```
enclosed by '"'
lines terminated by '\r\n';

Drop table if exists nonroad_tog;

Create table nonroad_tog (RunId tinyint(1), SCC char(10), Year smallint(4), FIPSStateId tinyint(2),
FIPSCountyId tinyint(2), PowerClass smallint(3), PolTOG double);

load data infile 'nonroad_tog.txt' into table nonroad_tog fields terminated by '\t'
enclosed by '"'
lines terminated by '\r\n';

##############################################
# STEP 2: JOIN TABLES

# Only select rows with Middlesex County
Drop table if exists nonroad_nmog_Middlesex;

Create table nonroad_nmog_Middlesex
Select *
From nonroad_nmog
Where FIPSCountyId = 23;
# 864 rows

Drop table if exists nonroad_tog_Middlesex;

Create table nonroad_tog_Middlesex
Select *
From nonroad_tog
Where FIPSCountyId = 23;
# 864 rows

Drop table if exists nonroad_all_pol;

Create table nonroad_all_pol
Select nmog.SCC, nmog.PowerClass, nmog.PolNMOG, nmog.PolCO, nmog.PolPM10_Pri, nmog.PolCO2,
nmog.PolPM25_Pri, tog.PolTOG
From nonroad_nmog_Middlesex nmog
Left Join nonroad_tog_Middlesex tog
On nmog.SCC = tog.SCC and nmog.PowerClass = tog.PowerClass;
# 864 rows
```

```
###########################################
# STEP 3: SEASONAL ADJUSTMENT

# Upload table
Drop table if exists seasonal_adj;

Create table seasonal_adj (SCC char(10), Error_Months tinyint(2),  Adj_Factor double);

load data infile 'seasonal_adj.csv' into table seasonal_adj fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';

# Join to nonroad_all_Pol table
Drop table if exists nonroad_seasonal;

Create table nonroad_seasonal
Select a.*, b.Adj_Factor
From nonroad_all_Pol a
Left outer join seasonal_adj b
On a. SCC = b.SCC;

# Adj_Factor if in table, 1 otherwise
Alter table nonroad_seasonal add seasonal_adj double;

Update nonroad_seasonal set seasonal_adj = if(adj_factor > 0, adj_factor, 1);

# Multiply emissions by seasonal adjustment factor
Alter table nonroad_seasonal add PolNMOG_seasonal double;
Alter table nonroad_seasonal add PolCO_seasonal double;
Alter table nonroad_seasonal add PolPM10_Pri_seasonal double;
Alter table nonroad_seasonal add PolCO2_seasonal double;
Alter table nonroad_seasonal add PolPM25_Pri_seasonal double;
Alter table nonroad_seasonal add PolTOG_seasonal double;

Update nonroad_seasonal set PolNMOG_seasonal = PolNMOG / seasonal_adj;
Update nonroad_seasonal set PolCO_seasonal = PolCO / seasonal_adj;
Update nonroad_seasonal set PolPM10_Pri_seasonal = PolPM10_Pri / seasonal_adj;
Update nonroad_seasonal set PolCO2_seasonal = PolCO2 / seasonal_adj;
Update nonroad_seasonal set PolPM25_Pri_seasonal = PolPM25_Pri / seasonal_adj;
Update nonroad_seasonal set PolTOG_seasonal = PolTOG / seasonal_adj;

###########################################
```

```
# STEP 4: FOSSIL FUELS - DIRECT EMISSIONS

# Check: are all SCCs for fossil fuels

# Convert emissions from short tons to grams
# Conversion factor: 907,814
Set @shortton_g = 907814;

Alter table nonroad_seasonal add PolNMOG_g double;
Alter table nonroad_seasonal add PolCO_g double;
Alter table nonroad_seasonal add PolPM10_Pri_g double;
Alter table nonroad_seasonal add PolCO2_g double;
Alter table nonroad_seasonal add PolPM25_Pri_g double;
Alter table nonroad_seasonal add PolTOG_g double;

Update nonroad_seasonal set PolNMOG_g = PolNMOG_seasonal * @shortton_g/1000;
Update nonroad_seasonal set PolCO_g = PolCO_seasonal * @shortton_g/1000;
Update nonroad_seasonal set PolPM10_Pri_g = PolPM10_Pri_seasonal * @shortton_g/1000;
Update nonroad_seasonal set PolCO2_g = PolCO2_seasonal * @shortton_g/1000;
Update nonroad_seasonal set PolPM25_Pri_g = PolPM25_Pri_seasonal * @shortton_g/1000;
Update nonroad_seasonal set PolTOG_g = PolTOG_seasonal * @shortton_g/1000;

###
# STEP 4a: DIRECT EMISSIONS OF CO2
Alter table nonroad_seasonal add CO2_PolNMOG double;
Alter table nonroad_seasonal add Oxid_CO double;
Alter table nonroad_seasonal add Direct_CO2 double;

Update nonroad_seasonal set CO2_PolNMOG = PolNMOG_g * (0.87/(12/44));
Update nonroad_seasonal set Oxid_CO = PolCO_g * (44/28);
Update nonroad_seasonal set Direct_CO2 = PolCO2_g + CO2_PolNMOG + Oxid_CO;

###
# STEP 4b: DIRECT EMISSIONS OF CH4
Alter table nonroad_seasonal add Direct_CH4 double;

Update nonroad_seasonal set Direct_CH4 = PolTOG_g - PolNMOG_g;

###
# STEP 4c: DIRECT EMISSIONS OF N2O

# Upload N2O table
```

```
Drop table if exists direct_n2o;

Create table direct_n2o (SCC char(10), PowerClass smallint(3), N2O double);

load data infile 'direct_n2o.csv' into table direct_n2o fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';

# Join to nonroad_all_pol table
Drop table if exists nonroad_all_pol_n2o;

Create table nonroad_all_pol_n2o
Select a.*, b.n2o as direct_n2o
From nonroad_seasonal a
Left outer join direct_n2o b
On a.SCC = b.SCC and a.PowerClass = b.PowerClass;

###
# STEP 4d: BLACK CARBON

Alter table nonroad_all_pol_n2o add BC_Speciation double;
Alter table nonroad_all_pol_n2o add Direct_BC double;

Update nonroad_all_pol_n2o set BC_Speciation = if(substr(SCC,3,2) < 66, 0.27, if(substr(SCC,3,2) = 70,
0.43,0.14));


Update nonroad_all_pol_n2o set Direct_BC = PolPM25_Pri_g * BC_Speciation;

############################################
# STEP 5: FUEL CONSUMPTION

# Upload Fuel Consumption Table
Drop table if exists fuel_consumption;

Create table fuel_consumption (SCC char(10), PowerClass smallint(3), Fuel_Used double);

load data infile 'fuel_consumption.csv' into table fuel_consumption fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';

Drop table if exists nonroad_all_pol_fuel_con;
```

```
Create table nonroad_all_pol_fuel_con
Select a.*, b.Fuel_Used
From nonroad_all_pol_n2o a
Left outer join fuel_consumption b
On a.SCC = b.SCC and a.PowerClass = b.PowerClass;

###########################################
# STEP 5: BIOFUELS

# Copy above table of final emissions apart from where SCC codes start with 2267 and 2268
Alter table nonroad_all_pol_fuel_con add Fuel char(4);

Update nonroad_all_pol_fuel_con set Fuel = substr(SCC,1,4);

Drop table if exists nonroad_biofuels;

Create table nonroad_biofuels
Select *
From nonroad_all_pol_fuel_con
where Fuel = '2260' or Fuel = '2265' or Fuel = '2270';

# Replace the first four digits of SCC with biofuel equivalent
Alter table nonroad_biofuels add Biofuel char(4);

Update nonroad_biofuels set Biofuel = case Fuel
  when '2260' then '2231'
  when '2265' then '2232'
  when '2270' then '2233'
  else 'na'
  end;

Alter table nonroad_biofuels add scc_part_2 char(6);

Update nonroad_biofuels set scc_part_2 = substr(SCC,5,6);

Update nonroad_biofuels set SCC = concat(Biofuel, scc_part_2);

###########################################
# STEP 6: COMBINE FOSSIL AND BIOFUELS TABLES

Drop table if exists nonroad_all_fuels;
```

```
Create table nonroad_all_fuels
Select SCC, PowerClass, Direct_CO2, Direct_CH4, Direct_N2O, Direct_BC, Fuel_Used
From nonroad_all_pol_fuel_con;

Insert into nonroad_all_fuels
Select SCC, PowerClass, Direct_CO2, Direct_CH4, Direct_N2O, Direct_BC, Fuel_Used
From nonroad_biofuels;


##########################################
# STEP 7: UPSTREAM EMISSIONS
/*
# Upload Fuel Consumption Table
Drop table if exists fuel_consumption;

Create table fuel_consumption (SCC char(10), PowerClass smallint(3), Fuel_Used double);

load data infile 'fuel_consumption.csv' into table fuel_consumption fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';
*/
# Upload Upstream GHG Emissions Factor Table
Drop table if exists Upstream_GHG_Factors;

Create table Upstream_GHG_Factors (Fuel smallint(4), Fuel_Type char(35), Pollutant char(4),
Upstream_Rate double);

load data infile 'Upstream_GHG_Factors.csv' into table Upstream_GHG_Factors fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';

# Create separate tables for CO2, CH4, N2O, BC
Drop table if exists upstream_co2_factor;

Create table upstream_co2_factor
Select *
from upstream_GHG_Factors
where Pollutant = 'CO2';

Drop table if exists upstream_ch4_factor;
```

```
Create table upstream_ch4_factor
Select *
from upstream_GHG_Factors
where Pollutant = 'CH4';

Drop table if exists upstream_n2o_factor;

Create table upstream_n2o_factor
Select *
from upstream_GHG_Factors
where Pollutant = 'N2O';

Drop table if exists upstream_bc_factor;

Create table upstream_bc_factor
Select *
from upstream_GHG_Factors
where Pollutant = 'BC';

# Add fuel type

Alter table nonroad_all_fuels add Fuel smallint(4);

Update nonroad_all_fuels set Fuel = substr(SCC,1,4);

# For railway maintenance update fuel type
Update nonroad_all_fuels set Fuel = case SCC
        when 2285002015 then 2270
        when 2285003015 then 2260
        when 2285004015 then 2265
        when 2285006015 then 2267
        when 2285008015 then 2268
        else Fuel
        end;

# Multiply relevant upstream GHG factor by fuel consumption
Drop table if exists nonroad_upstream;

Create table nonroad_upstream
Select a.*, co2.Upstream_Rate as Upstream_CO2_Rate, ch4.Upstream_rate as Upstream_CH4_Rate,
n2o.Upstream_rate as Upstream_N2O_Rate, bc.Upstream_rate as Upstream_BC_Rate
From nonroad_all_fuels a
```

```
Left outer join upstream_co2_factor co2
On a.Fuel = co2.Fuel
Left outer join upstream_ch4_factor ch4
On a.Fuel = ch4.Fuel
Left outer join upstream_n2o_factor n2o
On a.Fuel = n2o.Fuel
Left outer join upstream_bc_factor bc
On a.Fuel = bc.Fuel;

Alter table nonroad_upstream add Upstream_CO2 double;
Alter table nonroad_upstream add Upstream_Ch4 double;
Alter table nonroad_upstream add Upstream_n2o double;
Alter table nonroad_upstream add Upstream_bc double;

Update nonroad_upstream set Upstream_co2 = Fuel_Used * Upstream_CO2_Rate;
Update nonroad_upstream set Upstream_ch4 = Fuel_Used * Upstream_CH4_Rate;
Update nonroad_upstream set Upstream_n2o = Fuel_Used * Upstream_N2O_Rate;
Update nonroad_upstream set Upstream_bc = Fuel_Used * Upstream_BC_Rate;


############################################
# STEP 8: TOTAL EMISSIONS

# Sum of upstream and direct emissions
Alter table nonroad_upstream add Total_CO2 double;
Alter table nonroad_upstream add Total_Ch4 double;
Alter table nonroad_upstream add Total_n2o double;
Alter table nonroad_upstream add Total_bc double;

Update nonroad_upstream set Total_co2 = Direct_CO2 + Upstream_CO2;
Update nonroad_upstream set Total_ch4 = Direct_Ch4 + Upstream_Ch4;
Update nonroad_upstream set Total_n2o = Direct_n2o + Upstream_n2o;
Update nonroad_upstream set Total_bc = Direct_bc + Upstream_bc;

############################################
# STEP 9: FORMAT DATA FOR GASCAP

# Upload description table
Drop table if exists equipment_description;

Create table equipment_description (SCC char(10), Description char(45));
```

```
load data infile 'equipment_description.csv' into table equipment_description fields terminated by ','
enclosed by '"'
lines terminated by '\r\n';

# Match description to table
Drop table if exists nonroad_description;

Create table nonroad_description
Select a.*, b.description
from nonroad_upstream a
Left Outer Join equipment_description b
On a.SCC = b.SCC;

# Add column with fuel unit
#Alter table nonroad_description add Fuel smallint(4);
Alter table nonroad_description add Fuel_Unit char(8);

#Update nonroad_description set Fuel = substr(SCC,1,4);
Update nonroad_description set Fuel_Unit = if(Fuel = 2268, 'cu. feet', 'gallons');

# Create final table
Drop table if exists gascap_nonroad_final;

Create table gascap_nonroad_final
Select SCC, Description, Fuel, PowerClass, Total_co2, Total_ch4, Total_n2o, Total_BC, Direct_co2,
Direct_ch4, Direct_n2o, Direct_BC, Upstream_Co2, Upstream_CH4, Upstream_n2O, Upstream_Bc,
Fuel_Used, Fuel_unit
From nonroad_description;

# Output final table to CSV
Select 'SCC', 'Description', 'Fuel', 'PowerClass', 'Total_co2', 'Total_ch4', 'Total_n2o', 'Total_BC',
'Direct_co2', 'Direct_ch4', 'Direct_n2o', 'Direct_BC', 'Upstream_co2', 'Upstream_ch4', 'Upstream_n2O',
'Upstream_Bc', 'Fuel_Used', 'Fuel_unit'
Union
(
Select * into outfile 'gascap_nonroad_final.csv'
Fields Terminated by ',' Optionally enclosed by '"'
Lines terminated by '\n'
From gascap_nonroad_final
);
```

Input Files

Table 19 - Direct emissions of N_2O

CC	Power Class	N_2O
2260002006	6	0.0152625
2260002009	3	0.00671143
2260002021	3	0.007959218
2260002027	3	0.0117216
2260002054	3	0.011322
2260004016	1	0.00283272
2260004016	3	0.00744144
2260004021	3	0.0109298
2260004021	6	0.02028488
2260004026	3	0.0094276
2260004026	6	0.0222222
2260004031	3	0.00980796
2260004031	6	0.02378952
2260004036	3	0.00756539
2260004036	6	0.01213674
2260004071	3	0.01332
2260005035	1	0.0042328
2260005035	3	0.01234727
2260006005	1	0.0040256
2260006005	3	0.008368216
2260006010	1	0.005060046
2260006010	3	0.010201788
2260006010	40	0.194028
2260006010	75	0.28083
2260006015	3	0.009154096
2260007005	11	0.0352758
2265002003	6	0.0261294
2265002003	11	0.045557952
2265002003	16	0.06134304
2265002003	25	0.1018314
2265002003	40	0.155067
2265002003	75	0.30481044
2265002006	11	0.03059826
2265002009	6	0.01794463
2265002009	11	0.03347575
2265002009	16	0.0515669
2265002015	11	0.040837788
2265002015	16	0.06799416

CC	Power Class	N_2O
2265002015	25	0.08753904
2265002015	40	0.16893016
2265002015	75	0.27876688
2265002015	100	0.380804
2265002021	6	0.022423776
2265002021	11	0.03726381
2265002021	16	0.05789316
2265002021	25	0.08732
2265002021	40	0.1597956
2265002021	75	0.288156
2265002024	6	0.01871016
2265002024	11	0.032336668
2265002024	16	0.05660186
2265002024	25	0.0690753
2265002024	40	0.10965024
2265002024	75	0.239316
2265002027	6	0.026810496
2265002027	11	0.043956
2265002027	25	0.095904
2265002030	3	0.014652
2265002030	6	0.025450524
2265002030	11	0.043384572
2265002030	16	0.06564096
2265002030	25	0.0942612
2265002030	40	0.14652
2265002030	75	0.30129396
2265002030	100	0.39072
2265002033	1	0.0052614
2265002033	3	0.012913814
2265002033	6	0.028113414
2265002033	11	0.051175884
2265002033	16	0.093536
2265002033	25	0.12457826
2265002033	40	0.18350594
2265002033	75	0.35859364
2265002033	175	0.6904126
2265002039	11	0.04926402
2265002039	16	0.08473296
2265002039	25	0.11203452
2265002039	40	0.20080788
2265002039	75	0.37968216
2265002042	3	0.01261774

CC	Power Class	N_2O
2265002042	6	0.02279052
2265002042	11	0.036556518
2265002042	16	0.05902832
2265002042	25	0.07802042
2265002045	11	0.027824
2265002045	16	0.04876156
2265002045	25	0.06316048
2265002045	40	0.128686
2265002045	75	0.24012112
2265002045	175	0.4006656
2265002054	6	0.02717909
2265002054	11	0.0561697
2265002054	16	0.10064
2265002054	75	0.3933137
2265002057	25	0.107226
2265002057	40	0.135198
2265002057	75	0.3072258
2265002057	100	0.37296
2265002057	175	0.5282046
2265002060	40	0.194398
2265002060	75	0.3698816
2265002060	175	0.593702
2265002066	11	0.0383616
2265002066	25	0.06777216
2265002066	40	0.10656
2265002066	75	0.216672
2265002066	100	0.28416
2265002072	16	0.06837156
2265002072	25	0.07901572
2265002072	40	0.13704356
2265002072	75	0.23365648
2265002072	100	0.339068
2265002078	6	0.01504864
2265002078	11	0.02584968
2265002078	16	0.03725752
2265002078	25	0.05685716
2265002078	75	0.200244
2265002081	25	0.063936
2265002081	175	0.447552
2265003010	11	0.0274873
2265003010	16	0.04898356
2265003010	25	0.07192652

CC	Power Class	N_2O
2265003010	40	0.10627288
2265003020	40	0.0801864
2265003020	50	0.1002552
2265003020	75	0.1393494
2265003020	100	0.1976466
2265003020	175	0.321234
2265003020	300	0.479076
2265003030	6	0.02487769
2265003030	11	0.05177817
2265003030	16	0.0780219
2265003030	25	0.09578042
2265003030	40	0.16765514
2265003030	50	0.241684
2265003030	75	0.3328409
2265003030	100	0.47286
2265003030	175	0.7881
2265003030	600	2.159394
2265003040	6	0.017138844
2265003040	11	0.036215748
2265003040	16	0.05406588
2265003040	25	0.07288704
2265003040	40	0.12035952
2265003040	75	0.24359616
2265003040	100	0.31968
2265003040	175	0.543456
2265003040	300	0.77922
2265003050	3	0.011766
2265003050	25	0.07106664
2265003050	75	0.247086
2265003050	100	0.337292
2265003060	11	0.030636
2265003060	16	0.044252
2265003060	25	0.061272
2265004011	3	0.0062271
2265004011	6	0.0100122
2265004011	11	0.01523808
2265004016	6	0.01394752
2265004026	6	0.0222222
2265004026	11	0.0531986
2265004026	16	0.107744
2265004026	25	0.121212
2265004031	6	0.0236504

CC	Power Class	N_2O
2265004031	11	0.0577348
2265004031	16	0.0987752
2265004031	25	0.146076
2265004031	40	0.215636
2265004031	75	0.42577676
2265004031	175	0.8402848
2265004036	11	0.02253041
2265004036	16	0.0326081
2265004041	6	0.01435526
2265004041	11	0.025738236
2265004041	16	0.03545932
2265004041	25	0.05134712
2265004046	11	0.03848
2265004046	16	0.0647907
2265004046	25	0.08177
2265004046	40	0.1552187
2265004051	3	0.01767712
2265004051	6	0.0286232
2265004056	6	0.016286512
2265004056	11	0.03169716
2265004056	16	0.04431416
2265004056	25	0.05994296
2265004066	6	0.020202
2265004066	11	0.056513652
2265004066	16	0.08842704
2265004066	25	0.1157286
2265004066	40	0.2025972
2265004066	75	0.35076444
2265004066	100	0.46176
2265004066	175	0.686868
2265004071	6	0.02316348
2265004071	11	0.03894324
2265004071	16	0.0621156
2265004071	25	0.0858252
2265004071	40	0.1209456
2265004071	75	0.2645796
2265004076	1	0.003922888
2265004076	3	0.01004328
2265004076	6	0.020889164
2265004076	11	0.035228736
2265004076	16	0.06669768
2265004076	25	0.08601168

CC	Power Class	N_2O
2265004076	40	0.15468368
2265004076	75	0.283272
2265004076	100	0.369112
2265004076	175	0.484996
2265005010	11	0.037607836
2265005010	16	0.06510372
2265005015	25	0.0935952
2265005015	40	0.139934
2265005015	100	0.37681244
2265005015	175	0.5735
2265005030	6	0.021312
2265005030	11	0.032699712
2265005030	16	0.056832
2265005030	25	0.063936
2265005035	6	0.0210197
2265005035	11	0.03946124
2265005035	16	0.0714285
2265005035	25	0.0986531
2265005035	40	0.1600768
2265005035	75	0.29822
2265005035	100	0.4322747
2265005035	175	0.626743
2265005040	11	0.039410254
2265005040	16	0.07754904
2265005045	100	0.30784
2265005045	175	0.4690712
2265005055	6	0.0196988
2265005055	11	0.0371998
2265005055	16	0.0574277
2265005055	25	0.0758648
2265005055	40	0.1311761
2265005055	75	0.2538866
2265005055	100	0.3583228
2265005055	175	0.681318
2265005055	300	0.936507
2265005060	11	0.03959592
2265005060	75	0.265068
2265005060	100	0.35631
2265005060	175	0.53502
2265005060	300	0.933288
2265006005	6	0.022981144
2265006005	11	0.044362112

CC	Power Class	N_2O
2265006005	16	0.07215888
2265006005	25	0.10426304
2265006010	6	0.023645886
2265006010	11	0.042568722
2265006010	16	0.07561986
2265006010	25	0.0936951
2265006010	40	0.1631367
2265006010	50	0.234876
2265006010	75	0.3094236
2265006010	100	0.4148625
2265006010	175	0.5887218
2265006015	6	0.021499072
2265006015	11	0.0411292
2265006015	16	0.05648272
2265006015	25	0.07736848
2265006015	40	0.13124048
2265006015	75	0.25166512
2265006015	100	0.33852336
2265006015	175	0.5465936
2265006025	6	0.030061168
2265006025	11	0.046928432
2265006025	16	0.07905272
2265006025	25	0.0915824
2265006025	75	0.32018616
2265006025	100	0.40256
2265006025	175	0.65416
2265006030	3	0.01887
2265006030	6	0.03036183
2265006030	11	0.05726416
2265006030	16	0.0888777
2265006030	25	0.118252
2265006030	40	0.2298995
2265006030	75	0.41514
2265007010	11	0.04805264
2265007010	16	0.0747104
2265007010	25	0.1217152
2265007015	6	0.02849
2265007015	11	0.04662
2267002003	40	0.155067
2267002003	75	0.30481044
2267002015	40	0.16893016
2267002015	75	0.27876688

CC	Power Class	N_2O
2267002015	100	0.380804
2267002021	40	0.1597956
2267002021	75	0.288156
2267002024	40	0.10965024
2267002024	75	0.239316
2267002030	40	0.14652
2267002030	75	0.30129396
2267002030	100	0.39072
2267002033	40	0.18350594
2267002033	75	0.35859364
2267002033	175	0.6904126
2267002039	40	0.20080788
2267002039	75	0.37968216
2267002045	40	0.128686
2267002045	75	0.24012112
2267002045	175	0.4006656
2267002054	75	0.3933137
2267002057	40	0.135198
2267002057	75	0.3072258
2267002057	100	0.37296
2267002057	175	0.5282046
2267002060	40	0.194398
2267002060	75	0.3698816
2267002060	175	0.593702
2267002066	40	0.10656
2267002066	75	0.216672
2267002066	100	0.28416
2267002072	40	0.13704356
2267002072	75	0.23425736
2267002072	100	0.339068
2267002081	175	0.447552
2267003010	40	0.10627288
2267003010	75	0.20383152
2267003010	175	0.379546
2267003020	40	0.0742368
2267003020	50	0.1008546
2267003020	75	0.1291596
2267003020	100	0.1772226
2267003020	175	0.29193
2267003020	300	0.479076
2267003030	40	0.162874
2267003030	50	0.246938

CC	Power Class	N_2O
2267003030	75	0.3328409
2267003030	100	0.47286
2267003030	175	0.7881
2267003030	600	2.159394
2267003040	40	0.12035952
2267003040	75	0.24359616
2267003040	100	0.31968
2267003040	175	0.543456
2267003040	300	0.77922
2267003050	75	0.2102192
2267003050	100	0.337292
2267004066	40	0.2025972
2267004066	75	0.35076444
2267004066	100	0.46176
2267004066	175	0.686868
2267005055	175	0.62678
2267006005	40	0.15257024
2267006005	50	0.23142168
2267006005	75	0.31656312
2267006005	100	0.40900096
2267006005	175	0.6984416
2267006005	300	1.2056672
2267006005	600	1.871904
2267006010	40	0.1631367
2267006010	50	0.234876
2267006010	75	0.291042
2267006010	100	0.4148625
2267006010	175	0.5887218
2267006015	40	0.13124048
2267006015	75	0.25166512
2267006015	100	0.33852336
2267006015	175	0.5465936
2267006025	75	0.32018616
2267006025	100	0.40256
2267006025	175	0.65416
2267006030	40	0.2298995
2267006030	75	0.41514
2268002081	175	0.37296
2268003020	50	0.10656
2268003030	300	0.99826
2268003040	100	0.393606
2268003060	50	0.163392

CC	Power Class	N_2O
2268003060	75	0.251896
2268006005	40	0.15966536
2268006005	50	0.23987544
2268006005	75	0.30413408
2268006005	100	0.48010312
2268006005	175	0.7437296
2268006005	300	1.2066736
2268006005	600	1.9755632
2268006010	40	0.163392
2268006010	75	0.265512
2268006010	175	0.89355
2268006010	300	1.256076
2268006010	600	2.1613698
2268006015	75	0.215488
2268006015	175	0.613312
2268006020	75	0.43401
2268006020	100	0.573648
2268006020	175	0.917711
2268006020	300	1.522809
2268006020	600	2.527951
2270002003	25	0.0956154
2270002003	40	0.1432048
2270002003	50	0.19795444
2270002003	75	0.27488336
2270002003	100	0.3783139
2270002003	175	0.5876636
2270002003	300	0.9653226
2270002003	600	1.6892054
2270002006	6	0.0133644
2270002009	6	0.015709534
2270002009	11	0.027218828
2270002009	16	0.04524804
2270002009	25	0.0647537
2270002015	6	0.023742308
2270002015	11	0.03796237
2270002015	16	0.0591593
2270002015	25	0.08592288
2270002015	40	0.14198232
2270002015	50	0.20000646
2270002015	75	0.26519084
2270002015	100	0.37006216
2270002015	175	0.5771852

CC	Power Class	N_2O
2270002015	300	0.947422
2270002015	600	1.835903
2270002018	75	0.288156
2270002018	175	0.7020528
2270002018	300	1.0779654
2270002018	600	1.844635
2270002018	750	3.0020616
2270002018	1000	3.31816
2270002021	6	0.02017092
2270002021	11	0.0318718
2270002021	16	0.0641802
2270002021	25	0.08609752
2270002021	40	0.14765812
2270002021	75	0.2665443
2270002021	100	0.36338218
2270002021	175	0.5732558
2270002021	300	1.0050532
2270002021	600	2.00836
2270002024	11	0.0292522
2270002024	16	0.0580678
2270002024	25	0.09456756
2270002024	40	0.13835854
2270002024	50	0.1960334
2270002024	75	0.23982438
2270002024	100	0.3532094
2270002024	175	0.552299
2270002024	300	1.017278
2270002024	600	2.1506916
2270002024	750	3.115141
2270002024	1000	3.916302
2270002024	2000	6.741104
2270002027	6	0.0171828
2270002027	11	0.02474005
2270002027	16	0.04368886
2270002027	25	0.07057676
2270002027	40	0.09647824
2270002027	50	0.1342804
2270002027	75	0.18862896
2270002027	100	0.283198
2270002027	175	0.501165
2270002027	300	0.687312
2270002030	11	0.0419136

CC	Power Class	N_2O
2270002030	16	0.067673
2270002030	25	0.0943056
2270002030	40	0.1488806
2270002030	50	0.1966883
2270002030	75	0.26641332
2270002030	100	0.3787505
2270002030	175	0.5863538
2270002030	300	1.093683
2270002030	600	1.8101436
2270002030	750	3.2382622
2270002030	2000	6.549
2270002033	11	0.025456
2270002033	16	0.046139
2270002033	25	0.07471336
2270002033	40	0.10016936
2270002033	50	0.14296726
2270002033	75	0.1968067
2270002033	100	0.27085184
2270002033	175	0.4193876
2270002033	300	0.7611344
2270002033	600	1.4226722
2270002033	750	2.197171
2270002033	1000	2.765158
2270002033	1200	3.3411
2270002033	2000	4.773
2270002036	6	0.026196
2270002036	11	0.034783922
2270002036	16	0.05736924
2270002036	25	0.09404364
2270002036	40	0.1442963
2270002036	50	0.19983182
2270002036	75	0.2676358
2270002036	100	0.40023122
2270002036	175	0.6007616
2270002036	300	1.0185878
2270002036	600	1.7926796
2270002036	750	3.1409004
2270002036	1000	3.859544
2270002036	1200	5.2392
2270002036	2000	7.719088
2270002036	3000	10.2601
2270002039	11	0.04366

CC	Power Class	N_2O
2270002039	25	0.08784392
2270002039	40	0.14381604
2270002039	50	0.1886112
2270002039	75	0.2525731
2270002039	100	0.35569802
2270002039	175	0.5278494
2270002039	300	1.054389
2270002042	6	0.019037906
2270002042	11	0.025716924
2270002042	16	0.04162056
2270002042	25	0.06707656
2270002042	40	0.10430596
2270002042	75	0.18951992
2270002042	100	0.26556972
2270002042	175	0.4101598
2270002042	300	0.8053642
2270002042	600	1.2801186
2270002042	750	2.2423554
2270002045	40	0.1253708
2270002045	50	0.1326894
2270002045	75	0.203648
2270002045	100	0.28046148
2270002045	175	0.4620264
2270002045	300	0.7563614
2270002045	600	1.310984
2270002045	750	2.128758
2270002045	1000	2.8090696
2270002045	1200	3.407922
2270002048	50	0.2108778
2270002048	75	0.25995164
2270002048	100	0.36766086
2270002048	175	0.6147328
2270002048	300	1.0094192
2270002048	600	1.4922988
2270002048	750	3.2745
2270002051	175	0.700743
2270002051	300	1.0666138
2270002051	600	1.8332834
2270002051	750	3.0042446
2270002051	1000	3.789688
2270002051	1200	5.033998
2270002051	2000	7.802042

CC	Power Class	N_2O
2270002051	3000	10.583184
2270002054	25	0.06497644
2270002054	40	0.1021422
2270002054	50	0.1450992
2270002054	75	0.19327468
2270002054	100	0.28313436
2270002054	175	0.4209786
2270002054	300	0.7678166
2270002054	600	1.3466224
2270002054	750	2.1201666
2270002054	1000	2.92744
2270002057	16	0.058941
2270002057	25	0.0980167
2270002057	40	0.14564976
2270002057	50	0.19673196
2270002057	75	0.26815972
2270002057	100	0.3737296
2270002057	175	0.550116
2270002057	300	1.0002506
2270002057	600	1.5110726
2270002060	25	0.09967578
2270002060	40	0.15010308
2270002060	50	0.19839104
2270002060	75	0.2693822
2270002060	100	0.37320568
2270002060	175	0.5950858
2270002060	300	1.00418
2270002060	600	1.8311004
2270002060	750	3.0221452
2270002060	1000	3.7822658
2270002060	1200	4.724012
2270002060	2000	8.151322
2270002060	3000	9.792938
2270002066	16	0.024087
2270002066	25	0.03540012
2270002066	40	0.05048946
2270002066	50	0.07184142
2270002066	75	0.09706284
2270002066	100	0.13546218
2270002066	175	0.1875678
2270002066	300	0.3108
2270002069	75	0.25314068

CC	Power Class	N_2O
2270002069	100	0.38359676
2270002069	175	0.5942126
2270002069	300	1.028193
2270002069	600	1.8568598
2270002069	750	3.086762
2270002069	1000	4.029818
2270002069	1200	4.64979
2270002069	2000	6.431118
2270002072	11	0.014763
2270002072	16	0.02404038
2270002072	25	0.0315462
2270002072	40	0.05434338
2270002072	50	0.06983676
2270002072	75	0.08961918
2270002072	100	0.1310799
2270002072	175	0.1791762
2270002075	300	1.26614
2270002075	600	1.7913698
2270002075	750	2.951416
2270002075	1000	3.9634548
2270002075	1200	4.972874
2270002075	2000	6.618856
2270002075	3000	9.967578
2270002078	11	0.01554
2270002078	16	0.02223774
2270002078	25	0.0369075
2270002078	40	0.0499611
2270002078	50	0.075369
2270002078	75	0.0898212
2270002078	100	0.1327116
2270002078	175	0.1704738
2270002081	11	0.0344914
2270002081	16	0.06549
2270002081	25	0.0921226
2270002081	40	0.14905524
2270002081	50	0.19398138
2270002081	75	0.2613051
2270002081	100	0.36796648
2270002081	175	0.6011982
2270002081	300	1.0203342
2270002081	600	1.9323916
2270002081	750	3.1007332

CC	Power Class	N_2O
2270002081	1000	3.612865
2270002081	1200	5.2392
2270003010	11	0.012432
2270003010	16	0.02048172
2270003010	25	0.03361302
2270003010	40	0.0513597
2270003010	50	0.07064484
2270003010	75	0.09395484
2270003010	100	0.13031844
2270003010	175	0.175602
2270003020	16	0.06549
2270003020	25	0.10915
2270003020	40	0.15141288
2270003020	50	0.20528932
2270003020	75	0.26955684
2270003020	100	0.37320568
2270003020	175	0.5920296
2270003020	300	0.9618298
2270003020	600	1.5451274
2270003030	6	0.01591
2270003030	11	0.035002
2270003030	25	0.06901758
2270003030	40	0.11082906
2270003030	50	0.13886248
2270003030	75	0.19349742
2270003030	100	0.26047852
2270003030	175	0.4273426
2270003030	300	0.6895394
2270003030	600	1.1576116
2270003040	6	0.013895794
2270003040	11	0.03048356
2270003040	16	0.04365704
2270003040	25	0.07197684
2270003040	40	0.10335136
2270003040	50	0.14099442
2270003040	75	0.19508842
2270003040	100	0.27400202
2270003040	175	0.4149328
2270003040	300	0.7452244
2270003040	600	1.2390708
2270003040	750	2.0683
2270003050	40	0.0578088

CC	Power Class	N_2O
2270003050	75	0.10059042
2270003050	100	0.13431222
2270003050	175	0.2003106
2270003050	300	0.3810408
2270003050	600	0.6655782
2270003060	11	0.0305472
2270003060	16	0.04212968
2270003060	25	0.0618899
2270003060	40	0.10128306
2270003060	50	0.1428718
2270003060	75	0.181374
2270004031	6	0.018032394
2270004031	40	0.089096
2270004036	175	0.52503
2270004036	300	0.8012276
2270004036	600	1.2231608
2270004046	6	0.01591
2270004046	16	0.04492984
2270004046	25	0.06640834
2270004046	40	0.09953296
2270004046	50	0.14210812
2270004046	75	0.17526456
2270004046	100	0.26292866
2270004056	11	0.033411
2270004056	16	0.04652084
2270004056	25	0.06373546
2270004056	40	0.08378206
2270004056	50	0.141599
2270004056	100	0.25456
2270004066	25	0.07955
2270004066	40	0.1183704
2270004066	50	0.14993584
2270004066	75	0.19432474
2270004066	100	0.26878354
2270004066	175	0.3859766
2270004066	300	0.7690894
2270004066	600	1.3822608
2270004066	750	2.2366278
2270004066	1000	3.0158996
2270004066	1200	3.48429
2270004071	16	0.04314792
2270004071	25	0.0672993

CC	Power Class	N_2O
2270004071	40	0.11000174
2270004071	50	0.14468554
2270004071	75	0.20005234
2270004071	100	0.26671524
2270004071	175	0.359566
2270004076	16	0.04773
2270004076	25	0.0728678
2270004076	50	0.149554
2270004076	75	0.162282
2270004076	100	0.25456
2270004076	175	0.416842
2270005010	6	0.026196
2270005010	11	0.036381878
2270005015	25	0.09155502
2270005015	40	0.14180768
2270005015	50	0.20253874
2270005015	75	0.27147788
2270005015	100	0.37608724
2270005015	175	0.5832976
2270005015	300	1.032559
2270005015	600	1.8127632
2270005030	100	0.331816
2270005035	25	0.0986716
2270005035	40	0.13997396
2270005035	50	0.20943702
2270005035	75	0.27793956
2270005035	100	0.37652384
2270005035	175	0.5605944
2270005035	300	0.9893356
2270005035	600	1.565211
2270005045	75	0.30562
2270005045	100	0.37111
2270005045	175	0.5732558
2270005045	300	0.8732
2270005055	16	0.06278308
2270005055	25	0.09111842
2270005055	40	0.14006128
2270005055	50	0.19655732
2270005055	75	0.27348624
2270005055	100	0.3708917
2270005055	175	0.591593
2270005055	300	1.0059264

CC	Power Class	N_2O
2270005055	600	1.6376866
2270005060	25	0.06962216
2270005060	40	0.105006
2270005060	50	0.14344456
2270005060	75	0.19168368
2270005060	100	0.27323834
2270005060	175	0.4337066
2270005060	300	0.714359
2270005060	600	1.24098
2270006005	6	0.0170237
2270006005	11	0.026786076
2270006005	16	0.04314792
2270006005	25	0.06774478
2270006005	40	0.10640608
2270006005	50	0.14379458
2270006005	75	0.19079272
2270006005	100	0.27498844
2270006005	175	0.4317974
2270006005	300	0.757316
2270006005	600	1.3342126
2270006010	3	0.009546
2270006010	6	0.01662595
2270006010	11	0.026932448
2270006010	16	0.04368886
2270006010	25	0.06911304
2270006010	40	0.10920624
2270006010	50	0.14248996
2270006010	75	0.19849316
2270006010	100	0.27463842
2270006010	175	0.4212968
2270006010	300	0.7738624
2270006010	600	1.2651632
2270006015	6	0.017714194
2270006015	11	0.03013354
2270006015	16	0.04244788
2270006015	25	0.07216776
2270006015	40	0.106597
2270006015	50	0.14083532
2270006015	75	0.19333832
2270006015	100	0.26684252
2270006015	175	0.4111144
2270006015	300	0.7741806

CC	Power Class	N_2O
2270006015	600	1.3599868
2270006025	11	0.013742022
2270006025	16	0.02281272
2270006025	25	0.03308466
2270006025	40	0.05125092
2270006025	50	0.07185696
2270006025	75	0.09987558
2270006025	100	0.1314684
2270006025	175	0.2358972
2270006025	600	0.59052
2270006030	6	0.01648276
2270006030	11	0.028768462
2270006030	16	0.04445254
2270006030	25	0.06497644
2270006030	40	0.09937386
2270006030	50	0.14417642
2270006030	75	0.19518388
2270006030	100	0.28170246
2270006030	175	0.4082506
2270006030	300	0.7197684
2270006030	600	1.322121
2270006030	750	2.1920798
2270007015	40	0.15486202
2270007015	50	0.19616438
2270007015	75	0.28418294
2270007015	100	0.38839936
2270007015	175	0.598142
2270007015	300	0.9832232
2270007015	600	1.8393958
2270007015	750	3.0094838
2270008005	11	0.0333999
2270008005	16	0.067673
2270008005	25	0.10915
2270008005	40	0.14172036
2270008005	50	0.18695212
2270008005	75	0.26733018
2270008005	100	0.3728564
2270008005	175	0.5920296
2270008005	300	0.9989408
2270008005	600	1.9358844
2270008005	750	2.912122
2270008005	1200	4.675986

CC	Power Class	N_2O
2270010010	40	0.11706578
2270010010	75	0.19944776
2270010010	100	0.27979326
2270010010	175	0.4349794
2270010010	300	0.8123646
2270010010	600	1.2788458
2270010010	750	2.1691694
2270010010	1000	2.8233886
2270010010	1200	3.53202
2270010010	2000	4.747544
2285002015	11	0.01292928
2285002015	16	0.02195802
2285002015	25	0.027195
2285002015	40	0.05181036
2285002015	50	0.06856248
2285002015	75	0.09263394
2285002015	100	0.13650336
2285002015	175	0.208236
2285002015	300	0.363636
2285002015	600	0.7042728
2285002015	750	1.0710168
2285004015	3	0.013764
2285004015	6	0.01614976
2285004015	11	0.03023492
2285004015	16	0.05537716
2285004015	25	0.08345572
2285004015	40	0.1520922
2285006015	40	0.1520922

Table 20 - Fuel consumption

SCC	PowerClass	Fuel used
2260002006	6	1.695375
2260002009	3	0.7455129
2260002021	3	0.88411854
2260002027	3	1.302048
2260002054	3	1.25766
2260004016	1	0.3146616
2260004016	3	0.8266032
2260004021	3	1.214094
2260004021	6	2.2532664
2260004026	3	1.047228
2260004026	6	2.468466
2260004031	3	1.0894788
2260004031	6	2.6425656
2260004036	3	0.8403717
2260004036	6	1.3481622
2260004071	3	1.4796
2260005035	1	0.470184
2260005035	3	1.3715481
2260006005	1	0.447168
2260006005	3	0.92955048
2260006010	1	0.56207538
2260006010	3	1.13322564
2260006010	40	12.69048
2260006010	75	18.3678
2260006015	3	1.01684688
2260007005	11	2.898336
2265002003	6	2.902482
2265002003	11	3.74313984
2265002003	16	5.0400768
2265002003	25	8.366688
2265002003	40	10.14222
2265002003	75	19.9362504
2265002006	11	2.5140192
2265002009	6	1.9933089
2265002009	11	2.75044
2265002009	16	4.236848
2265002015	11	3.35532096
2265002015	16	5.5865472
2265002015	25	7.1923968

SCC	PowerClass	Fuel used
2265002015	40	11.0489456
2265002015	75	18.2328608
2265002015	100	24.90664
2265002021	6	2.49085728
2265002021	11	3.0616752
2265002021	16	4.7566272
2265002021	25	7.1744
2265002021	40	10.451496
2265002021	75	18.84696
2265002024	6	2.0783448
2265002024	11	2.65685056
2265002024	16	4.6505312
2265002024	25	5.675376
2265002024	40	7.1717184
2265002024	75	15.65256
2265002027	6	2.97813888
2265002027	11	3.61152
2265002027	25	7.87968
2265002030	3	1.62756
2265002030	6	2.82707172
2265002030	11	3.56457024
2265002030	16	5.3932032
2265002030	25	7.744704
2265002030	40	9.5832
2265002030	75	19.7062536
2265002030	100	25.5552
2265002033	1	0.584442
2265002033	3	1.43448042
2265002033	6	3.12286842
2265002033	11	4.20472128
2265002033	16	7.68512
2265002033	25	10.2356192
2265002033	40	12.0022804
2265002033	75	23.4539624
2265002033	175	45.156716
2265002039	11	4.0476384
2265002039	16	6.9618432
2265002039	25	9.2049984
2265002039	40	13.1339208
2265002039	75	24.8332656
2265002042	3	1.4015922
2265002042	6	2.5315956

SCC	PowerClass	Fuel used
2265002042	11	3.00356256
2265002042	16	4.8498944
2265002042	25	6.4103264
2265002045	11	2.28608
2265002045	16	4.0063552
2265002045	25	5.1894016
2265002045	40	8.41676
2265002045	75	15.7052192
2265002045	175	26.205696
2265002054	6	3.0190827
2265002054	11	4.615024
2265002054	16	8.2688
2265002054	75	25.724842
2265002057	25	8.80992
2265002057	40	8.84268
2265002057	75	20.094228
2265002057	100	24.3936
2265002057	175	34.547436
2265002060	40	12.71468
2265002060	75	24.192256
2265002060	175	38.83132
2265002066	11	3.151872
2265002066	25	5.5683072
2265002066	40	6.9696
2265002066	75	14.17152
2265002066	100	18.5856
2265002072	16	5.6175552
2265002072	25	6.4921024
2265002072	40	8.9633896
2265002072	75	15.2823968
2265002072	100	22.17688
2265002078	6	1.6716192
2265002078	11	2.1238656
2265002078	16	3.0611584
2265002078	25	4.6715072
2265002078	75	13.09704
2265002081	25	5.25312
2265002081	175	29.27232
2265003010	11	2.258416
2265003010	16	4.0245952
2265003010	25	5.9096384
2265003010	40	6.9508208

SCC	PowerClass	Fuel used
2265003020	40	5.244624
2265003020	50	6.557232
2265003020	75	9.114204
2265003020	100	12.927156
2265003020	175	21.01044
2265003020	300	31.33416
2265003030	6	2.7634407
2265003030	11	4.2542064
2265003030	16	6.410448
2265003030	25	7.8695264
2265003030	40	10.9655524
2265003030	50	15.80744
2265003030	75	21.769594
2265003030	100	30.9276
2265003030	175	51.546
2265003030	600	141.23604
2265003040	6	1.90380132
2265003040	11	2.97556416
2265003040	16	4.4421696
2265003040	25	5.9885568
2265003040	40	7.8721632
2265003040	75	15.9325056
2265003040	100	20.9088
2265003040	175	35.54496
2265003040	300	50.9652
2265003050	3	1.30698
2265003050	25	5.8389888
2265003050	75	16.16076
2265003050	100	22.06072
2265003060	11	2.51712
2265003060	16	3.63584
2265003060	25	5.03424
2265004011	3	0.691713
2265004011	6	1.112166
2265004011	11	1.2519936
2265004016	6	1.5493056
2265004026	6	2.468466
2265004026	11	4.370912
2265004026	16	8.85248
2265004026	25	9.95904
2265004031	6	2.627112
2265004031	11	4.743616

SCC	PowerClass	Fuel used
2265004031	16	8.115584
2265004031	25	12.00192
2265004031	40	14.10376
2265004031	75	27.8481016
2265004031	175	54.959168
2265004036	11	1.8511472
2265004036	16	2.679152
2265004041	6	1.5945978
2265004041	11	2.11470912
2265004041	16	2.9134144
2265004041	25	4.2187904
2265004046	11	3.1616
2265004046	16	5.323344
2265004046	25	6.7184
2265004046	40	10.152142
2265004051	3	1.9635936
2265004051	6	3.179496
2265004056	6	1.80912336
2265004056	11	2.6043072
2265004056	16	3.6409472
2265004056	25	4.9250432
2265004066	6	2.24406
2265004066	11	4.64328384
2265004066	16	7.2653568
2265004066	25	9.508512
2265004066	40	13.250952
2265004066	75	22.9418904
2265004066	100	30.2016
2265004066	175	44.92488
2265004071	6	2.5730244
2265004071	11	3.1996608
2265004071	16	5.103552
2265004071	25	7.051584
2265004071	40	7.910496
2265004071	75	17.304936
2265004076	1	0.43575864
2265004076	3	1.1156184
2265004076	6	2.32039092
2265004076	11	2.89446912
2265004076	16	5.4800256
2265004076	25	7.0669056
2265004076	40	10.1171488

SCC	PowerClass	Fuel used
2265004076	75	18.52752
2265004076	100	24.14192
2265004076	175	31.72136
2265005010	11	3.08994112
2265005010	16	5.3490624
2265005015	25	7.689984
2265005015	40	9.15244
2265005015	100	24.6455704
2265005015	175	37.51
2265005030	6	2.36736
2265005030	11	2.68667904
2265005030	16	4.66944
2265005030	25	5.25312
2265005035	6	2.334891
2265005035	11	3.2422208
2265005035	16	5.86872
2265005035	25	8.105552
2265005035	40	10.469888
2265005035	75	19.5052
2265005035	100	28.273102
2265005035	175	40.99238
2265005040	11	3.23803168
2265005040	16	6.3715968
2265005045	100	20.1344
2265005045	175	30.679792
2265005055	6	2.188164
2265005055	11	3.056416
2265005055	16	4.718384
2265005055	25	6.233216
2265005055	40	8.579626
2265005055	75	16.605556
2265005055	100	23.436248
2265005055	175	44.56188
2265005055	300	61.25262
2265005060	11	3.2532864
2265005060	75	17.33688
2265005060	100	23.3046
2265005060	175	34.9932
2265005060	300	61.04208
2265006005	6	2.55277032
2265006005	11	3.64488704
2265006005	16	5.9287296

SCC	PowerClass	Fuel used
2265006005	25	8.5664768
2265006010	6	2.62661058
2265006010	11	3.49753824
2265006010	16	6.2130912
2265006010	25	7.698192
2265006010	40	10.670022
2265006010	50	15.36216
2265006010	75	20.237976
2265006010	100	27.13425
2265006010	175	38.505588
2265006015	6	2.38814016
2265006015	11	3.379264
2265006015	16	4.6407424
2265006015	25	6.3567616
2265006015	40	8.5838368
2265006015	75	16.4602592
2265006015	100	22.1412576
2265006015	175	35.750176
2265006025	6	3.33922704
2265006025	11	3.85574144
2265006025	16	6.4951424
2265006025	25	7.524608
2265006025	75	20.9419056
2265006025	100	26.3296
2265006025	175	42.7856
2265006030	3	2.0961
2265006030	6	3.3726249
2265006030	11	4.7049472
2265006030	16	7.302384
2265006030	25	9.71584
2265006030	40	15.03667
2265006030	75	27.1524
2265007010	11	3.9481088
2265007010	16	6.138368
2265007010	25	10.000384
2265007015	6	3.1647
2265007015	11	3.8304
2267002003	40	10.14222
2267002003	75	19.9362504
2267002015	40	11.0489456
2267002015	75	18.2328608
2267002015	100	24.90664

SCC	PowerClass	Fuel used
2267002021	40	10.451496
2267002021	75	18.84696
2267002024	40	7.1717184
2267002024	75	15.65256
2267002030	40	9.5832
2267002030	75	19.7062536
2267002030	100	25.5552
2267002033	40	12.0022804
2267002033	75	23.4539624
2267002033	175	45.156716
2267002039	40	13.1339208
2267002039	75	24.8332656
2267002045	40	8.41676
2267002045	75	15.7052192
2267002045	175	26.205696
2267002054	75	25.724842
2267002057	40	8.84268
2267002057	75	20.094228
2267002057	100	24.3936
2267002057	175	34.547436
2267002060	40	12.71468
2267002060	75	24.192256
2267002060	175	38.83132
2267002066	40	6.9696
2267002066	75	14.17152
2267002066	100	18.5856
2267002072	40	8.9633896
2267002072	75	15.3216976
2267002072	100	22.17688
2267002081	175	29.27232
2267003010	40	6.9508208
2267003010	75	13.3316832
2267003010	175	24.82436
2267003020	40	4.855488
2267003020	50	6.596436
2267003020	75	8.447736
2267003020	100	11.591316
2267003020	175	19.0938
2267003020	300	31.33416
2267003030	40	10.65284
2267003030	50	16.15108
2267003030	75	21.769594

SCC	PowerClass	Fuel used
2267003030	100	30.9276
2267003030	175	51.546
2267003030	600	141.23604
2267003040	40	7.8721632
2267003040	75	15.9325056
2267003040	100	20.9088
2267003040	175	35.54496
2267003040	300	50.9652
2267003050	75	13.749472
2267003050	100	22.06072
2267004066	40	13.250952
2267004066	75	22.9418904
2267004066	100	30.2016
2267004066	175	44.92488
2267005055	175	40.9948
2267006005	40	9.9789184
2267006005	50	15.1362288
2267006005	75	20.7049392
2267006005	100	26.7508736
2267006005	175	45.681856
2267006005	300	78.857152
2267006005	600	122.43264
2267006010	40	10.670022
2267006010	50	15.36216
2267006010	75	19.03572
2267006010	100	27.13425
2267006010	175	38.505588
2267006015	40	8.5838368
2267006015	75	16.4602592
2267006015	100	22.1412576
2267006015	175	35.750176
2267006025	75	20.9419056
2267006025	100	26.3296
2267006025	175	42.7856
2267006030	40	15.03667
2267006030	75	27.1524
2268002081	175	24.3936
2268003020	50	6.9696
2268003030	300	65.2916
2268003040	100	25.74396
2268003060	50	10.68672
2268003060	75	16.47536

SCC	PowerClass	Fuel used
2268006005	40	10.4429776
2268006005	50	15.6891504
2268006005	75	19.8920128
2268006005	100	31.4013392
2268006005	175	48.643936
2268006005	300	78.922976
2268006005	600	129.212512
2268006010	40	10.68672
2268006010	75	17.36592
2268006010	175	58.443
2268006010	300	82.15416
2268006010	600	141.365268
2268006015	75	14.09408
2268006015	175	40.11392
2268006020	75	28.3866
2268006020	100	37.51968
2268006020	175	60.02326
2268006020	300	99.59994
2268006020	600	165.34166
2270002003	25	7.855968
2270002003	40	9.366368
2270002003	50	12.9472904
2270002003	75	18.15864618
2270002003	100	24.99121174
2270002003	175	38.82073976
2270002003	300	63.76868916
2270002003	600	111.5879956
2270002006	6	1.484532
2270002009	6	1.74503202
2270002009	11	2.23635776
2270002009	16	3.7176768
2270002009	25	5.320304
2270002015	6	2.63732124
2270002015	11	3.1190704
2270002015	16	4.860656
2270002015	25	7.0596096
2270002015	40	9.2864112
2270002015	50	13.0815036
2270002015	75	17.51836354
2270002015	100	24.44610626
2270002015	175	38.12854232
2270002015	300	62.5861852

SCC	PowerClass	Fuel used
2270002015	600	121.2787598
2270002018	75	19.0354296
2270002018	175	46.37722848
2270002018	300	71.20981164
2270002018	600	121.855591
2270002018	750	198.3145666
2270002018	1000	219.195856
2270002021	6	2.2406076
2270002021	11	2.618656
2270002021	16	5.273184
2270002021	25	7.0739584
2270002021	40	9.6576392
2270002021	75	17.60777238
2270002021	100	24.00483039
2270002021	175	37.86896828
2270002021	300	66.39327112
2270002021	600	132.671176
2270002024	11	2.403424
2270002024	16	4.770976
2270002024	25	7.7698752
2270002024	40	9.0493964
2270002024	50	12.821644
2270002024	75	15.84266891
2270002024	100	23.33282204
2270002024	175	36.4845734
2270002024	300	67.2008348
2270002024	600	142.0735246
2270002024	750	205.7845306
2270002024	1000	258.7087932
2270002024	2000	445.3136864
2270002027	6	1.908684
2270002027	11	2.032696
2270002027	16	3.5895712
2270002027	25	5.7987392
2270002027	40	6.3101984
2270002027	50	8.782664
2270002027	75	12.3373536
2270002027	100	18.52268
2270002027	175	32.7789
2270002027	300	44.95392
2270002030	11	3.443712
2270002030	16	5.56016

SCC	PowerClass	Fuel used
2270002030	25	7.748352
2270002030	40	9.737596
2270002030	50	12.864478
2270002030	75	17.59911991
2270002030	100	25.0200533
2270002030	175	38.73421508
2270002030	300	72.2481078
2270002030	600	119.5771078
2270002030	750	213.9178505
2270002030	2000	432.6234
2270002033	11	2.09152
2270002033	16	3.79088
2270002033	25	6.1386112
2270002033	40	6.5516176
2270002033	50	9.3508316
2270002033	75	12.872222
2270002033	100	17.7151744
2270002033	175	27.430216
2270002033	300	49.782304
2270002033	600	93.050452
2270002033	750	143.70686
2270002033	1000	180.85628
2270002033	1200	218.526
2270002033	2000	312.18
2270002036	6	2.90988
2270002036	11	2.85792224
2270002036	16	4.7135808
2270002036	25	7.7268288
2270002036	40	9.437758
2270002036	50	13.0700812
2270002036	75	17.67987628
2270002036	100	26.43905805
2270002036	175	39.68598656
2270002036	300	67.28735948
2270002036	600	118.4234454
2270002036	750	207.4861826
2270002036	1000	254.9593904
2270002036	1200	346.09872
2270002036	2000	509.9187808
2270002036	3000	677.77666
2270002039	11	3.5872
2270002039	25	7.2174464

SCC	PowerClass	Fuel used
2270002039	40	9.4063464
2270002039	50	12.336192
2270002039	75	16.68484246
2270002039	100	23.49721893
2270002039	175	34.86944604
2270002039	300	69.6523674
2270002042	6	2.11475118
2270002042	11	2.11295808
2270002042	16	3.4196352
2270002042	25	5.5111552
2270002042	40	6.8221736
2270002042	75	12.3956272
2270002042	100	17.3696952
2270002042	175	26.826668
2270002042	300	52.675172
2270002042	600	83.726676
2270002042	750	146.662164
2270002045	40	8.199928
2270002045	50	8.678604
2270002045	75	13.31968
2270002045	100	18.3436968
2270002045	175	30.219024
2270002045	300	49.470124
2270002045	600	85.74544
2270002045	750	139.23228
2270002045	1000	183.728336
2270002045	1200	222.89652
2270002048	50	13.792548
2270002048	75	17.17226482
2270002048	100	24.28747768
2270002048	175	40.60891648
2270002048	300	66.68168672
2270002048	600	98.58045208
2270002048	750	216.3117
2270002051	175	46.2907038
2270002051	300	70.45993108
2270002051	600	121.1057104
2270002051	750	198.4587744
2270002051	1000	250.3447408
2270002051	1200	332.5431868
2270002051	2000	515.3986772
2270002051	3000	699.1194144

SCC	PowerClass	Fuel used
2270002054	25	5.3386048
2270002054	40	6.680652
2270002054	50	9.490272
2270002054	75	12.6412088
2270002054	100	18.5185176
2270002054	175	27.534276
2270002054	300	50.219356
2270002054	600	88.076384
2270002054	750	138.670356
2270002054	1000	191.4704
2270002057	16	4.84272
2270002057	25	8.053264
2270002057	40	9.5262816
2270002057	50	12.8673336
2270002057	75	17.71448615
2270002057	100	24.68837536
2270002057	175	36.3403656
2270002057	300	66.07601396
2270002057	600	99.82063916
2270002060	25	8.1895776
2270002060	40	9.8175528
2270002060	50	12.9758464
2270002060	75	17.79524252
2270002060	100	24.65376549
2270002060	175	39.31104628
2270002060	300	66.335588
2270002060	600	120.9615026
2270002060	750	199.6412783
2270002060	1000	249.8544343
2270002060	1200	312.0656792
2270002060	2000	538.4719252
2270002060	3000	646.9161908
2270002066	16	1.97904
2270002066	25	2.9085504
2270002066	40	3.3022836
2270002066	50	4.6988172
2270002066	75	7.491152592
2270002066	100	10.45475138
2270002066	175	14.47617864
2270002066	300	23.98704
2270002069	75	16.72233649
2270002069	100	25.34019462

SCC	PowerClass	Fuel used
2270002069	175	39.25336316
2270002069	300	67.9218738
2270002069	600	122.6631547
2270002069	750	203.9098292
2270002069	1000	266.2075988
2270002069	1200	307.162614
2270002069	2000	424.8361788
2270002072	11	1.21296
2270002072	16	1.9752096
2270002072	25	2.591904
2270002072	40	3.5543508
2270002072	50	4.5677016
2270002072	75	6.916662984
2270002072	100	10.11653412
2270002072	175	13.82852856
2270002075	300	83.640524
2270002075	600	118.3369207
2270002075	750	194.9689456
2270002075	1000	261.8236817
2270002075	1200	328.5053684
2270002075	2000	437.2380496
2270002075	3000	658.4528148
2270002078	11	1.2768
2270002078	16	1.8271008
2270002078	25	3.0324
2270002078	40	3.267726
2270002078	50	4.92954
2270002078	75	6.93225456
2270002078	100	10.24246608
2270002078	175	13.15689144
2270002081	11	2.833888
2270002081	16	5.3808
2270002081	25	7.568992
2270002081	40	9.7490184
2270002081	50	12.6874308
2270002081	75	17.26167366
2270002081	100	24.30766677
2270002081	175	39.71482812
2270002081	300	67.40272572
2270002081	600	127.6527446
2270002081	750	204.8327591
2270002081	1000	238.663909

SCC	PowerClass	Fuel used
2270002081	1200	346.09872
2270003010	11	1.02144
2270003010	16	1.6828224
2270003010	25	2.7617184
2270003010	40	3.359202
2270003010	50	4.6205544
2270003010	75	7.251282192
2270003010	100	10.05776587
2270003010	175	13.5526776
2270003020	16	5.3808
2270003020	25	8.968
2270003020	40	9.9032208
2270003020	50	13.4270312
2270003020	75	17.80677914
2270003020	100	24.65376549
2270003020	175	39.10915536
2270003020	300	63.53795668
2270003020	600	102.0702808
2270003030	6	1.7673
2270003030	11	2.87584
2270003030	25	5.6706336
2270003030	40	7.2488196
2270003030	50	9.0823568
2270003030	75	12.6557772
2270003030	100	17.0367032
2270003030	175	27.950516
2270003030	300	45.099604
2270003030	600	75.714056
2270003040	6	1.54355982
2270003040	11	2.5045952
2270003040	16	3.5869568
2270003040	25	5.9137728
2270003040	40	6.7597376
2270003040	50	9.2217972
2270003040	75	12.7598372
2270003040	100	17.9212132
2270003040	175	27.138848
2270003040	300	48.741704
2270003040	600	81.041928
2270003040	750	135.278
2270003050	40	3.781008
2270003050	75	7.763405496

SCC	PowerClass	Fuel used
2270003050	100	10.36599934
2270003050	175	15.45964728
2270003050	300	29.40811104
2270003050	600	51.36824616
2270003060	11	2.509824
2270003060	16	3.4614656
2270003060	25	5.085008
2270003060	40	6.6244596
2270003060	50	9.344588
2270003060	75	11.86284
2270004031	6	2.00305782
2270004031	40	5.82736
2270004036	175	34.3398
2270004036	300	52.404616
2270004036	600	80.001328
2270004046	6	1.7673
2270004046	16	3.6915328
2270004046	25	5.4562528
2270004046	40	6.5099936
2270004046	50	9.2946392
2270004046	75	11.4632496
2270004046	100	17.1969556
2270004056	11	2.74512
2270004056	16	3.8222528
2270004056	25	5.2366432
2270004056	40	5.4797996
2270004056	50	9.26134
2270004056	100	16.6496
2270004066	25	6.536
2270004066	40	7.742064
2270004066	50	9.8066144
2270004066	75	12.7098884
2270004066	100	17.5798964
2270004066	175	25.244956
2270004066	300	50.302604
2270004066	600	90.407328
2270004066	750	146.287548
2270004066	1000	197.256136
2270004066	1200	227.8914
2270004071	16	3.5451264
2270004071	25	5.529456
2270004071	40	7.1947084

SCC	PowerClass	Fuel used
2270004071	50	9.4632164
2270004071	75	13.0845044
2270004071	100	17.4446184
2270004071	175	23.51756
2270004076	16	3.9216
2270004076	25	5.986976
2270004076	50	9.78164
2270004076	75	10.61412
2270004076	100	16.6496
2270004076	175	27.26372
2270005010	6	2.90988
2270005010	11	2.98921376
2270005015	25	7.5223584
2270005015	40	9.2749888
2270005015	50	13.2471284
2270005015	75	17.93368201
2270005015	100	24.84411978
2270005015	175	38.53232416
2270005015	300	68.2102894
2270005015	600	119.7501571
2270005030	100	21.9195856
2270005035	25	8.107072
2270005035	40	9.1550536
2270005035	50	13.6983132
2270005035	75	18.3605371
2270005035	100	24.87296134
2270005035	175	37.03256304
2270005035	300	65.35497496
2270005035	600	103.3969926
2270005045	75	20.189092
2270005045	100	24.515326
2270005045	175	37.86896828
2270005045	300	57.68312
2270005055	16	5.1583936
2270005055	25	7.4864864
2270005055	40	9.1607648
2270005055	50	12.8559112
2270005055	75	18.06635318
2270005055	100	24.50090522
2270005055	175	39.0803138
2270005055	300	66.45095424
2270005055	600	108.1846916

SCC	PowerClass	Fuel used
2270005060	25	5.7203072
2270005060	40	6.86796
2270005060	50	9.3820496
2270005060	75	12.5371488
2270005060	100	17.8712644
2270005060	175	28.366756
2270005060	300	46.72294
2270005060	600	81.1668
2270006005	6	1.891011
2270006005	11	2.20080192
2270006005	16	3.5451264
2270006005	25	5.5660576
2270006005	40	6.9595328
2270006005	50	9.4049428
2270006005	75	12.4788752
2270006005	100	17.9857304
2270006005	175	28.241884
2270006005	300	49.53256
2270006005	600	87.264716
2270006010	3	1.06038
2270006010	6	1.8468285
2270006010	11	2.21282816
2270006010	16	3.5895712
2270006010	25	5.6784768
2270006010	40	7.1426784
2270006010	50	9.3196136
2270006010	75	12.9825256
2270006010	100	17.9628372
2270006010	175	27.555088
2270006010	300	50.614784
2270006010	600	82.748512
2270006015	6	1.96771182
2270006015	11	2.4758368
2270006015	16	3.4876096
2270006015	25	5.9294592
2270006015	40	6.97202
2270006015	50	9.2113912
2270006015	75	12.6453712
2270006015	100	17.4529432
2270006015	175	26.889104
2270006015	300	50.635596
2270006015	600	88.950488

SCC	PowerClass	Fuel used
2270006025	11	1.12907424
2270006025	16	1.8743424
2270006025	25	2.7183072
2270006025	40	3.3520872
2270006025	50	4.6998336
2270006025	75	7.708235304
2270006025	100	10.14651792
2270006025	175	18.20616336
2270006025	600	45.575376
2270006030	6	1.8309228
2270006030	11	2.36367904
2270006030	16	3.6523168
2270006030	25	5.3386048
2270006030	40	6.4995876
2270006030	50	9.4299172
2270006030	75	12.7660808
2270006030	100	18.4248636
2270006030	175	26.701796
2270006030	300	47.076744
2270006030	600	86.47386
2270006030	750	143.373868
2270007015	40	10.1288132
2270007015	50	12.8302108
2270007015	75	18.7729714
2270007015	100	25.65745178
2270007015	175	39.5129372
2270007015	300	64.95119312
2270007015	600	121.5094923
2270007015	750	198.8048731
2270008005	11	2.744208
2270008005	16	5.56016
2270008005	25	8.968
2270008005	40	9.2692776
2270008005	50	12.2276792
2270008005	75	17.65968719
2270008005	100	24.63069224
2270008005	175	39.10915536
2270008005	300	65.98948928
2270008005	600	127.883477
2270008005	750	192.3732052
2270008005	1200	308.8931076
2270010010	40	7.6567348

SCC	PowerClass	Fuel used
2270010010	75	13.0449616
2270010010	100	18.2999916
2270010010	175	28.450004
2270010010	300	53.133036
2270010010	600	83.643428
2270010010	750	141.875404
2270010010	1000	184.664876
2270010010	1200	231.0132
2270010010	2000	310.51504
2285002015	11	1.0622976
2285002015	16	1.8041184
2285002015	25	2.2344
2285002015	40	3.3886776
2285002015	50	4.4843568
2285002015	75	7.149337272
2285002015	100	10.53510797
2285002015	175	16.0713168
2285002015	300	28.0648368
2285002015	600	54.35463264
2285002015	750	82.65933984
2285004015	3	1.52892
2285004015	6	1.7939328
2285004015	11	2.4841664
2285004015	16	4.5499072
2285004015	25	6.8569024
2285004015	40	9.947652
2285006015	40	9.947652

Table 21 - Upstream GHG factors

Fuel	Fuel Type	Pollutant	Upstream_Rate
2260	Gasoline (2 Stroke)	CO2	326.721
2260	Gasoline (2 Stroke)	CH4	1.994
2260	Gasoline (2 Stroke)	N2O	0.005
2260	Gasoline (2 Stroke)	PM25	0.073
2260	Gasoline (2 Stroke)	BC	0.010
2265	Gasoline (4 Stroke)	CO2	326.721
2265	Gasoline (4 Stroke)	CH4	1.994
2265	Gasoline (4 Stroke)	N2O	0.005
2265	Gasoline (4 Stroke)	PM25	0.073
2265	Gasoline (4 Stroke)	BC	0.010
2270	Low Sulfur Diesel	CO2	210.103
2270	Low Sulfur Diesel	CH4	4.518
2270	Low Sulfur Diesel	N2O	0.003
2270	Low Sulfur Diesel	PM25	0.049
2270	Low Sulfur Diesel	BC	0.007
2267	LPG	CO2	184.241
2267	LPG	CH4	2.310
2267	LPG	N2O	0.003
2267	LPG	PM25	0.030
2267	LPG	BC	0.004
2268	CNG	CO2	313.894
2268	CNG	CH4	2.118
2268	CNG	N2O	0.005
2268	CNG	PM25	0.070
2268	CNG	BC	0.010
2231	2 Stroke Gasoline (10% Ethanol RFG)	CO2	276.288
2231	2 Stroke Gasoline (10% Ethanol RFG)	CH4	1.991
2231	2 Stroke Gasoline (10% Ethanol RFG)	N2O	0.055
2231	2 Stroke Gasoline (10% Ethanol RFG)	PM25	0.091
2231	2 Stroke Gasoline (10% Ethanol RFG)	BC	0.013
2232	4 Stroke Gasoline (10% Ethanol RFG)	CO2	276.288
2232	4 Stroke Gasoline (10% Ethanol RFG)	CH4	1.991
2232	4 Stroke Gasoline (10% Ethanol RFG)	N2O	0.055
2232	4 Stroke Gasoline (10% Ethanol RFG)	PM25	0.091
2232	4 Stroke Gasoline (10% Ethanol RFG)	BC	0.013
2233	20% Biodiesel	CO2	23.657
2233	20% Biodiesel	CH4	1.730
2233	20% Biodiesel	N2O	0.041
2233	20% Biodiesel	PM25	0.491
2233	20% Biodiesel	BC	0.069

Table 22 - Equipment description

SCC	Equipment Description
2260001010	2-Stroke Motorcycles: Off-Road
2260001020	2-Stroke Snowmobiles
2260001030	2-Stroke All Terrain Vehicles
2260001050	2-Stroke Golf Carts
2260001060	2-Stroke Specialty Vehicle Carts
2260002003	2-Stroke Asphalt Pavers
2260002006	2-Stroke Tampers/Rammers
2260002009	2-Stroke Plate Compactors
2260002012	2-Stroke Concrete Pavers
2260002015	2-Stroke Rollers
2260002018	2-Stroke Scrapers
2260002021	2-Stroke Paving Equipment
2260002024	2-Stroke Surfacing Equipment
2260002027	2-Stroke Signal Boards
2260002030	2-Stroke Trenchers
2260002033	2-Stroke Bore/Drill Rigs
2260002036	2-Stroke Excavators
2260002039	2-Stroke Concrete/Industrial Saws
2260002042	2-Stroke Cement & Mortar Mixers
2260002045	2-Stroke Cranes
2260002048	2-Stroke Graders
2260002051	2-Stroke Off-highway Trucks
2260002054	2-Stroke Crushing/Proc. Equipment
2260002057	2-Stroke Rough Terrain Forklifts
2260002060	2-Stroke Rubber Tire Loaders
2260002063	2-Stroke Rubber Tire Dozers
2260002066	2-Stroke Tractors/Loaders/Backhoes
2260002069	2-Stroke Crawler Dozer
2260002072	2-Stroke Skid Steer Loaders
2260002075	2-Stroke Off-Highway Tractors
2260002078	2-Stroke Dumpers/Tenders
2260002081	2-Stroke Other Construction Equipment
2260003010	2-Stroke Aerial Lifts
2260003020	2-Stroke Forklifts
2260003030	2-Stroke Sweepers/Scrubbers
2260003040	2-Stroke Other General Industrial Equipment
2260003050	2-Stroke Other Material Handling Equipment
2260003060	2-Stroke Refrigeration

SCC	Equipment Description
2260003070	2-Stroke Terminal Tractors
2260004010	2-Stroke Lawn mowers (Residential)
2260004011	2-Stroke Lawn mowers (Commercial)
2260004015	2-Stroke Rotary Tillers < 6 HP (Residential)
2260004016	2-Stroke Rotary Tillers < 6 HP (Commercial)
2260004020	2-Stroke Chain Saws < 6 HP (Residential)
2260004021	2-Stroke Chain Saws < 6 HP (Commercial)
2260004025	2-Stroke Trimmers/Edgers/Brush Cutters
2260004026	2-Stroke Trimmers/Edgers/Brush Cutters
2260004030	2-Stroke Leafblowers/Vacuums (Residential)
2260004031	2-Stroke Leafblowers/Vacuums (Commercial)
2260004035	2-Stroke Snowblowers (Residential)
2260004036	2-Stroke Snowblowers (Commercial)
2260004040	2-Stroke Rear Engine Riding Mowers (Res.)
2260004041	2-Stroke Rear Engine Riding Mowers (Comm.)
2260004045	2-Stroke Front Mowers (Residential)
2260004046	2-Stroke Front Mowers (Commercial)
2260004050	2-Stroke Shredders < 6 HP (Residential)
2260004051	2-Stroke Shredders < 6 HP (Commercial)
2260004055	2-Stroke Lawn & Garden Tractors (Residential)
2260004056	2-Stroke Lawn & Garden Tractors (Commercial)
2260004060	2-Stroke Wood Splitters (Residential)
2260004061	2-Stroke Wood Splitters (Commercial)
2260004065	2-Stroke Chippers/Stump Grinders (Res.)
2260004066	2-Stroke Chippers/Stump Grinders (Comm.)
2260004070	2-Stroke Commercial Turf Equipment (Res.)
2260004071	2-Stroke Commercial Turf Equipment (Comm)
2260004075	2-Stroke Other Lawn & Garden Equipment
2260004076	2-Stroke Other Lawn & Garden Equipment
2260005010	2-Stroke 2-Wheel Tractors
2260005015	2-Stroke Agricultural Tractors
2260005020	2-Stroke Combines
2260005025	2-Stroke Balers
2260005030	2-Stroke Agricultural Mowers
2260005035	2-Stroke Sprayers
2260005040	2-Stroke Tillers > 6 HP
2260005045	2-Stroke Swathers
2260005050	2-Stroke Hydro Power Units
2260005055	2-Stroke Other Agricultural Equipment
2260005060	2-Stroke Irrigation Sets
2260006005	2-Stroke Light Commercial Generator Set

SCC	Equipment Description
2260006010	2-Stroke Light Commercial Pumps
2260006015	2-Stroke Light Commercial Air Compressors
2260006020	2-Stroke Light Commercial Gas Compressors
2260006025	2-Stroke Light Commercial Welders
2260006030	2-Stroke Light Commercial Pressure Wash
2260007005	2-Stroke Logging Equipment Chain Saws > 6 HP
2260007010	2-Stroke Logging Equipment Shredders > 6 HP
2260007015	2-Stroke Logging Equipment Skidders
2260007020	2-Stroke Logging Equipment Fellers/Bunchers
2260008005	2-Stroke Airport Support Equipment
2260009010	2-Stroke Other Underground Mining Equipment
2260010010	2-Stroke Other Oil Field Equipment
2265001010	4-Stroke Motorcycles: Off-Road
2265001020	4-Stroke Snowmobiles
2265001030	4-Stroke All Terrain Vehicles
2265001050	4-Stroke Golf Carts
2265001060	4-Stroke Specialty Vehicle Carts
2265002003	4-Stroke Asphalt Pavers
2265002006	4-Stroke Tampers/Rammers
2265002009	4-Stroke Plate Compactors
2265002012	4-Stroke Concrete Pavers
2265002015	4-Stroke Rollers
2265002018	4-Stroke Scrapers
2265002021	4-Stroke Paving Equipment
2265002024	4-Stroke Surfacing Equipment
2265002027	4-Stroke Signal Boards
2265002030	4-Stroke Trenchers
2265002033	4-Stroke Bore/Drill Rigs
2265002036	4-Stroke Excavators
2265002039	4-Stroke Concrete/Industrial Saws
2265002042	4-Stroke Cement & Mortar Mixers
2265002045	4-Stroke Cranes
2265002048	4-Stroke Graders
2265002051	4-Stroke Off-highway Trucks
2265002054	4-Stroke Crushing/Proc. Equipment
2265002057	4-Stroke Rough Terrain Forklifts
2265002060	4-Stroke Rubber Tire Loaders
2265002063	4-Stroke Rubber Tire Dozers
2265002066	4-Stroke Tractors/Loaders/Backhoes
2265002069	4-Stroke Crawler Tractors
2265002072	4-Stroke Skid Steer Loaders

SCC	Equipment Description
2265002075	4-Stroke Off-Highway Tractors
2265002078	4-Stroke Dumpers/Tenders
2265002081	4-Stroke Other Construction Equipment
2265003010	4-Stroke Aerial Lifts
2265003020	4-Stroke Forklifts
2265003030	4-Stroke Sweepers/Scrubbers
2265003040	4-Stroke Other General Industrial Equipment
2265003050	4-Stroke Other Material Handling Equipment
2265003060	4-Stroke Industrial AC\Refrigeration
2265003070	4-Stroke Terminal Tractors
2265004010	4-Stroke Lawn mowers (Residential)
2265004011	4-Stroke Lawn mowers (Commercial)
2265004015	4-Stroke Rotary Tillers < 6 HP (Residential)
2265004016	4-Stroke Rotary Tillers < 6 HP (Commercial)
2265004020	4-Stroke Chain Saws < 6 HP (Residential)
2265004021	4-Stroke Chain Saws < 6 HP (Commercial)
2265004025	4-Stroke Trimmers/Edgers/Brush Cutters
2265004026	4-Stroke Trimmers/Edgers/Brush Cutters
2265004030	4-Stroke Leaf blowers/Vacuums (Residential)
2265004031	4-Stroke Leaf blowers/Vacuums (Commercial)
2265004035	4-Stroke Snow blowers (Residential)
2265004036	4-Stroke Snow blowers (Commercial)
2265004040	4-Stroke Rear Engine Riding Mowers (Res.)
2265004041	4-Stroke Rear Engine Riding Mowers (Comm)
2265004045	4-Stroke Front Mowers (Residential)
2265004046	4-Stroke Front Mowers (Commercial)
2265004050	4-Stroke Shredders < 6 HP (Residential)
2265004051	4-Stroke Shredders < 6 HP (Commercial)
2265004055	4-Stroke Lawn & Garden Tractors (Residential)
2265004056	4-Stroke Lawn & Garden Tractors (Commercial)
2265004060	4-Stroke Wood Splitters (Residential)
2265004061	4-Stroke Wood Splitters (Commercial)
2265004065	4-Stroke Chippers/Stump Grinders (Res.)
2265004066	4-Stroke Chippers/Stump Grinders (Comm.)
2265004070	4-Stroke Commercial Turf Equipment (Res.)
2265004071	4-Stroke Commercial Turf Equipment (Comm)
2265004075	4-Stroke Other Lawn & Garden Equipment
2265004076	4-Stroke Other Lawn & Garden Equipment
2265005010	4-Stroke 2-Wheel Tractors
2265005015	4-Stroke Agricultural Tractors
2265005020	4-Stroke Combines

SCC	Equipment Description
2265005025	4-Stroke Balers
2265005030	4-Stroke Agricultural Mowers
2265005035	4-Stroke Sprayers
2265005040	4-Stroke Tillers > 5 HP
2265005045	4-Stroke Swathers
2265005050	4-Stroke Hydro Power Units
2265005055	4-Stroke Other Agricultural Equipment
2265005060	4-Stroke Irrigation Sets
2265006005	4-Stroke Light Commercial Generator Sets
2265006010	4-Stroke Light Commercial Pumps
2265006015	4-Stroke Light Commercial Air Compressors
2265006020	4-Stroke Light Commercial Gas Compressors
2265006025	4-Stroke Light Commercial Welders
2265006030	4-Stroke Light Commercial Pressure Washers
2265007005	4-Stroke Logging Equipment Chain Saws > 6 HP
2265007010	4-Stroke Logging Equipment Shredders > 6 HP
2265007015	4-Stroke Logging Equipment Skidders
2265007020	4-Stroke Logging Equipment Fellers/Bunchers
2265008005	4-Stroke Airport Support Equipment
2265009010	4-Stroke Other Underground Mining Equipment
2265010010	4-Stroke Other Oil Field Equipment
2267001020	LPG Snowmobiles
2267001050	LPG Golf Carts
2267001060	LPG Specialty Vehicle Carts
2267002003	LPG Asphalt Pavers
2267002006	LPG Tampers/Rammers
2267002009	LPG Plate Compactors
2267002012	LPG Concrete Pavers
2267002015	LPG Rollers
2267002018	LPG Scrapers
2267002021	LPG Paving Equipment
2267002024	LPG Surfacing Equipment
2267002027	LPG Signal Boards
2267002030	LPG Trenchers
2267002033	LPG Bore/Drill Rigs
2267002036	LPG Excavators
2267002039	LPG Concrete/Industrial Saws
2267002042	LPG Cement & Mortar Mixers
2267002045	LPG Cranes
2267002048	LPG Graders
2267002051	LPG Off-highway Trucks

SCC	Equipment Description
2267002054	LPG Crushing/Proc. Equipment
2267002057	LPG Rough Terrain Forklifts
2267002060	LPG Rubber Tire Loaders
2267002063	LPG Rubber Tire Dozers
2267002066	LPG Tractors/Loaders/Backhoes
2267002069	LPG Crawler Tractors
2267002072	LPG Skid Steer Loaders
2267002075	LPG Off-Highway Tractors
2267002078	LPG Dumpers/Tenders
2267002081	LPG Other Construction Equipment
2267003010	LPG Aerial Lifts
2267003020	LPG Forklifts
2267003030	LPG Sweepers/Scrubbers
2267003040	LPG Other General Industrial Equipment
2267003050	LPG Other Material Handling Equipment
2267003060	LPG AC\Refrigeration
2267003070	LPG Terminal Tractors
2267004010	LPG Lawn mowers (Residential)
2267004011	LPG Lawn mowers (Commercial)
2267004015	LPG Rotary Tillers < 6 HP (Residential)
2267004016	LPG Rotary Tillers < 6 HP (Commercial)
2267004020	LPG Chain Saws < 6 HP (Residential)
2267004021	LPG Chain Saws < 6 HP (Commercial)
2267004025	LPG Trimmers/Edgers/Brush Cutters (Res.)
2267004026	LPG Trimmers/Edgers/Brush Cutters (Comm.)
2267004030	LPG Leaf blowers/Vacuums (Residential)
2267004031	LPG Leaf blowers/Vacuums (Commercial)
2267004035	LPG Snow blowers (Residential)
2267004036	LPG Snow blowers (Commercial)
2267004040	LPG Rear Engine Riding Mowers (Residential)
2267004041	LPG Rear Engine Riding Mowers (Commercial)
2267004045	LPG Front Mowers (Residential)
2267004046	LPG Front Mowers (Commercial)
2267004050	LPG Shredders < 6 HP (Residential)
2267004051	LPG Shredders < 6 HP (Commercial)
2267004055	LPG Lawn & Garden Tractors (Residential)
2267004056	LPG Lawn & Garden Tractors (Commercial)
2267004060	LPG Wood Splitters (Residential)
2267004061	LPG Wood Splitters (Commercial)
2267004065	LPG Chippers/Stump Grinders (Residential)
2267004066	LPG Chippers/Stump Grinders (Commercial)

SCC	Equipment Description
2267004070	LPG Commercial Turf Equipment (Residential)
2267004071	LPG Commercial Turf Equipment (Commercial)
2267004075	LPG Other Lawn & Garden Equipment (Res.)
2267004076	LPG Other Lawn & Garden Equipment (Comm.)
2267005010	LPG 2-Wheel Tractors
2267005015	LPG Agricultural Tractors
2267005020	LPG Combines
2267005025	LPG Balers
2267005030	LPG Agricultural Mowers
2267005035	LPG Sprayers
2267005040	LPG Tillers > 6 HP
2267005045	LPG Swathers
2267005050	LPG Hydro Power Units
2267005055	LPG Other Agricultural Equipment
2267005060	LPG Irrigation Sets
2267006005	LPG Light Commercial Generator Sets
2267006010	LPG Light Commercial Pumps
2267006015	LPG Light Commercial Air Compressors
2267006020	LPG Light Commercial Gas Compressors
2267006025	LPG Light Commercial Welders
2267006030	LPG Light Commercial Pressure Washers
2267007005	LPG Logging Equipment Chain Saws > 6 HP
2267007010	LPG Logging Equipment Shredders > 6 HP
2267007015	LPG Logging Equipment Skidders
2267007020	LPG Logging Equipment Fellers/Bunchers
2267008005	LPG Airport Support Equipment
2267009010	LPG Other Underground Mining Equipment
2267010010	LPG Other Oil Field Equipment
2268001020	CNG Snowmobiles
2268001050	CNG Golf Carts
2268001060	CNG Specialty Vehicle Carts
2268002003	CNG Asphalt Pavers
2268002006	CNG Tampers/Rammers
2268002009	CNG Plate Compactors
2268002012	CNG Concrete Pavers
2268002015	CNG Rollers
2268002018	CNG Scrapers
2268002021	CNG Paving Equipment
2268002024	CNG Surfacing Equipment
2268002027	CNG Signal Boards
2268002030	CNG Trenchers

SCC	Equipment Description
2268002033	CNG Bore/Drill Rigs
2268002036	CNG Excavators
2268002039	CNG Concrete/Industrial Saws
2268002042	CNG Cement & Mortar Mixers
2268002045	CNG Cranes
2268002048	CNG Graders
2268002051	CNG Off-highway Trucks
2268002054	CNG Crushing/Proc. Equipment
2268002057	CNG Rough Terrain Forklifts
2268002060	CNG Rubber Tire Loaders
2268002063	CNG Rubber Tire Dozers
2268002066	CNG Tractors/Loaders/Backhoes
2268002069	CNG Crawler Tractors
2268002072	CNG Skid Steer Loaders
2268002075	CNG Off-Highway Tractors
2268002078	CNG Dumpers/Tenders
2268002081	CNG Other Construction Equipment
2268003010	CNG Aerial Lifts
2268003020	CNG Forklifts
2268003030	CNG Sweepers/Scrubbers
2268003040	CNG Other General Industrial Equipment
2268003050	CNG Other Material Handling Equipment
2268003060	CNG AC\Refrigeration
2268003070	CNG Terminal Tractors
2268004010	CNG Lawn mowers (Residential)
2268004011	CNG Lawn mowers (Commercial)
2268004015	CNG Rotary Tillers < 6 HP (Residential)
2268004016	CNG Rotary Tillers < 6 HP (Commercial)
2268004020	CNG Chain Saws < 6 HP (Residential)
2268004021	CNG Chain Saws < 6 HP (Commercial)
2268004025	CNG Trimmers/Edgers/Brush Cutters (Res.)
2268004026	CNG Trimmers/Edgers/Brush Cutters (Comm.)
2268004030	CNG Leaf blowers/Vacuums (Residential)
2268004031	CNG Leaf blowers/Vacuums (Commercial)
2268004035	CNG Snow blowers (Residential)
2268004036	CNG Snow blowers (Commercial)
2268004040	CNG Rear Engine Riding Mowers (Residential)
2268004041	CNG Rear Engine Riding Mowers (Commercial)
2268004045	CNG Front Mowers (Residential)
2268004046	CNG Front Mowers (Commercial)
2268004050	CNG Shredders < 6 HP (Residential)

SCC	Equipment Description
2268004051	CNG Shredders < 6 HP (Commercial)
2268004055	CNG Lawn & Garden Tractors (Residential)
2268004056	CNG Lawn & Garden Tractors (Commercial)
2268004060	CNG Wood Splitters (Residential)
2268004061	CNG Wood Splitters (Commercial)
2268004065	CNG Chippers/Stump Grinders (Residential)
2268004066	CNG Chippers/Stump Grinders (Commercial)
2268004070	CNG Commercial Turf Equipment (Residential)
2268004071	CNG Commercial Turf Equipment (Commercial)
2268004075	CNG Other Lawn & Garden Equipment (Res.)
2268004076	CNG Other Lawn & Garden Equipment (Comm.)
2268005010	CNG 2-Wheel Tractors
2268005015	CNG Agricultural Tractors
2268005020	CNG Combines
2268005025	CNG Balers
2268005030	CNG Agricultural Mowers
2268005035	CNG Sprayers
2268005040	CNG Tillers > 6 HP
2268005045	CNG Swathers
2268005050	CNG Hydro Power Units
2268005055	CNG Other Agricultural Equipment
2268005060	CNG Irrigation Sets
2268006005	CNG Light Commercial Generator Sets
2268006010	CNG Light Commercial Pumps
2268006015	CNG Light Commercial Air Compressors
2268006020	CNG Light Commercial Gas Compressors
2268006025	CNG Light Commercial Welders
2268006030	CNG Light Commercial Pressure Washers
2268007005	CNG Logging Equipment Chain Saws > 6 HP
2268007010	CNG Logging Equipment Shredders > 6 HP
2268007015	CNG Logging Equipment Skidders
2268007020	CNG Logging Equipment Fellers/Bunchers
2268008005	CNG Airport Support Equipment
2268009010	CNG Other Underground Mining Equipment
2268010010	CNG Other Oil Field Equipment
2270001020	Diesel Snowmobiles (unused)
2270001030	Diesel All Terrain Vehicles/MC (unused)
2270001050	Diesel Golf Carts (unused)
2270001060	Diesel Specialty Vehicle Carts
2270002003	Diesel Pavers
2270002006	Diesel Tampers/Rammers (unused)

SCC	Equipment Description
2270002009	Diesel Plate Compactors
2270002012	Diesel Concrete Pavers (unused)
2270002015	Diesel Rollers
2270002018	Diesel Scrapers
2270002021	Diesel Paving Equipment
2270002024	Diesel Surfacing Equipment
2270002027	Diesel Signal Boards
2270002030	Diesel Trenchers
2270002033	Diesel Bore/Drill Rigs
2270002036	Diesel Excavators
2270002039	Diesel Concrete/Industrial Saws
2270002042	Diesel Cement & Mortar Mixers
2270002045	Diesel Cranes
2270002048	Diesel Graders
2270002051	Diesel Off-highway Trucks
2270002054	Diesel Crushing/Proc. Equipment
2270002057	Diesel Rough Terrain Forklifts
2270002060	Diesel Rubber Tire Loaders
2270002063	Diesel Rubber Tire Dozers
2270002066	Diesel Tractors/Loaders/Backhoes
2270002069	Diesel Crawler Tractors
2270002072	Diesel Skid Steer Loaders
2270002075	Diesel Off-Highway Tractors
2270002078	Diesel Dumpers/Tenders
2270002081	Diesel Other Construction Equipment
2270003010	Diesel Aerial Lifts
2270003020	Diesel Forklifts
2270003030	Diesel Sweepers/Scrubbers
2270003040	Diesel Other General Industrial Equipment
2270003050	Diesel Other Material Handling Equipment
2270003060	Diesel AC\Refrigeration
2270003070	Diesel Terminal Tractors
2270004010	Diesel Lawn mowers (Residential)
2270004011	Diesel Lawn mowers (Commercial)
2270004015	Diesel Rotary Tillers < 6 HP (Residential)
2270004016	Diesel Rotary Tillers < 6 HP (Commercial)
2270004020	Diesel Chain Saws < 6 HP (Residential)
2270004021	Diesel Chain Saws < 6 HP (Commercial)
2270004025	Diesel Trimmers/Edgers/Brush Cutters (Res.)
2270004026	Diesel Trimmers/Edgers/Brush Cutters (Comm.)
2270004030	Diesel Leaf blowers/Vacuums (Residential)

SCC	Equipment Description
2270004031	Diesel Leaf blowers/Vacuums (Commercial)
2270004035	Diesel Snow blowers (Residential)
2270004036	Diesel Snow blowers (Commercial)
2270004040	Diesel Rear Engine Riding Mowers (Res.)
2270004041	Diesel Rear Engine Riding Mowers (Comm.)
2270004045	Diesel Front Mowers (Residential)
2270004046	Diesel Front Mowers (Commercial)
2270004050	Diesel Shredders < 6 HP (Residential)
2270004051	Diesel Shredders < 6 HP (Commercial)
2270004055	Diesel Lawn & Garden Tractors (Residential)
2270004056	Diesel Lawn & Garden Tractors (Commercial)
2270004060	Diesel Wood Splitters (Residential)
2270004061	Diesel Wood Splitters (Commercial)
2270004065	Diesel Chippers/Stump Grinders (Residential)
2270004066	Diesel Chippers/Stump Grinders (Commercial)
2270004070	Diesel Commercial Turf Equipment (Res.)
2270004071	Diesel Commercial Turf Equipment (Comm.)
2270004075	Diesel Other Lawn & Garden Equipment (Res.)
2270004076	Diesel Other Lawn & Garden Equipment (Comm.)
2270005010	Diesel 2-Wheel Tractors
2270005015	Diesel Agricultural Tractors
2270005020	Diesel Combines
2270005025	Diesel Balers
2270005030	Diesel Agricultural Mowers
2270005035	Diesel Sprayers
2270005040	Diesel Tillers > 6 HP
2270005045	Diesel Swathers
2270005050	Diesel Hydro Power Units
2270005055	Diesel Other Agricultural Equipment
2270005060	Diesel Irrigation Sets
2270006005	Diesel Light Commercial Generator Sets
2270006010	Diesel Light Commercial Pumps
2270006015	Diesel Light Commercial Air Compressors
2270006020	Diesel Light Commercial Gas Compressors
2270006025	Diesel Light Commercial Welders
2270006030	Diesel Light Commercial Pressure Washer
2270007005	Diesel Logging Equipment Chain Saws > 6 HP
2270007010	Diesel Logging Equipment Shredders > 6 HP
2270007015	Diesel Logging Equip Fell/Bunch/Skidders
2270007020	Diesel Logging Equip Fell/Bunch (unused)
2270008005	Diesel Airport Support Equipment

SCC	Equipment Description
2270009010	Diesel Other Underground Mining Equipment
2270010010	Diesel Other Oil Field Equipment
2282005010	2-Stroke Outboards
2282005015	2-Stroke Personal Watercraft
2282010005	4-Stroke Inboards
2282020005	Diesel Inboards
2282020010	Diesel Outboards
2282020025	Diesel Sailboat Aux. Outboard (unused)
2285002015	Diesel Railway Maintenance
2285003015	2-Stroke Gasoline Railway Maintenance
2285004015	4-Stroke Gasoline Railway Maintenance
2285006015	LPG Railway Maintenance
2285008015	CNG Railway Maintenance

Table 23 - GASCAP output Contract 13130 – Route 35 reconstruction

SECTION 1:	**Materials**	
Direct CO_2	4,774.764	(MT)
Direct CH_4	0.176	(MT)
Direct N_2O	0.068	(MT)
Direct CO_2e	**4,799.348**	**(MT)**
Upstream CO_2	18,831.259	(MT)
Upstream CH_4	83.792	(MT)
Upstream N_2O	2.911	(MT)
Upstream SF_6	2.053	(kg)
Upstream CO_2e	**21,840.373**	**(MT)**
Combined CO_2e	**26,639.721**	**(MT)**

SECTION 2:	**Equipment**	
Direct CO_2	757.421	(MT)
Direct CH_4	0.035	(MT)
Direct N_2O	0.009	(MT)
Direct PMBC	0.159	(MT)
Direct CO_2 Equiv. from HFCs	0.000	(MT)
Direct CO_2e	761.097	**(MT)**
Upstream CO_2	111.551	(MT)
Upstream CH_4	2.314	(MT)
Upstream N_2O	0.003	(MT)
Upstream PMBC	0.004	(MT)
Upstream SF_6	0.081	(kg)
Upstream CO_2e	171.957	**(MT)**
Combined CO_2e	933.054	**(MT)**

OVERALL RESULTS		
CO_2	27,573.85	(MT)
CH_4	104.64	(MT)
N_2O	3.04	(MT)
SF_6	2.25	(kg)
PMBC	0.19	(MT)
Total CO_2e	31,152.51	(MT)

Fuel Consumption		
Gasoline (10% Ethanol RFG)	20,635.25	gallons
Gasoline	6,885.35	gallons
20% Biodiesel	0.00	gallons
Diesel	791,069.96	gallons
Liquified Petroleum Gas	0.00	gallons
Compressed Natural Gas	0.00	GGE
Fuel Costs		
Gasoline (10% Ethanol RFG)	$4.00	$ per gallon
Gasoline	$4.00	$ per gallon
20% Biodiesel	$3.75	$ per gallon
Diesel	$4.00	$ per gallon
Liquified Petroleum Gas	$1.50	$ per gallon
Compressed Natural Gas	$1.50	$ per GGE
Total Fuel Cost	$3,274,362.26	

SECTION 3:	Recyclables Credits	
CO2	0.000	(MT)
CH4	0.000	(MT)
N2O	0.000	(MT)
SF6	0.000	(kg)
Total CO2e	**0.000**	**(MT)**

SECTION 4:	Lifecycle Maintenance	
Direct CO2	993.347	(MT)
Direct CH4	0.051	(MT)
Direct N2O	0.014	(MT)
Direct PMBC	0.021	(MT)
Direct CO2e	**998.827**	**(MT)**
Upstream CO2	2,041.807	(MT)
Upstream CH4	18.199	(MT)
Upstream N2O	0.030	(MT)
Upstream PMBC	0.001	(MT)
Upstream SF6	0.112	(kg)
Upstream CO2e	**2,508.419**	**(MT)**
Combined CO2e	**3,507.246**	**(MT)**

SECTION 5a:	Staging	
Direct CO2	3,065.470	(MT)
Direct CH4	0.010	(MT)
Direct N2O	0.010	(MT)
Direct CO2 Equiv. from HFCs	2.300	(MT)
Direct CO2e	**3,070.080**	**(MT)**
Upstream CO2	622.600	(MT)
Upstream CH4	4.210	(MT)
Upstream N2O	0.010	(MT)
Upstream SF6	0.090	(kg)
Upstream CO2e	**731.640**	**(MT)**
Combined CO2e	**3,801.720**	**(MT)**

SECTION 5b:	Traffic Disruption	
Direct CO2	101,804.50	(g)
Direct CH4	5.27	(g)
Direct N2O	4.95	(g)
Direct PMBC	9.07	(g)
Direct CO2e	103,410.33	(g)
Upstream CO2	22,629.67	(g)
Upstream CH4	179.80	(g)
Upstream N2O	1.03	(g)
Upstream PMBC	1.76	(g)
Upstream SF6	1.79	(mg)
Upstream CO2e	27,473.51	(g)
Total CO2e	**130,883.84**	**(g)**

SECTION 6:	Lighting	
Direct CO2	0.00	(g)
Direct CH4	0.00	(g)
Direct N2O	0.00	(g)
Direct CO2e	**0.00**	**(g)**
Upstream SF6	0.00	(g)
Upstream CO2e	**0.00**	**(mg)**
Combined CO2e	**0.00**	**(g)**

SECTION 7:	Rail	
Direct CO2	0.00	(g)
Upstream and Disposal CO2	0.00	(g)
Upstream and Disposal CH4	0.00	(g)
Upstream and Disposal N2O	0.00	(g)
Total CO2e	**0.00**	**(g)**

SECTION 8:	Induced Travel	
CO2	0.00	(g)
CH4	0.00	(g)
N2O	0.00	(g)
BC	0.00	(g)
SF6	0.00	(mg)
Total CO2e	**0.00**	**(g)**

Table 24 - Case study Contract 13130 bid items for materials included in GASCAP

Item Code	Item Description	Quantity	Unit	Contract Section	Group Code	Item Group
159138M	HMA Patch	300	T	0001	159	Traffic Control
203018P	I-13 Soil Aggregate	1,016	CY	0001	203	Embankment
302036P	Dense-Graded Aggregate Base Course, 6" Thick	171,596	SY	0001	302	Aggregate Base Course
302048P	Dense-Graded Aggregate Base Course, 12" Thick	163,776	SY	0001	302	Aggregate Base Course
302060P	Coarse Aggregate, Size No. 57	15,000	CY	0001	302	Aggregate Base Course
401027M	Polymerized Joint Adhesive	10,000	LF	0001	401	Hot Mix Asphalt (HMA) Courses
401030M	Tack Coat	72,071	GAL	0001	401	Hot Mix Asphalt (HMA) Courses
401036M	Prime Coat	24,024	GAL	0001	401	Hot Mix Asphalt (HMA) Courses
401042M	Hot Mix Asphalt 9.5 M 64 Surface Course	14,203	T	0001	401	Hot Mix Asphalt (HMA) Courses
401048M	Hot Mix Asphalt 9.5 M 76 Surface Course	19,654	T	0001	401	Hot Mix Asphalt (HMA) Courses
401054M	Hot Mix Asphalt 12.5 M 64 Surface Course	6,405	T	0001	401	Hot Mix Asphalt (HMA) Courses
401072M	Hot Mix Asphalt 12.5 M 64 Intermediate Course	33,856	T	0001	401	Hot Mix Asphalt (HMA) Courses
401096M	Hot Mix Asphalt 19 M 64 Base Course	19,188	T	0001	401	Hot Mix Asphalt (HMA) Courses
401099M	Hot Mix Asphalt 25 M 64 Base Course	135,406	T	0001	401	Hot Mix Asphalt (HMA) Courses
511015P	Fiberglass Reinforced Plastic Lumber	1,289	CF	0001	511	Bulkhead, Fender, and Dolphin Systems
601194P	15" Reinforced Concrete Pipe, Class V	7,985	LF	0001	601	Pipe
601196P	18" Reinforced Concrete Pipe, Class V	3,894	LF	0001	601	Pipe
601200P	24" Reinforced Concrete Pipe, Class V	1,225	LF	0001	601	Pipe
601204P	30" Reinforced Concrete Pipe, Class V	944	LF	0001	601	Pipe
601206P	36" Reinforced Concrete Pipe, Class V	709	LF	0001	601	Pipe
601630P	14" X 23" Reinforced Concrete Elliptical Pipe, CLSS HE - IV	910	LF	0001	601	Pipe
601632P	19" X 30" Reinforced Concrete Elliptical Pipe, CLSS HE - IV	1,181	LF	0001	601	Pipe
601634P	22" X 34" Reinforced Concrete Elliptical Pipe, CLSS HE - IV	829	LF	0001	601	Pipe
601636P	24" X 38" Reinforced Concrete	535	LF	0001	601	Pipe

	Elliptical Pipe, CLSS HE - IV					
601638P	27" X 42" Reinforced Concrete Elliptical Pipe, CLSS HE - IV	554	LF	0001	601	Pipe
601680M	16" Ductile Iron Pipe	193	LF	0001	601	Pipe
601681M	18" Ductile Iron Pipe	2,076	LF	0001	601	Pipe
601682M	24" Ductile Iron Pipe	3,583	LF	0001	601	Pipe
601683M	30" Ductile Iron Pipe	5,269	LF	0001	601	Pipe
601685M	14" Ductile Iron Pipe	8,400	LF	0001	601	Pipe
601760P	Pipe Bedding	2,800	CY	0001	601	Pipe
602006P	Concrete Headwall	5	CY	0001	602	Drainage Structures
602009M	Inlet, Type A	52	U	0001	602	Drainage Structures
602012M	Inlet, Type B	404	U	0001	602	Drainage Structures
602013M	Inlet, Type Double B	7	U	0001	602	Drainage Structures
602018M	Inlet, Type E	44	U	0001	602	Drainage Structures
602024M	Inlet, Type B-1	3	U	0001	602	Drainage Structures
602027M	Inlet, Type B-2	7	U	0001	602	Drainage Structures
602036M	Inlet, Type E-1	3	U	0001	602	Drainage Structures
602054M	Manhole, 4' Diameter	70	U	0001	602	Drainage Structures
602057M	Manhole, 5' Diameter	60	U	0001	602	Drainage Structures
602060M	Manhole, 6' Diameter	45	U	0001	602	Drainage Structures
602095M	Manhole, 7' Diameter	23	U	0001	602	Drainage Structures
602096M	Inlet Converted To Manhole	3	U	0001	602	Drainage Structures
602153M	Reconstructed Inlet, Type B, Using New Casting	3	U	0001	602	Drainage Structures
602180M	Reconstructed Manhole, Using Existing Casting	2	U	0001	602	Drainage Structures
603036P	Riprap Stone Channel Protection, 12" Thick (D50=6")	19	SY	0001	603	Slope and Channel Protection
606012P	Concrete Sidewalk, 4" Thick	14,721	SY	0001	606	Sidewalks, Driveways, and Islands
606030P	Hot Mix Asphalt Driveway, 1 1/2" Thick	248	SY	0001	606	Sidewalks, Driveways, and Islands
606039P	Hot Mix Asphalt Driveway, 6" Thick	502	SY	0001	606	Sidewalks, Driveways, and Islands
606051P	Concrete Driveway, 6" Thick	2706	SY	0001	606	Sidewalks, Driveways, and Islands
606075P	Concrete Island, 4" Thick	252	SY	0001	606	Sidewalks, Driveways, and Islands
607018P	9" X 16" Concrete Vertical Curb	102183	LF	0001	607	Curb
608005P	Non-vegetative Surface, Porous Hot Mix Asphalt, 6" Thick	3,875	SY	0001	608	Non-Vegetative Surfaces

609003M	Beam Guide Rail	6,045	LF	0001	609	Beam Guide Rail
609006M	Beam Guide Rail, Dual-Faced	28	LF	0001	609	Beam Guide Rail
609021M	Rub Rail	2,082	LF	0001	609	Beam Guide Rail
609024M	Flared Guide Rail Terminal	9	U	0001	609	Beam Guide Rail
609030M	Telescoping Guide Rail End Terminal	3	U	0001	609	Beam Guide Rail
609039M	Beam Guide Rail Anchorage	11	U	0001	609	Beam Guide Rail
612003P	Regulatory and Warning Sign	5200	SF	0001	612	Signs
612006P	Guide Sign, Type Ga, Steel "U" Post Supports	486	SF	0001	612	Signs
612015P	Guide Sign Panel, Type GO	832	SF	0001	612	Signs
612018P	Guide Sign Panel, Type GOX	332	SF	0001	612	Signs
651051P	4" Ductile Iron Water Pipe, Class 52	250	LF	0001	651	Water
651054P	6" Ductile Iron Water Pipe, Class 52	1,970	LF	0001	651	Water
651057P	8" Ductile Iron Water Pipe, Class 52	3,038	LF	0001	651	Water
651063P	12" Ductile Iron Water Pipe, Class 52	4,941	LF	0001	651	Water
651293P	4" Polyvinyl Chloride Water Pipe	20	LF	0001	651	Water
651296P	8" Polyvinyl Chloride Water Pipe	230	LF	0001	651	Water
652235P	10" Polyvinyl Chloride Sewer Pipe	256	LF	0001	652	Sanitary Sewers
652236P	8" Polyvinyl Chloride Sewer Pipe	2,447	LF	0001	652	Sanitary Sewers
652420M	Manhole, Sanitary Sewer	27	U	0001	652	Sanitary Sewers
652566P	Manhole, Sanitary Sewer Type A	1	U	0001	652	Sanitary Sewers
701021P	3" Rigid Metallic Conduit	1,319	LF	0001	701	General Items
701102M	18" X 36" Junction Box	16	U	0001	701	General Items
701132M	Foundation, Type P-MC	3	U	0001	701	General Items
701135M	Foundation, Type SPF	4	U	0001	701	General Items
701138M	Foundation, Type Stf	6	U	0001	701	General Items
701144M	Foundation, Type SFK	1	U	0001	701	General Items
701171M	Meter Cabinet, Type Tl	3	U	0001	701	General Items
701192P	Ground Wire, No. 8 AWG	1,424	LF	0001	701	General Items
701201P	Multiple Lighting Wire, No. 8 AWG	1,478	LF	0001	701	General Items
701213P	Service Wire, No. 6 AWG	376	LF	0001	701	General Items
702012M	Traffic Signal Standard, Aluminum	8	U	0001	702	Traffic Signals
702015M	Traffic Signal Standard, Steel	6	U	0001	702	Traffic Signals
702018M	Pedestrian Signal Standard	4	U	0001	702	Traffic Signals
702021M	Traffic Signal Mast Arm,	4	U	0001	702	Traffic Signals

	Aluminum					
702024M	Traffic Signal Mast Arm, Steel	6	U	0001	702	Traffic Signals
702027P	Traffic Signal Cable, 2 Conductor	1,406	LF	0001	702	Traffic Signals
702030P	Traffic Signal Cable, 5 Conductor	2,975	LF	0001	702	Traffic Signals
702033P	Traffic Signal Cable, 10 Conductor	4,386	LF	0001	702	Traffic Signals
702036M	Traffic Signal Head	29	U	0001	702	Traffic Signals
702039M	Pedestrian Signal Head	18	U	0001	702	Traffic Signals
702042M	Push Button	8	U	0001	702	Traffic Signals
703012M	Lighting Mast Arm Aluminum	2	U	0001	703	Highway Lighting
703015M	Lighting Mast Arm Steel	3	U	0001	703	Highway Lighting
703018M	Luminaire	5	U	0001	703	Highway Lighting
903006M	Miscellaneous Concrete	500	CY	0001	903	Concrete
504003P	Reinforcement Steel	1,600	LB	0007	504	Structural Concrete
504006P	Reinforcement Steel, Epoxy-Coated	550	LB	0007	504	Structural Concrete
504015P	Concrete Footing	22	CY	0007	504	Structural Concrete
512012M	Overhead Sign Support, Structure No. Overhead Sign Support, Structure No.1	1	U	0007	512	Sign Support Structures
701126M	Foundation, Type MCF	1	U	0007	701	General Items
701183M	Meter Cabinet, Type L	1	U	0007	701	General Items
701192P	Ground Wire, No. 8 AWG	120	LF	0007	701	General Items
701213P	Service Wire, No. 6 AWG	120	LF	0007	701	General Items
504003P	Reinforcement Steel	1,600	LB	0008	504	Structural Concrete
504006P	Reinforcement Steel, Epoxy-Coated	550	LB	0008	504	Structural Concrete
504015P	Concrete Footing	22	CY	0008	504	Structural Concrete
512012M	Overhead Sign Support, Structure No.2	1	U	0008	512	Sign Support Structures
701126M	Foundation, Type MCF	1	U	0008	701	General Items
701183M	Meter Cabinet, Type L	1	U	0008	701	General Items
701192P	Ground Wire, No. 8 AWG	70	LF	0008	701	General Items
701213P	Service Wire, No. 6 AWG	70	LF	0008	701	General Items

Table 25 - Case study Contract 13130 bid items included in GASCAP equipment module

Item Code	Item Description	Quantity	Unit	Contract Section	Group Code	Item Group
154003P	Mobilization	(1)	LS	0001	154	Mobilization
159024M	Flashing Arrow Board, 2' X 4'	8	U	0001	159	Traffic Control
159027M	Flashing Arrow Board, 4' X 8'	4	U	0001	159	Traffic Control
159030M	Portable Variable Message Sign	4	U	0001	159	Traffic Control
159108M	Traffic Control Truck With Mounted Crash Cushion	4	U	0001	159	Traffic Control
161003P	Final Cleanup	(1)	LS	0001	161	Final Cleanup
201003P	Clearing Site	(1)	LS	0001	201	Clearing Site
201009P	Clearing Site, Structure No. 1	(1)	LS	0007	201	Clearing Site
201009P	Clearing Site, Structure No. 2	(1)	LS	0008	201	Clearing Site
202003P	Stripping	1	Acre	0001	202	Excavation
202006M	Excavation, Test Pit	500	CY	0001	202	Excavation
202009P	Excavation, Unclassified	202882	CY	0001	202	Excavation
202009P	Excavation, Unclassified	115	CY	0007	202	Excavation
202009P	Excavation, Unclassified	115	CY	0008	202	Excavation
202015P	Excavation, Regulated Material	1,000	CY	0001	202	Excavation
202018P	Excavation, Acid Producing Soil	1,000	CY	0001	202	Excavation
202021P	Removal of Pavement	18,334	SY	0001	202	Excavation
202024M	Disposal of Regulated Material	500	T	0001	202	Excavation
202036P	Acid Producing Soil Remediation	1,000	SY	0001	202	Excavation
202039M	Disposal of Acid Producing Soil	1,000	T	0001	202	Excavation
401009P	HMA Milling, 3" or Less	1,000	SY	0001	401	Hot Mix Asphalt (HMA) Courses
502003P	Furnishing Equipment For Driving Piles	(1)	LS	0001	502	Load Bearing Piles
601670M	Cleaning Existing Pipe, 12" To 24" Diameter	3,085	LF	0003	601	Pipe
601672M	Cleaning Existing Pipe, Over 24" To 48" Diameter	3,071	LF	0003	601	Pipe
602099M	Reset Existing Casting	50	U	0001	602	Drainage Structures
602105M	Set Inlet Type B, Casting	27	U	0001	602	Drainage Structures
609075M	Removal of Beam Guide Rail	5,621	LF	0001	609	Beam Guide Rail
612021M	Relocate Sign	50	U	0001	612	Signs
652418M	Sanitary Sewer By-Pass Pumping	(1)	LS	0001	652	Sanitary Sewers
652419M	Sanitary Sewer Cleanout	100	U	0001	652	Sanitary Sewers
652432M	Reset Manhole, Sanitary Sewer, Using Existing Casting	100	U	0001	652	Sanitary Sewers
654007P	Electrical Utility Relocation, Electrical Utility Relocation, JCP&L	(1)	LS	0001	654	#N/A
702054M	Temporary Traffic Signal System,	(1)	LS	0001	702	Traffic Signals

	Location No. 1					
702060M	Controller Turn-On	3	U	0001	702	Traffic Signals
801006M	Selective Thinning	500	SY	0003	801	Selective Vegetation Removal
802021M	Tree Removal, Over 6" To 12" Diameter	25	U	0005	802	Trimming and Removing Trees
802024M	Tree Removal, Over 12" To 18" Diameter	15	U	0005	802	Trimming and Removing Trees
803006M	Preparation of Existing Soil	1,000	SY	0005	803	Preparation of Existing Soil
810003M	Mowing	4	Acre	0003	810	Mowing
811138M	Plant Establishment Period	(1)	LS	0005	811	Planting
811140P	Tree Maintenance	(1) LS		0003	811	Planting
610036M	Removal of Traffic Stripes	160000	LF	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
610039M	Removal of Traffic Markings	10000	SF	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
651249M	Relocate Fire Hydrant	10	U	0001	651	Water
651252M	Reset Fire Hydrant	10	U	0001	651	Water
651255M	Reset Water Valve Box	200	U	0001	651	Water
610024M	Removal of Rpm	1750	U	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
158084M	Erosion Control Sediment Removal	1500	CY	0004	158	Soil Erosion and Sediment Control and Water Quality Control
651243M	Water Service Connection	221	U	0001	651	Water
652417M	Sanitary Sewer Service Connection	247	U	0001	652	Sanitary Sewers

Table 26 - Case study Contract 13130 material items unavailable in GASCAP

Item Code	Item Description	Quantity	Unit	Contract Section	Group Code	Item Group
158003M	Caution Fence	165	LF	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158009M	Heavy Duty Silt Fence, Orange	11,523	LF	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158015M	Haybale	400	U	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158018M	Haybale Check Dam With Temporary Stone Outlet	33	LF	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158030M	Inlet Filter Type 2, 2' X 4'	730	U	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158048M	Floating Turbidity Barrier, Type 3	190	LF	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158051M	Dewatering Basin	4	U	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158054M	Sediment Control Bag	10,000	SF	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158059M	Construction Driveway, Wood Mats	1,000	SY	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158060M	Construction Driveway	500	T	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158063P	Concrete Washout System	(1)	LS	0004	158	Soil Erosion and Sediment Control and Water Quality Control
158069M	Oil-Water Separator	4	U	0004	158	Soil Erosion and Sediment Control and Water Quality

						Control
158072M	Oil Only Emergency Spill Kit, Type 1	4	U	0004	158	Soil Erosion and Sediment Control and Water Quality Control
203041P	Geotextile, Roadway Stabilization	417,272	SY	0004	203	Embankment
511012M	Composite Pile, Inch Diameter Composite Pile, 13 Inch Diameter	5,458	LF	0001	511	Bulkhead, Fender, and Dolphin Systems
601741M	36" Ductile Iron Pipe	6,807	LF	0001	601	Pipe
601742M	42" Ductile Iron Pipe	2,581	LF	0001	601	Pipe
601743M	48" Ductile Iron Pipe	5,448	LF	0001	601	Pipe
602058M	Manhole, 8' Diameter	2	U	0001	602	Drainage Structures
602226M	Junction Chamber	11	U	0001	602	Drainage Structures
602229M	Manufactured Treatment Device	33	U	0001	602	Drainage Structures
602292M	24" Tide Control Check Valve, Inline	15	U	0001	602	Drainage Structures
602293M	30" Tide Control Check Valve, Inline	10	U	0001	602	Drainage Structures
602294M	36" Tide Control Check Valve, Inline	6	U	0001	602	Drainage Structures
606084P	Detectable Warning Surface	412	SY	0001	606	Sidewalks, Driveways, and Islands
606092P	Imprinted Crosswalk	472	SY	0001	606	Sidewalks, Driveways, and Islands
608017P	Nonvegetative Surface, Porous Resin Bound Aggregate, 2" Thick	500	SY	0001	608	Non-Vegetative Surfaces
610003M	Traffic Stripes, Long Life, Epoxy Resin 4"	123,984	LF	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
610009M	Traffic Markings, Thermoplastic	21248	SF	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
610012M	Rpm, Mono-Directional, White Lens	900	U	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
610018M	Rpm, Mono-Directional, Amber Lens	800	U	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
610021M	Rpm, Bi-Directional, Amber Lens	50	U	0001	610	Traffic Stripes, Traffic Markings, and Rumble Strips
610030M	Flexible Delineator, Ground Mounted	1000	U	0001	610	Traffic Stripes, Traffic Markings,

						and Rumble Strips
612032P	Custom Sign	256	SF	0003	612	Signs
651246M	Fire Hydrant	10	U	0001	651	Water
651270M	Gate Valves and Boxes	40	U	0001	651	Water
651273M	Butterfly Valves and Boxes	20	U	0001	651	Water
651277M	2" Blowoff Valve	5	U	0001	651	Water
651295P	6" Polyvinyl Chloride Water Pipe	140	LF	0001	651	Water
652008P	14" Ductile Iron Sewer Pipe	700	LF	0001	652	Sanitary Sewers
652466P	12" Sanitary Sewer Main	1,434	LF	0001	652	Sanitary Sewers
652469P	10" Sanitary Force Main	1,434	LF	0001	652	Sanitary Sewers
701015P	2" Rigid Metallic Conduit	127	LF	0001	701	General Items
701015P	2" Rigid Metallic Conduit	80	LF	0007	701	General Items
701015P	2" Rigid Metallic Conduit	35	LF	0008	701	General Items
701123M	Foundation, Type Sft	7	U	0001	701	General Items
702009M	Controller, 8 Phase	4	U	0001	702	Traffic Signals
702103P	Optical Emergency Pre-Emption System	(1)	LS	0001	702	Traffic Signals
703021M	Sign Lighting, Structure No. Sign Lighting, Structure No. 1	(1)	LS	0007	703	Highway Lighting
703021M	Sign Lighting, Structure No. Sign Lighting, Structure No. 2	(1)	LS	0008	703	Highway Lighting
704002M	ITS Conduit, Type A	26,076	LF	0001	704	Intelligent Transportation Systems (ITS)
704003M	Junction Box ITS Type A	5	U	0001	704	Intelligent Transportation Systems (ITS)
704006M	Junction Box ITS Type B	13	U	0001	704	Intelligent Transportation Systems (ITS)
704092M	Adaptive Image Detector, Ctss	10	U	0001	704	Intelligent Transportation Systems (ITS)
804006P	Topsoiling, 4" Thick	7,032	SY	0005	804	Topsoiling
805003M	Turf Repair Strip	1,000	LF	0005	805	Turf Repair Strip
806006P	Fertilizing and Seeding, Type A-3	7,032	SY	0005	806	Fertilizing and Seeding
806018P	Fertilizing and Seeding, Type F	1,055	SY	0004	806	Fertilizing and Seeding
806030P	Wildflower Seeding	1,500	SY	0005	806	Fertilizing and Seeding
809003M	Straw Mulching	7,032	SY	0005	809	Mulching
809009M	Stone Mulching	52,880	SY	0005	809	Mulching

809018M	Wood Mulching	5,740	SY	0005	809	Mulching
811024M	Small Deciduous Tree, 2-2 1/2" Caliper, B&B	72	U	0006	811	Planting
811027M	Small Deciduous Tree, 1 1/4-1 1/2" Caliper, B&B	10	U	0006	811	Planting
811032M	Small Deciduous Tree, 8-10' High, B&B	171	U	0006	811	Planting
811037M	Evergreen Tree, 7-8' High B&B	12	U	0006	811	Planting
811039M	Evergreen Tree, 6-7' High, B&B	7	U	0006	811	Planting
811057M	Deciduous Shrub, 3-4' High, B&B	10	U	0006	811	Planting
811061M	Deciduous Shrub, 30-36" High, B&B	68	U	0006	811	Planting
811063M	Deciduous Shrub, 18-24" High, #3 Container	314	U	0006	811	Planting
811078M	Evergreen Shrub, 18-24" High, #3 Container	34	U	0006	811	Planting
811108M	Ground Cover or Vine, 2" Plug	21	U	0006	811	Planting
811111M	Perennial, #1 Container	41,429	U	0006	811	Planting

Table 27 - Case study Contract 13130 items not in GASCAP scope

Item Code	Item Description	Quantity	Unit	Contract Section	Group Code	Item Group
151006M	Performance Bond and Payment Bond	1	Doll	0001	151	Performance Bond and Payment Bond
152004P	Owner's and Contractor's Protective Liability Insurance	1	Doll	0003	152	Insurance
152015P	Pollution Liability Insurance	1	Doll	0003	152	Insurance
153003P	Progress Schedule	(1)	LS	0001	153	Progress Schedule
153006P	Progress Schedule Update	12	U	0001	153	Progress Schedule
153012P	Trainees	5,500	HOUR	0001	153	Progress Schedule
155015M	Field Office Type E Set Up	1	U	0002	155	Construction Field Office
155033M	Field Office Type E Maintenance	24	MO	0002	155	Construction Field Office
156003M	Materials Field Laboratory Set-Up	1	U	0002	156	Materials Field Laboratory and Curing facility
156006M	Materials Field Laboratory Maintenance	24	MO	0002	156	Materials Field Laboratory and Curing facility
156015M	Nuclear Density Gauge	1	U	0002	156	Materials Field Laboratory and Curing facility
159141M	Traffic Director, Flagger	2,000	HOUR	0001	159	Traffic Control
160004M	Fuel Price Adjustment	1	Doll	0001	160	Price Adjustments
160007M	Asphalt Price Adjustment	1	Doll	0001	160	Price Adjustments
162005P	Vibration Monitoring	(1)	LS	0001	162	
201018M	Monitoring Well	4	U	0001	201	Clearing Site
201019M	Sealing of Monitoring Wells	4	U	0001	201	Clearing Site
201020M	Reset Monitoring Well Box	4	U	0001	201	Clearing Site
202030M	Soil Sampling and Analyses, Regulated	25	U	0001	202	Excavation
202033M	Soil Sampling and Analyses, Acid Producing Soil	50	U	0001	202	Excavation
401108M	Core Samples, Hot Mix Asphalt	800	U	0001	401	Hot Mix Asphalt (HMA) Courses
602219P	Stormwater Pumping Station (Located @ 20Th Avenue)	(1)	LS	0001	602	Drainage Structures
602219P	Stormwater Pumping Station (Located @ 8Th Avenue)	(1)	LS	0001	602	Drainage Structures
602219P	Stormwater Pumping Station (Located @ Island Avenue)	(1)	LS	0001	602	Drainage Structures
602219P	Stormwater Pumping Station (Located @ L Street)	(1)	LS	0001	602	Drainage Structures

602219P	Stormwater Pumping Station (Located @ Eisenhower Avenue)	(1)	LS	0001	602	Drainage Structures

Table 28 - Case study Contract 13130 temporary material items

Item Code	Item Description	Quantity	Unit	Contract Section	Group Code	Item Group
157004M	Construction Layout	1	Doll	0001	157	Construction Layout and Monuments
157006M	Monument	100	U	0001	157	Construction Layout and Monuments
157009M	Monument Box	100	U	0001	157	Construction Layout and Monuments
159003M	Breakaway Barricade	300	U	0001	159	Traffic Control
159006M	Drum	600	U	0001	159	Traffic Control
159009M	Traffic Cone	100	U	0001	159	Traffic Control
159012M	Construction Signs	5,000	SF	0001	159	Traffic Control
159015M	Construction Identification Sign, 4' X 8'	6	U	0001	159	Traffic Control
159021P	Construction Barrier Curb	2,000	LF	0001	159	Traffic Control
159042M	Temporary Crash Cushion, Inertial Barrier System, 10 Modules	1	U	0001	159	Traffic Control
159054M	Temporary Crash Cushion, Inertial Barrier System, 14 Modules	1	U	0001	159	Traffic Control
159063M	Temporary Crash Cushion, Quadguard 3 Bays X 24" Wide	1	U	0001	159	Traffic Control
159075M	Temporary Crash Cushion, Quadguard 7 Bays X 24" Wide	1	U	0001	159	Traffic Control
159114M	Removable Black Line Masking Tape, 6"	5,000	LF	0001	159	Traffic Control
159123M	Temporary Pavement Marking Tape, 6"	5,000	LF	0001	159	Traffic Control
159126M	Temporary Traffic Stripes, 4"	200,000	LF	0001	159	Traffic Control
159129M	Temporary Traffic Stripes, 6"	20,000	LF	0001	159	Traffic Control
159132M	Temporary Pavement Markings	10,000	SF	0001	159	Traffic Control
159135M	Temporary Pavement Markers	2,000	U	0001	159	Traffic Control
501003P	Temporary Sheeting	870	SF	0007	501	Sheeting and Cofferdams
501003P	Temporary Sheeting	870	SF	0008	501	Sheeting and Cofferdams
501009P	Temporary Cofferdam	(1)	LS	0001	501	Sheeting and Cofferdams
605189P	Temporary Chain-Link Fence, 8' High	2,000	LF	0001	605	Fence

Table 29 - Case study equipment activity input Contract 13130 for constructing freeway/extra lane

Year	Description	Fuel Type	Power Rating	Hours	Air Conditioning
2008	Bore/Drill Rigs	Diesel	175	128.9	No
2008	Cement & Mortar Mixers	4 Stroke Gasoline (10% Ethanol RFG)	11	280.6	No
2008	Dumpers/Tenders	4 Stroke Gasoline (10% Ethanol RFG)	11	5.7	No
2008	Concrete/Industrial Saws	4 Stroke Gasoline (10% Ethanol RFG)	11	410	No
2008	Cranes	Diesel	300	137.3	No
2008	Crushing/Proc. Equipment	Diesel	75	0	No
2008	Crawler Tractors	Diesel	175	805.6	No
2008	Excavators	Diesel	175	1166.1	No
2008	Graders	Diesel	300	1270.6	No
2008	Off-Highway Tractors	Diesel	750	0	No
2008	Off-highway Trucks	Diesel	600	0	No
2008	Pavers	Diesel	175	1074.7	No
2008	Paving Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	395.5	No
2008	Plate Compactors	4 Stroke Gasoline (10% Ethanol RFG)	6	171.8	No
2008	Rollers	Diesel	100	2532.6	No
2008	Rough Terrain Forklifts	Diesel	100	1034.7	No
2008	Rubber Tire Loaders	Diesel	175	1167	No
2008	Scrapers	Diesel	600	1093.2	No
2008	Signal Boards	Diesel	25	6367.8	No
2008	Skid Steer Loaders	Diesel	75	151.3	No
2008	Surfacing Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	417.1	No
2008	Trenchers	Diesel	75	17.2	No
2008	Tampers/Rammers	2 Stroke Gasoline (10% Ethanol RFG)	6	60.1	No
2008	Tractors/Loaders/Backhoes	Diesel	100	2471.4	No
2008	Other Construction Equipment	Diesel	600	0	No
2008	Aerial Lifts	Diesel	75	214.1	No
2008	Forklifts	Gasoline (4 Stroke)	75	34.4	No
2008	Sweepers/Scrubbers	Diesel	175	566.3	No
2008	Other General Industrial Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	256.3	No
2008	Other Material Handling Equipment	Diesel	175	5.7	No
2008	Chain Saws	2 Stroke Gasoline (10% Ethanol RFG)	6	88.4	No

2008	Chippers/Stump Grinders (Commercial)	Diesel	100	0	No
2008	Commercial Turf Equipment (Comm.)	4 Stroke Gasoline (10% Ethanol RFG)	25	71.8	No
2008	Light Commercial Generator Sets	4 Stroke Gasoline (10% Ethanol RFG)	11	1791.1	No
2008	Light Commercial Pumps	4 Stroke Gasoline (10% Ethanol RFG)	6	660.2	No
2008	Light Commercial Air Compressors	4 Stroke Gasoline (10% Ethanol RFG)	6	1019.5	No
2008	Light Commercial Welders	4 Stroke Gasoline (10% Ethanol RFG)	16	54.5	No
2008	Light Commercial Pressure Washers	4 Stroke Gasoline (10% Ethanol RFG)	6	2.8	No

Table 30 - Case study equipment activity input Contract 13130 for constructing median, thrie beam barrier

Year	Description	Fuel Type	Power Rating	Hours	Air Conditioning
2008	Bore/Drill Rigs	Diesel	175	320	No
2008	Cement & Mortar Mixers	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Dumpers/Tenders	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Concrete/Industrial Saws	4 Stroke Gasoline (10% Ethanol RFG)	11	3.5	No
2008	Cranes	Diesel	300	0	No
2008	Crushing/Proc. Equipment	Diesel	75	0	No
2008	Crawler Tractors	Diesel	175	0	No
2008	Excavators	Diesel	175	27	No
2008	Graders	Diesel	300	67.5	No
2008	Off-Highway Tractors	Diesel	750	0	No
2008	Off-highway Trucks	Diesel	600	0	No
2008	Pavers	Diesel	175	5.2	No
2008	Paving Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	12.2	No
2008	Plate Compactors	4 Stroke Gasoline (10% Ethanol RFG)	6	4.3	No
2008	Rollers	Diesel	100	81.4	No
2008	Rough Terrain Forklifts	Diesel	100	7.8	No
2008	Rubber Tire Loaders	Diesel	175	93.6	No
2008	Scrapers	Diesel	600	0	No
2008	Signal Boards	Diesel	25	801.3	No
2008	Skid Steer Loaders	Diesel	75	142.4	No
2008	Surfacing Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	11.3	No
2008	Trenchers	Diesel	75	0	No
2008	Tampers/Rammers	2 Stroke Gasoline (10% Ethanol RFG)	6	6.1	No
2008	Tractors/Loaders/Backhoes	Diesel	100	120.3	No
2008	Other Construction Equipment	Diesel	600	0	No
2008	Aerial Lifts	Diesel	75	0	No
2008	Forklifts	Gasoline (4 Stroke)	75	0	No
2008	Sweepers/Scrubbers	Diesel	175	1.7	No
2008	Other General Industrial Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Other Material Handling Equipment	Diesel	175	0	No
2008	Chain Saws	2 Stroke Gasoline (10% Ethanol RFG)	6	0	No

2008	Chippers/Stump Grinders (Commercial)	Diesel	100	0	No
2008	Commercial Turf Equipment (Comm.)	4 Stroke Gasoline (10% Ethanol RFG)	25	0	No
2008	Light Commercial Generator Sets	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Light Commercial Pumps	4 Stroke Gasoline (10% Ethanol RFG)	6	0	No
2008	Light Commercial Air Compressors	4 Stroke Gasoline (10% Ethanol RFG)	6	199	No
2008	Light Commercial Welders	4 Stroke Gasoline (10% Ethanol RFG)	16	0	No
2008	Light Commercial Pressure Washers	4 Stroke Gasoline (10% Ethanol RFG)	6	0	No

Table 31 - Case study equipment activity input Contract 13130 for landscaping

Year	Description	Fuel Type	Power Rating	Hours	Air Conditioning
2008	Bore/Drill Rigs	Diesel	175	0	No
2008	Cement & Mortar Mixers	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Dumpers/Tenders	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Concrete/Industrial Saws	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Cranes	Diesel	300	0	No
2008	Crushing/Proc. Equipment	Diesel	75	0	No
2008	Crawler Tractors	Diesel	175	0.1	No
2008	Excavators	Diesel	175	0	No
2008	Graders	Diesel	300	0	No
2008	Off-Highway Tractors	Diesel	750	0	No
2008	Off-highway Trucks	Diesel	600	0	No
2008	Pavers	Diesel	175	0	No
2008	Paving Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Plate Compactors	4 Stroke Gasoline (10% Ethanol RFG)	6	0	No
2008	Rollers	Diesel	100	0.2	No
2008	Rough Terrain Forklifts	Diesel	100	0	No
2008	Rubber Tire Loaders	Diesel	175	1.7	No
2008	Scrapers	Diesel	600	0	No
2008	Signal Boards	Diesel	25	0	No
2008	Skid Steer Loaders	Diesel	75	26.8	No
2008	Surfacing Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Trenchers	Diesel	75	18.6	No
2008	Tampers/Rammers	2 Stroke Gasoline (10% Ethanol RFG)	6	0.2	No
2008	Tractors/Loaders/Backhoes	Diesel	100	1.5	No
2008	Other Construction Equipment	Diesel	600	0	No
2008	Aerial Lifts	Diesel	75	0	No
2008	Forklifts	Gasoline (4 Stroke)	75	0	No
2008	Sweepers/Scrubbers	Diesel	175	0	No
2008	Other General Industrial Equipment	4 Stroke Gasoline (10% Ethanol RFG)	11	0	No
2008	Other Material Handling Equipment	Diesel	175	0	No
2008	Chain Saws	2 Stroke Gasoline (10% Ethanol RFG)	6	0	No
2008	Chippers/Stump Grinders	Diesel	100	0.2	No

	(Commercial)				
2008	Commercial Turf Equipment (Comm.)	4 Stroke Gasoline (10% Ethanol RFG)	25	0	No
2008	Light Commercial Generator Sets	4 Stroke Gasoline (10% Ethanol RFG)	11	0.6	No
2008	Light Commercial Pumps	4 Stroke Gasoline (10% Ethanol RFG)	6	0	No
2008	Light Commercial Air Compressors	4 Stroke Gasoline (10% Ethanol RFG)	6	0	No
2008	Light Commercial Welders	4 Stroke Gasoline (10% Ethanol RFG)	16	0	No
2008	Light Commercial Pressure Washers	4 Stroke Gasoline (10% Ethanol RFG)	6	0	No

Table 32 - Case study equipment activity input Contract 13130 for generators

Year	Description	Fuel Type	Power Rating	Hours	Air Conditioning
2009	Light Commercial Generator Sets	Diesel	300	600	No

APPENDIX D:
ON-ROAD EMISSIONS FACTORS CALCULATED FOR THE TRAFFIC DISRUPTION MODULE

Table 33 - GHG emissions rates in grams per VMT by functional classification and vehicle type

Functional Classification	Description	Speed (mph)	Emissions Rate (g/mile) CO_2	CH_4	N_2O	BC	CO_2e
Freeways	Passenger Cars	2.5	825.925	1.12E-02	6.77E-02	5.17E-04	816.610
Freeways	Passenger Cars	5	451.016	6.27E-03	3.39E-02	3.14E-04	445.870
Freeways	Passenger Cars	10	266.725	3.76E-03	1.69E-02	2.00E-04	263.550
Freeways	Passenger Cars	15	212.520	2.86E-03	1.13E-02	1.37E-04	209.895
Freeways	Passenger Cars	20	180.554	2.37E-03	8.46E-03	1.13E-04	178.150
Freeways	Passenger Cars	25	162.687	2.13E-03	6.77E-03	1.14E-04	160.415
Freeways	Passenger Cars	30	152.989	2.05E-03	5.64E-03	1.31E-04	150.709
Freeways	Passenger Cars	35	148.188	2.05E-03	4.84E-03	1.69E-04	145.909
Freeways	Passenger Cars	40	145.637	2.06E-03	4.23E-03	1.99E-04	143.303
Freeways	Passenger Cars	45	143.223	2.05E-03	3.76E-03	2.18E-04	140.870
Freeways	Passenger Cars	50	139.356	1.98E-03	3.39E-03	2.18E-04	137.071
Freeways	Passenger Cars	55	135.624	1.86E-03	3.08E-03	2.00E-04	133.455
Freeways	Passenger Cars	60	132.195	1.80E-03	2.82E-03	1.88E-04	130.133
Freeways	Passenger Cars	65	133.573	1.86E-03	2.60E-03	1.82E-04	131.489
Freeways	Passenger Cars	70	137.535	2.08E-03	2.42E-03	1.82E-04	135.294
Freeways	Passenger Cars	75	142.662	2.41E-03	2.26E-03	1.95E-04	140.120
Freeways	Trucks & Buses	2.5	12,306.093	4.73E-01	1.68E-01	7.55E-01	12,249.787
Freeways	Trucks & Buses	5	6,262.379	2.41E-01	8.38E-02	3.81E-01	6,233.777
Freeways	Trucks & Buses	10	3,959.495	1.24E-01	4.18E-02	3.08E-01	3,943.393
Freeways	Trucks & Buses	15	3,605.092	8.31E-02	2.79E-02	3.62E-01	3,592.631
Freeways	Trucks & Buses	20	3,279.660	6.21E-02	2.10E-02	3.58E-01	3,269.320
Freeways	Trucks & Buses	25	3,079.837	5.21E-02	1.69E-02	3.54E-01	3,070.563
Freeways	Trucks & Buses	30	3,034.355	4.42E-02	1.41E-02	3.57E-01	3,025.860
Freeways	Trucks & Buses	35	2,580.613	3.95E-02	1.20E-02	2.64E-01	2,573.122
Freeways	Trucks & Buses	40	2,544.171	3.51E-02	1.05E-02	2.56E-01	2,537.139
Freeways	Trucks & Buses	45	2,516.684	3.17E-02	9.36E-03	2.49E-01	2,510.011
Freeways	Trucks & Buses	50	2,418.048	2.90E-02	8.42E-03	2.22E-01	2,411.737
Freeways	Trucks & Buses	55	2,296.716	2.67E-02	7.65E-03	1.89E-01	2,290.743
Freeways	Trucks & Buses	60	2,270.577	2.46E-02	7.01E-03	1.76E-01	2,264.870
Freeways	Trucks & Buses	65	2,401.506	2.28E-02	6.47E-03	1.88E-01	2,395.953
Freeways	Trucks & Buses	70	2,513.965	2.12E-02	6.01E-03	1.97E-01	2,508.541
Freeways	Trucks & Buses	75	2,445.993	1.99E-02	5.60E-03	1.92E-01	2,440.827
Freeways	Recreation Vehicles	2.5	1,300.661	6.43E-02	1.55E-02	5.70E-02	1,296.894

Freeways	Recreation Vehicles	5	662.013	3.27E-02	7.77E-03	2.88E-02	660.102
Freeways	Recreation Vehicles	10	416.083	1.68E-02	3.86E-03	2.29E-02	415.006
Freeways	Recreation Vehicles	15	375.189	1.13E-02	2.55E-03	2.62E-02	374.353
Freeways	Recreation Vehicles	20	340.917	8.47E-03	1.91E-03	2.60E-02	340.220
Freeways	Recreation Vehicles	25	319.225	7.09E-03	1.53E-03	2.55E-02	318.602
Freeways	Recreation Vehicles	30	314.282	6.00E-03	1.27E-03	2.58E-02	313.716
Freeways	Recreation Vehicles	35	268.111	5.37E-03	1.09E-03	1.93E-02	267.610
Freeways	Recreation Vehicles	40	264.246	4.78E-03	9.57E-04	1.87E-02	263.777
Freeways	Recreation Vehicles	45	261.239	4.32E-03	8.50E-04	1.83E-02	260.793
Freeways	Recreation Vehicles	50	250.885	3.94E-03	7.65E-04	1.64E-02	250.464
Freeways	Recreation Vehicles	55	238.153	3.63E-03	6.95E-04	1.41E-02	237.754
Freeways	Recreation Vehicles	60	234.596	3.35E-03	6.35E-04	1.33E-02	234.214
Freeways	Recreation Vehicles	65	248.423	3.09E-03	5.86E-04	1.41E-02	248.056
Freeways	Recreation Vehicles	70	260.355	2.87E-03	5.45E-04	1.48E-02	260.001
Freeways	Recreation Vehicles	75	253.618	2.68E-03	5.09E-04	1.44E-02	253.282
Arterial Roads	Passenger Cars	2.5	848.578	1.17E-02	3.95E-02	5.41E-04	839.038
Arterial Roads	Passenger Cars	5	470.850	6.55E-03	1.98E-02	3.48E-04	465.383
Arterial Roads	Passenger Cars	10	285.539	4.08E-03	9.88E-03	2.51E-04	281.932
Arterial Roads	Passenger Cars	15	226.391	3.30E-03	6.58E-03	2.20E-04	223.326
Arterial Roads	Passenger Cars	20	195.862	2.85E-03	4.94E-03	1.91E-04	193.087
Arterial Roads	Passenger Cars	25	174.684	2.44E-03	3.95E-03	1.48E-04	172.252
Arterial Roads	Passenger Cars	30	157.944	2.22E-03	3.29E-03	1.37E-04	155.622
Arterial Roads	Passenger Cars	35	147.381	1.94E-03	2.82E-03	1.29E-04	145.361
Arterial Roads	Passenger Cars	40	141.540	1.75E-03	2.47E-03	1.22E-04	139.705
Arterial Roads	Passenger Cars	45	137.226	1.62E-03	2.19E-03	1.19E-04	135.518
Arterial Roads	Passenger Cars	50	134.141	1.55E-03	1.98E-03	1.20E-04	132.509
Arterial Roads	Passenger Cars	55	132.227	1.51E-03	1.80E-03	1.21E-04	130.634
Arterial Roads	Passenger Cars	60	130.503	1.50E-03	1.65E-03	1.22E-04	128.948
Arterial Roads	Passenger Cars	65	132.126	1.59E-03	1.52E-03	1.26E-04	130.472
Arterial Roads	Passenger Cars	70	136.712	1.85E-03	1.41E-03	1.36E-04	134.881
Arterial Roads	Passenger Cars	75	143.301	2.25E-03	1.32E-03	1.59E-04	141.092
Arterial Roads	Trucks & Buses	2.5	5,204.386	2.14E-01	7.29E-02	2.99E-01	5,180.674
Arterial Roads	Trucks & Buses	5	2,603.796	1.07E-01	3.62E-02	1.50E-01	2,591.914

Arterial Roads	Trucks & Buses	10	1,662.058	5.47E-02	1.80E-02	1.22E-01	1,655.308
Arterial Roads	Trucks & Buses	15	1,522.368	3.68E-02	1.20E-02	1.43E-01	1,517.080
Arterial Roads	Trucks & Buses	20	1,381.156	2.75E-02	9.05E-03	1.40E-01	1,376.705
Arterial Roads	Trucks & Buses	25	1,289.584	2.32E-02	7.25E-03	1.37E-01	1,285.575
Arterial Roads	Trucks & Buses	30	1,264.790	1.97E-02	6.07E-03	1.37E-01	1,261.100
Arterial Roads	Trucks & Buses	35	1,059.761	1.76E-02	5.18E-03	9.89E-02	1,056.560
Arterial Roads	Trucks & Buses	40	1,035.892	1.57E-02	4.53E-03	9.37E-02	1,032.909
Arterial Roads	Trucks & Buses	45	1,017.250	1.42E-02	4.03E-03	8.97E-02	1,014.437
Arterial Roads	Trucks & Buses	50	969.447	1.29E-02	3.62E-03	7.82E-02	966.800
Arterial Roads	Trucks & Buses	55	914.097	1.19E-02	3.29E-03	6.44E-02	911.599
Arterial Roads	Trucks & Buses	60	900.715	1.10E-02	3.01E-03	5.94E-02	898.346
Arterial Roads	Trucks & Buses	65	960.494	1.01E-02	2.78E-03	6.45E-02	958.155
Arterial Roads	Trucks & Buses	70	1,012.202	9.44E-03	2.59E-03	6.89E-02	1,009.882
Arterial Roads	Trucks & Buses	75	984.132	8.82E-03	2.41E-03	6.72E-02	981.906
Arterial Roads	Recreation Vehicles	2.5	1,046.659	5.49E-02	1.33E-02	4.12E-02	1,043.973
Arterial Roads	Recreation Vehicles	5	523.963	2.75E-02	6.63E-03	2.06E-02	522.619
Arterial Roads	Recreation Vehicles	10	331.496	1.41E-02	3.28E-03	1.64E-02	330.736
Arterial Roads	Recreation Vehicles	15	299.855	9.50E-03	2.16E-03	1.85E-02	299.259
Arterial Roads	Recreation Vehicles	20	271.219	7.13E-03	1.62E-03	1.81E-02	270.720
Arterial Roads	Recreation Vehicles	25	252.190	5.97E-03	1.29E-03	1.76E-02	251.744
Arterial Roads	Recreation Vehicles	30	246.685	5.07E-03	1.07E-03	1.76E-02	246.280
Arterial Roads	Recreation Vehicles	35	207.158	4.57E-03	9.19E-04	1.29E-02	206.801
Arterial Roads	Recreation Vehicles	40	202.030	4.07E-03	8.03E-04	1.22E-02	201.695
Arterial Roads	Recreation Vehicles	45	198.001	3.68E-03	7.12E-04	1.17E-02	197.684
Arterial Roads	Recreation Vehicles	50	188.364	3.36E-03	6.40E-04	1.03E-02	188.065
Arterial Roads	Recreation Vehicles	55	177.336	3.10E-03	5.81E-04	8.66E-03	177.053
Arterial Roads	Recreation Vehicles	60	173.921	2.85E-03	5.30E-04	8.02E-03	173.650
Arterial Roads	Recreation Vehicles	65	186.068	2.63E-03	4.91E-04	8.69E-03	185.808
Arterial Roads	Recreation Vehicles	70	196.679	2.44E-03	4.57E-04	9.27E-03	196.428
Arterial Roads	Recreation Vehicles	75	191.660	2.27E-03	4.27E-04	9.05E-03	191.422
Collector Roads	Passenger Cars	2.5	164.113	2.27E-03	1.30E-02	1.04E-04	162.254
Collector Roads	Passenger Cars	5	91.019	1.27E-03	6.52E-03	6.69E-05	89.955

Collector Roads	Passenger Cars	10	55.178	7.91E-04	3.26E-03	4.84E-05	54.477
Collector Roads	Passenger Cars	15	43.752	6.41E-04	2.17E-03	4.23E-05	43.156
Collector Roads	Passenger Cars	20	37.857	5.53E-04	1.63E-03	3.68E-05	37.317
Collector Roads	Passenger Cars	25	33.766	4.74E-04	1.30E-03	2.86E-05	33.293
Collector Roads	Passenger Cars	30	30.540	4.30E-04	1.09E-03	2.65E-05	30.087
Collector Roads	Passenger Cars	35	28.501	3.78E-04	9.32E-04	2.50E-05	28.107
Collector Roads	Passenger Cars	40	27.382	3.40E-04	8.15E-04	2.38E-05	27.025
Collector Roads	Passenger Cars	45	26.550	3.15E-04	7.25E-04	2.32E-05	26.217
Collector Roads	Passenger Cars	50	25.949	3.00E-04	6.52E-04	2.33E-05	25.632
Collector Roads	Passenger Cars	55	25.581	2.92E-04	5.93E-04	2.34E-05	25.271
Collector Roads	Passenger Cars	60	25.228	2.90E-04	5.43E-04	2.36E-05	24.925
Collector Roads	Passenger Cars	65	25.536	3.08E-04	5.02E-04	2.43E-05	25.215
Collector Roads	Passenger Cars	70	26.424	3.58E-04	4.66E-04	2.61E-05	26.068
Collector Roads	Passenger Cars	75	27.691	4.35E-04	4.35E-04	3.07E-05	27.262
Collector Roads	Trucks & Buses	2.5	1,207.538	4.95E-02	2.56E-02	6.98E-02	1,202.128
Collector Roads	Trucks & Buses	5	604.105	2.48E-02	1.27E-02	3.49E-02	601.395
Collector Roads	Trucks & Buses	10	385.918	1.27E-02	6.34E-03	2.85E-02	384.380
Collector Roads	Trucks & Buses	15	353.755	8.52E-03	4.23E-03	3.33E-02	352.553
Collector Roads	Trucks & Buses	20	321.006	6.37E-03	3.18E-03	3.27E-02	319.997
Collector Roads	Trucks & Buses	25	299.783	5.36E-03	2.55E-03	3.20E-02	298.876
Collector Roads	Trucks & Buses	30	294.069	4.55E-03	2.13E-03	3.21E-02	293.237
Collector Roads	Trucks & Buses	35	246.351	4.08E-03	1.82E-03	2.31E-02	245.627
Collector Roads	Trucks & Buses	40	240.841	3.63E-03	1.59E-03	2.19E-02	240.166
Collector Roads	Trucks & Buses	45	236.540	3.28E-03	1.42E-03	2.09E-02	235.903
Collector Roads	Trucks & Buses	50	225.431	2.99E-03	1.27E-03	1.83E-02	224.831
Collector Roads	Trucks & Buses	55	212.551	2.75E-03	1.16E-03	1.50E-02	211.985
Collector Roads	Trucks & Buses	60	209.496	2.54E-03	1.06E-03	1.39E-02	208.958
Collector Roads	Trucks & Buses	65	223.382	2.35E-03	9.78E-04	1.50E-02	222.853
Collector Roads	Trucks & Buses	70	235.383	2.19E-03	9.09E-04	1.61E-02	234.859
Collector Roads	Trucks & Buses	75	228.821	2.04E-03	8.46E-04	1.57E-02	228.320
Collector Roads	Recreation Vehicles	2.5	224.631	1.17E-02	4.29E-03	8.92E-03	224.051
Collector Roads	Recreation Vehicles	5	112.445	5.87E-03	2.14E-03	4.46E-03	112.155
Collector Roads	Recreation Vehicles	10	71.194	3.01E-03	1.06E-03	3.54E-03	71.030
Collector Roads	Recreation Vehicles	15	64.447	2.03E-03	6.99E-04	4.01E-03	64.318
Collector Roads	Recreation Vehicles	20	58.309	1.52E-03	5.23E-04	3.93E-03	58.202
Collector Roads	Recreation Vehicles	25	54.230	1.28E-03	4.16E-04	3.82E-03	54.134
Collector Roads	Recreation Vehicles	30	53.060	1.08E-03	3.46E-04	3.83E-03	52.973
Collector Roads	Recreation	35	44.553	9.76E-04	2.97E-04	2.79E-03	44.476

	Vehicles						
Collector Roads	Recreation Vehicles	40	43.460	8.69E-04	2.60E-04	2.66E-03	43.388
Collector Roads	Recreation Vehicles	45	42.602	7.86E-04	2.30E-04	2.55E-03	42.534
Collector Roads	Recreation Vehicles	50	40.534	7.18E-04	2.07E-04	2.24E-03	40.470
Collector Roads	Recreation Vehicles	55	38.163	6.61E-04	1.88E-04	1.88E-03	38.102
Collector Roads	Recreation Vehicles	60	37.438	6.10E-04	1.72E-04	1.74E-03	37.379
Collector Roads	Recreation Vehicles	65	40.044	5.62E-04	1.59E-04	1.88E-03	39.988
Collector Roads	Recreation Vehicles	70	42.318	5.20E-04	1.48E-04	2.01E-03	42.264
Collector Roads	Recreation Vehicles	75	41.230	4.85E-04	1.38E-04	1.96E-03	41.179
Local Roads	Passenger Cars	2.5	303.009	4.17E-03	1.52E-02	1.93E-04	299.599
Local Roads	Passenger Cars	5	168.122	2.34E-03	7.58E-03	1.24E-04	166.168
Local Roads	Passenger Cars	10	101.951	1.46E-03	3.79E-03	8.99E-05	100.662
Local Roads	Passenger Cars	15	80.833	1.18E-03	2.53E-03	7.86E-05	79.738
Local Roads	Passenger Cars	20	69.934	1.02E-03	1.90E-03	6.83E-05	68.942
Local Roads	Passenger Cars	25	62.372	8.73E-04	1.52E-03	5.31E-05	61.503
Local Roads	Passenger Cars	30	56.397	7.92E-04	1.26E-03	4.92E-05	55.567
Local Roads	Passenger Cars	35	52.626	6.94E-04	1.08E-03	4.62E-05	51.904
Local Roads	Passenger Cars	40	50.543	6.24E-04	9.48E-04	4.38E-05	49.887
Local Roads	Passenger Cars	45	49.003	5.77E-04	8.42E-04	4.26E-05	48.392
Local Roads	Passenger Cars	50	47.900	5.52E-04	7.58E-04	4.29E-05	47.317
Local Roads	Passenger Cars	55	47.217	5.39E-04	6.89E-04	4.32E-05	46.648
Local Roads	Passenger Cars	60	46.598	5.35E-04	6.32E-04	4.37E-05	46.042
Local Roads	Passenger Cars	65	47.176	5.69E-04	5.83E-04	4.50E-05	46.585
Local Roads	Passenger Cars	70	48.814	6.61E-04	5.42E-04	4.85E-05	48.160
Local Roads	Passenger Cars	75	51.165	8.05E-04	5.05E-04	5.70E-05	50.376
Local Roads	Trucks & Buses	2.5	1,896.749	7.79E-02	2.82E-02	1.09E-01	1,888.124
Local Roads	Trucks & Buses	5	948.952	3.89E-02	1.40E-02	5.46E-02	944.631
Local Roads	Trucks & Buses	10	605.794	1.99E-02	6.97E-03	4.46E-02	603.339
Local Roads	Trucks & Buses	15	554.930	1.34E-02	4.66E-03	5.21E-02	553.007
Local Roads	Trucks & Buses	20	503.468	1.00E-02	3.50E-03	5.11E-02	501.850
Local Roads	Trucks & Buses	25	470.099	8.44E-03	2.80E-03	5.00E-02	468.642
Local Roads	Trucks & Buses	30	461.070	7.16E-03	2.35E-03	5.01E-02	459.729
Local Roads	Trucks & Buses	35	386.319	6.42E-03	2.00E-03	3.61E-02	385.156
Local Roads	Trucks & Buses	40	377.625	5.71E-03	1.75E-03	3.42E-02	376.541
Local Roads	Trucks & Buses	45	370.836	5.16E-03	1.56E-03	3.27E-02	369.813
Local Roads	Trucks & Buses	50	353.410	4.71E-03	1.40E-03	2.85E-02	352.448
Local Roads	Trucks & Buses	55	333.231	4.33E-03	1.27E-03	2.35E-02	332.323
Local Roads	Trucks & Buses	60	328.363	3.99E-03	1.16E-03	2.17E-02	327.502
Local Roads	Trucks & Buses	65	350.153	3.70E-03	1.08E-03	2.35E-02	349.303
Local Roads	Trucks & Buses	70	368.998	3.44E-03	1.00E-03	2.51E-02	368.156
Local Roads	Trucks & Buses	75	358.759	3.21E-03	9.31E-04	2.45E-02	357.951

Local Roads	Recreation Vehicles	2.5	378.081	1.98E-02	5.07E-03	1.49E-02	377.110
Local Roads	Recreation Vehicles	5	189.268	9.92E-03	2.54E-03	7.46E-03	188.782
Local Roads	Recreation Vehicles	10	119.755	5.08E-03	1.26E-03	5.91E-03	119.480
Local Roads	Recreation Vehicles	15	108.334	3.43E-03	8.26E-04	6.69E-03	108.118
Local Roads	Recreation Vehicles	20	97.991	2.57E-03	6.18E-04	6.55E-03	97.811
Local Roads	Recreation Vehicles	25	91.118	2.16E-03	4.92E-04	6.36E-03	90.957
Local Roads	Recreation Vehicles	30	89.132	1.83E-03	4.10E-04	6.38E-03	88.986
Local Roads	Recreation Vehicles	35	74.849	1.65E-03	3.52E-04	4.65E-03	74.720
Local Roads	Recreation Vehicles	40	72.998	1.47E-03	3.07E-04	4.43E-03	72.877
Local Roads	Recreation Vehicles	45	71.544	1.33E-03	2.72E-04	4.25E-03	71.430
Local Roads	Recreation Vehicles	50	68.063	1.21E-03	2.45E-04	3.74E-03	67.955
Local Roads	Recreation Vehicles	55	64.079	1.12E-03	2.22E-04	3.13E-03	63.976
Local Roads	Recreation Vehicles	60	62.847	1.03E-03	2.03E-04	2.90E-03	62.749
Local Roads	Recreation Vehicles	65	67.234	9.49E-04	1.88E-04	3.14E-03	67.140
Local Roads	Recreation Vehicles	70	71.067	8.79E-04	1.75E-04	3.35E-03	70.976
Local Roads	Recreation Vehicles	75	69.251	8.20E-04	1.63E-04	3.27E-03	69.165

APPENDIX E:
COMPLETE OUTPUT FOR APPLIED CASE STUDIES

Table 34 - Emissions estimates from crack seal analysis #1

Materials					
Direct CO2	40,356.23	(g)	Upstream CO2	1,002,867.93	(g)
Direct CH4	0.59	(g)	Upstream CH4	7,673.48	(g)
Direct N2O	0.61	(g)	Upstream N2O	13.86	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	2.97	(mg)
Direct CO2e	40,553.35	**(g)**	**Upstream CO2e**	1,198,902.25	**(g)**
			Combined CO2e	1,239,455.60	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	267,004.72	(g)	Upstream CO2	60,071.20	(g)
Direct CH4	16.95	(g)	Upstream CH4	459.46	(g)
Direct N2O	4.91	(g)	Upstream N2O	0.79	(g)
Direct PMBC	11.95	(g)	Upstream PMBC	4.34	(g)
Direct CO2e from HFCs	171.00	(g)	Upstream SF6	1,282.30	(mg)
Direct CO2e	269,061.39	**(g)**	**Upstream CO2e**	75,693.37	**(g)**
			Combined CO2e	344,754.76	**(g)**
Vehicle Running Emissions					
Direct CO2	4,255.70	(g)	Upstream CO2	864.58	(g)
Direct CH4	0.05	(g)	Upstream CH4	5.84	(g)
Direct N2O	0.01	(g)	Upstream N2O	0.02	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.45	(g)	Upstream SF6	0.13	(mg)
Direct CO2e	4,261.52	**(g)**	**Upstream CO2e**	1,025.22	**(g)**
			Combined CO2e	5,286.74	**(g)**

Total Emissions					
Direct CO2	311,616.65	(g)	Upstream CO2	1,063,803.70	(g)
Direct CH4	17.59	(g)	Upstream CH4	8,138.78	(g)
Direct N2O	5.53	(g)	Upstream N2O	14.67	(g)
Direct PMBC	11.95	(g)	Upstream PMBC	4.34	(g)
Direct CO2e from HFCs	171.45	(g)	Upstream SF6	1,285.41	(mg)
Direct CO2e	313,876.26	**(g)**	**Upstream CO2e**	1,275,620.84	**(g)**
			Combined CO2e	1,589,497.10	**(g)**

Table 35 - Emissions estimates from crack seal analysis #2

Materials					
Direct CO2	9,521.73	(g)	Upstream CO2	236,618.69	(g)
Direct CH4	0.14	(g)	Upstream CH4	1,810.50	(g)
Direct N2O	0.14	(g)	Upstream N2O	3.27	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.70	(mg)
Direct CO2e	9,568.24	**(g)**	**Upstream CO2e**	282,871.43	**(g)**
			Combined CO2e	292,439.67	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	35,079.61	(g)	Upstream CO2	7,834.02	(g)
Direct CH4	2.70	(g)	Upstream CH4	59.92	(g)
Direct N2O	0.58	(g)	Upstream N2O	0.10	(g)
Direct PMBC	1.29	(g)	Upstream PMBC	0.46	(g)
Direct CO2e from HFCs	18.00	(g)	Upstream SF6	167.23	(mg)
Direct CO2e	35,339.31	**(g)**	**Upstream CO2e**	9,773.29	**(g)**
			Combined CO2e	45,112.60	**(g)**

Vehicle Running Emissions					
Direct CO2	1,540.91	(g)	Upstream CO2	313.05	(g)
Direct CH4	0.01	(g)	Upstream CH4	2.11	(g)
Direct N2O	0.01	(g)	Upstream N2O	0.01	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.27	(g)	Upstream SF6	0.05	(mg)
Direct CO2e	1,543.18	**(g)**	**Upstream CO2e**	373.66	**(g)**
			Combined CO2e	1,916.84	**(g)**
Total Emissions					
Direct CO2	46,142.25	(g)	Upstream CO2	244,765.76	(g)
Direct CH4	2.85	(g)	Upstream CH4	1,872.53	(g)
Direct N2O	0.73	(g)	Upstream N2O	3.38	(g)
Direct PMBC	1.29	(g)	Upstream PMBC	0.46	(g)
Direct CO2e from HFCs	18.27	(g)	Upstream SF6	167.98	(mg)
Direct CO2e	46,450.74	**(g)**	**Upstream CO2e**	293,018.37	**(g)**
			Combined CO2e	339,469.11	**(g)**

Table 36 - Emissions estimates from crack seal analysis #3

Materials					
Direct CO2	11,463.51	(g)	Upstream CO2	284,872.63	(g)
Direct CH4	0.17	(g)	Upstream CH4	2,179.71	(g)
Direct N2O	0.17	(g)	Upstream N2O	3.94	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.84	(mg)
Direct CO2e	11,519.50	**(g)**	**Upstream CO2e**	340,557.74	**(g)**
			Combined CO2e	352,077.24	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**

Vehicle Idling Emissions					
Direct CO2	295,426.02	(g)	Upstream CO2	66,815.00	(g)
Direct CH4	15.90	(g)	Upstream CH4	511.04	(g)
Direct N2O	5.79	(g)	Upstream N2O	0.88	(g)
Direct PMBC	14.87	(g)	Upstream PMBC	5.48	(g)
Direct CO2e from HFCs	324.00	(g)	Upstream SF6	1,426.26	(mg)
Direct CO2e	297,872.64	**(g)**	**Upstream CO2e**	87,241.68	**(g)**
			Combined CO2e	385,114.33	**(g)**
Vehicle Running Emissions					
Direct CO2	2,957.83	(g)	Upstream CO2	600.91	(g)
Direct CH4	0.03	(g)	Upstream CH4	4.06	(g)
Direct N2O	0.01	(g)	Upstream N2O	0.01	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	1.35	(g)	Upstream SF6	0.09	(mg)
Direct CO2e	2,962.93	**(g)**	**Upstream CO2e**	736.21	**(g)**
			Combined CO2e	3,699.14	**(g)**
Total Emissions					
Direct CO2	309,847.36	(g)	Upstream CO2	352,288.54	(g)
Direct CH4	16.10	(g)	Upstream CH4	2,694.81	(g)
Direct N2O	5.97	(g)	Upstream N2O	4.83	(g)
Direct PMBC	14.87	(g)	Upstream PMBC	5.48	(g)
Direct CO2e from HFCs	325.35	(g)	Upstream SF6	1,427.19	(mg)
Direct CO2e	312,355.08	**(g)**	**Upstream CO2e**	428,535.63	**(g)**
			Combined CO2e	740,890.71	**(g)**

Table 37 - Emissions estimates from manual patch analysis #1

Materials					
Direct CO2	6,913.25	(g)	Upstream CO2	36,908.22	(g)
Direct CH4	0.10	(g)	Upstream CH4	267.95	(g)
Direct N2O	0.11	(g)	Upstream N2O	0.54	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	2.19	(mg)
Direct CO2e	6,947.15	**(g)**	**Upstream CO2e**	43,819.40	(g)
			Combined CO2e	50,766.55	(g)
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	224,846.08	(g)	Upstream CO2	50,586.27	(g)
Direct CH4	14.27	(g)	Upstream CH4	386.92	(g)
Direct N2O	4.13	(g)	Upstream N2O	0.67	(g)
Direct PMBC	10.06	(g)	Upstream PMBC	3.65	(g)
Direct CO2e from HFCs	288.00	(g)	Upstream SF6	1,079.83	(mg)
Direct CO2e	226,722.01	**(g)**	**Upstream CO2e**	67,024.98	**(g)**
			Combined CO2e	293,747.00	**(g)**
Vehicle Running Emissions					
Direct CO2	4,619.29	(g)	Upstream CO2	938.44	(g)
Direct CH4	0.05	(g)	Upstream CH4	6.34	(g)
Direct N2O	0.02	(g)	Upstream N2O	0.02	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	2.10	(g)	Upstream SF6	0.14	(mg)
Direct CO2e	4,627.32	**(g)**	**Upstream CO2e**	1,149.49	**(g)**
			Combined CO2e	5,776.81	**(g)**

Total Emissions					
Direct CO2	236,378.62	(g)	Upstream CO2	88,432.94	(g)
Direct CH4	14.43	(g)	Upstream CH4	661.20	(g)
Direct N2O	4.25	(g)	Upstream N2O	1.23	(g)
Direct PMBC	10.06	(g)	Upstream PMBC	3.65	(g)
Direct CO2e from HFCs	290.10	(g)	Upstream SF6	1,082.17	(mg)
Direct CO2e	238,296.49	**(g)**	**Upstream CO2e**	111,993.87	**(g)**
			Combined CO2e	350,290.36	**(g)**

Table 38 - Emissions estimates from manual patch analysis #2

Materials					
Direct CO2	1,739.17	(g)	Upstream CO2	9,229.40	(g)
Direct CH4	0.03	(g)	Upstream CH4	67.07	(g)
Direct N2O	0.03	(g)	Upstream N2O	0.14	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.55	(mg)
Direct CO2e	1,747.71	**(g)**	**Upstream CO2e**	10,959.21	**(g)**
			Combined CO2e	12,706.92	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	21,131.91	(g)	Upstream CO2	4,812.55	(g)
Direct CH4	0.87	(g)	Upstream CH4	36.81	(g)
Direct N2O	0.45	(g)	Upstream N2O	0.06	(g)
Direct PMBC	1.22	(g)	Upstream PMBC	0.46	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	102.73	(mg)
Direct CO2e	21,287.19	**(g)**	**Upstream CO2e**	5,751.76	**(g)**
			Combined CO2e	27,038.95	**(g)**

Vehicle Running Emissions					
Direct CO2	891.66	(g)	Upstream CO2	181.15	(g)
Direct CH4	0.00	(g)	Upstream CH4	1.22	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.03	(mg)
Direct CO2e	892.51	**(g)**	**Upstream CO2e**	212.66	**(g)**
			Combined CO2e	1,105.17	**(g)**
Total Emissions					
Direct CO2	23,762.74	(g)	Upstream CO2	14,223.10	(g)
Direct CH4	0.90	(g)	Upstream CH4	105.10	(g)
Direct N2O	0.48	(g)	Upstream N2O	0.20	(g)
Direct PMBC	1.22	(g)	Upstream PMBC	0.46	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	103.31	(mg)
Direct CO2e	23,927.41	**(g)**	**Upstream CO2e**	16,923.63	**(g)**
			Combined CO2e	40,851.04	**(g)**

Table 39 - Emissions estimates from manual patch analysis #3

Materials					
Direct CO2	695.67	(g)	Upstream CO2	3,691.76	(g)
Direct CH4	0.01	(g)	Upstream CH4	26.83	(g)
Direct N2O	0.01	(g)	Upstream N2O	0.05	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.22	(mg)
Direct CO2e	699.08	**(g)**	**Upstream CO2e**	4,383.69	**(g)**
			Combined CO2e	5,082.77	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**

Vehicle Idling Emissions					
Direct CO2	10,565.96	(g)	Upstream CO2	2,406.28	(g)
Direct CH4	0.43	(g)	Upstream CH4	18.40	(g)
Direct N2O	0.22	(g)	Upstream N2O	0.03	(g)
Direct PMBC	0.61	(g)	Upstream PMBC	0.23	(g)
Direct CO2e from HFCs	9.00	(g)	Upstream SF6	51.37	(mg)
Direct CO2e	10,652.59	**(g)**	**Upstream CO2e**	3,081.08	**(g)**
			Combined CO2e	13,733.67	**(g)**
Vehicle Running Emissions					
Direct CO2	222.91	(g)	Upstream CO2	45.29	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.31	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.09	(g)	Upstream SF6	0.01	(mg)
Direct CO2e	223.22	**(g)**	**Upstream CO2e**	55.22	**(g)**
			Combined CO2e	278.43	**(g)**
Total Emissions					
Direct CO2	11,484.54	(g)	Upstream CO2	6,143.32	(g)
Direct CH4	0.44	(g)	Upstream CH4	45.54	(g)
Direct N2O	0.24	(g)	Upstream N2O	0.09	(g)
Direct PMBC	0.61	(g)	Upstream PMBC	0.23	(g)
Direct CO2e from HFCs	9.09	(g)	Upstream SF6	51.59	(mg)
Direct CO2e	11,574.90	**(g)**	**Upstream CO2e**	7,519.98	**(g)**
			Combined CO2e	19,094.88	**(g)**

Table 40 - Emissions estimates from Pothole Killer analysis #1

Materials					
Direct CO2	1,693.49	(g)	Upstream CO2	152,513.27	(g)
Direct CH4	0.02	(g)	Upstream CH4	1,141.25	(g)
Direct N2O	0.03	(g)	Upstream N2O	2.10	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.46	(mg)
Direct CO2e	1,701.76	**(g)**	**Upstream CO2e**	181,681.36	**(g)**
			Combined CO2e	183,383.13	**(g)**

Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	253,582.93	(g)	Upstream CO2	57,750.60	(g)
Direct CH4	10.39	(g)	Upstream CH4	441.71	(g)
Direct N2O	5.38	(g)	Upstream N2O	0.76	(g)
Direct PMBC	14.66	(g)	Upstream PMBC	5.48	(g)
Direct CO2e from HFCs	108.00	(g)	Upstream SF6	1,232.77	(mg)
Direct CO2e	255,554.26	**(g)**	**Upstream CO2e**	71,483.49	**(g)**
			Combined CO2e	327,037.76	**(g)**
Vehicle Running Emissions					
Direct CO2	22,909.28	(g)	Upstream CO2	4,654.19	(g)
Direct CH4	0.06	(g)	Upstream CH4	31.42	(g)
Direct N2O	0.07	(g)	Upstream N2O	0.08	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	4.75	(g)	Upstream SF6	0.70	(mg)
Direct CO2e	22,935.50	**(g)**	**Upstream CO2e**	5,572.00	**(g)**
			Combined CO2e	28,507.50	**(g)**
Total Emissions					
Direct CO2	278,185.70	(g)	Upstream CO2	214,918.07	(g)
Direct CH4	10.48	(g)	Upstream CH4	1,614.38	(g)
Direct N2O	5.47	(g)	Upstream N2O	2.95	(g)
Direct PMBC	14.66	(g)	Upstream PMBC	5.48	(g)
Direct CO2e from HFCs	112.75	(g)	Upstream SF6	1,233.92	(mg)
Direct CO2e	280,191.52	**(g)**	**Upstream CO2e**	258,736.86	**(g)**
			Combined CO2e	538,928.38	**(g)**

Table 41 - Emissions estimates from Pothole Killer analysis #2

Materials					
Direct CO2	12,829.47	(g)	Upstream CO2	1,155,403.57	(g)
Direct CH4	0.19	(g)	Upstream CH4	8,645.83	(g)
Direct N2O	0.19	(g)	Upstream N2O	15.93	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	3.45	(mg)
Direct CO2e	12,892.14	**(g)**	**Upstream CO2e**	1,376,373.97	**(g)**
			Combined CO2e	1,389,266.11	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	338,110.57	(g)	Upstream CO2	77,000.81	(g)
Direct CH4	13.86	(g)	Upstream CH4	588.95	(g)
Direct N2O	7.17	(g)	Upstream N2O	1.02	(g)
Direct PMBC	19.54	(g)	Upstream PMBC	7.30	(g)
Direct CO2e from HFCs	288.00	(g)	Upstream SF6	1,643.69	(mg)
Direct CO2e	340,883.02	**(g)**	**Upstream CO2e**	98,594.52	**(g)**
			Combined CO2e	439,477.54	**(g)**
Vehicle Running Emissions					
Direct CO2	19,391.46	(g)	Upstream CO2	3,939.52	(g)
Direct CH4	0.05	(g)	Upstream CH4	26.59	(g)
Direct N2O	0.06	(g)	Upstream N2O	0.07	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	8.04	(g)	Upstream SF6	0.59	(mg)
Direct CO2e	19,417.67	**(g)**	**Upstream CO2e**	4,808.02	**(g)**
			Combined CO2e	24,225.68	**(g)**

Total Emissions					
Direct CO2	370,331.50	(g)	Upstream CO2	1,236,343.90	(g)
Direct CH4	14.10	(g)	Upstream CH4	9,261.38	(g)
Direct N2O	7.43	(g)	Upstream N2O	17.01	(g)
Direct PMBC	19.54	(g)	Upstream PMBC	7.30	(g)
Direct CO2e from HFCs	296.04	(g)	Upstream SF6	1,647.73	(mg)
Direct CO2e	373,192.82	**(g)**	**Upstream CO2e**	1,479,776.52	**(g)**
			Combined CO2e	1,852,969.34	**(g)**

Table 42 - Emissions estimates from Pothole Killer analysis #3

Materials					
Direct CO2	6,978.42	(g)	Upstream CO2	36,922.29	(g)
Direct CH4	0.11	(g)	Upstream CH4	268.43	(g)
Direct N2O	0.11	(g)	Upstream N2O	0.54	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	2.19	(mg)
Direct CO2e	7,012.68	**(g)**	**Upstream CO2e**	43,845.59	**(g)**
			Combined CO2e	50,858.27	**(g)**
Generators					
Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2e	0.00	**(g)**	**Upstream CO2e**	0.00	**(g)**
			Combined CO2e	0.00	**(g)**
Vehicle Idling Emissions					
Direct CO2	169,055.28	(g)	Upstream CO2	38,500.40	(g)
Direct CH4	6.93	(g)	Upstream CH4	294.48	(g)
Direct N2O	3.59	(g)	Upstream N2O	0.51	(g)
Direct PMBC	9.77	(g)	Upstream PMBC	3.65	(g)
Direct CO2e from HFCs	144.00	(g)	Upstream SF6	821.84	(mg)
Direct CO2e	170,441.51	**(g)**	**Upstream CO2e**	49,297.26	**(g)**
			Combined CO2e	219,738.77	**(g)**

Vehicle Running Emissions					
Direct CO2	5,990.32	(g)	Upstream CO2	1,216.98	(g)
Direct CH4	0.02	(g)	Upstream CH4	8.22	(g)
Direct N2O	0.02	(g)	Upstream N2O	0.02	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2e from HFCs	2.48	(g)	Upstream SF6	0.18	(mg)
Direct CO2e	5,998.42	**(g)**	**Upstream CO2e**	1,485.30	**(g)**
			Combined CO2e	7,483.72	**(g)**
Total Emissions					
Direct CO2	182,024.02	(g)	Upstream CO2	76,639.67	(g)
Direct CH4	7.05	(g)	Upstream CH4	571.13	(g)
Direct N2O	3.71	(g)	Upstream N2O	1.08	(g)
Direct PMBC	9.77	(g)	Upstream PMBC	3.65	(g)
Direct CO2e from HFCs	146.48	(g)	Upstream SF6	824.22	(mg)
Direct CO2e	183,452.61	**(g)**	**Upstream CO2e**	94,628.15	**(g)**
			Combined CO2e	278,080.76	**(g)**

APPENDIX F: USER GUIDE

The following pages are the User Guide for GASCAP users. This is also available as a separate file on the CD's with the software.

GAS CAP

Version 2.0

User Guide

RUTGERS
Edward J. Bloustein School
of Planning and Public Policy

GASCAP was developed by the Alan M. Voorhees Transportation Center at Rutgers University under contract to the New Jersey Department of Transportation (NJDOT). This software is freely available to use for all purposes associated with estimating greenhouse gas emissions for transportation capital projects. Any modifications or updates made to GASCAP must also be for public use and the product and any modifications to. GASCAP may not be sold for commercial use.

RUTGERS
Edward J. Bloustein School
of Planning and Public Policy

User Guide: Version 2.0

Contents

Introduction

GASCAP is a Microsoft Excel based spreadsheet tool designed for the New Jersey Department of Transportation to estimate greenhouse gas emissions associated with transportation capital projects. The current version includes sections to calculate emissions for the following:

Section 1: Materials - Estimates direct and upstream emissions for materials used in construction projects based on item codes from NJ DOT project bid sheets.

Section 2: Non-Road Equipment - Estimates direct and upstream emissions for non-road equipment used during construction activities.

Section 3: Recyclables - Estimates a credit against estimated emissions based on the use of various recycled materials in construction projects.

Section 4: Lifecycle Maintenance - Estimates direct and upstream emissions based on expected materials and equipment that will be used in maintaining the completed product over its lifespan.

Section 5a: Staging - Estimates direct and upstream emissions for on-road vehicles and temporary lighting used during construction of a project.

Section 5b: Traffic Disruption - Estimates direct and upstream emissions resulting from changes in vehicle miles of travel and vehicle efficiency due to work zones, lane closures, and detours.

Section 6: Lighting - Estimates direct emissions from the operation of permanent lighting fixtures over the lifespan of a project.

Section 7: Rail - Estimates direct and upstream emissions for various inputs that are specific to rail construction projects.

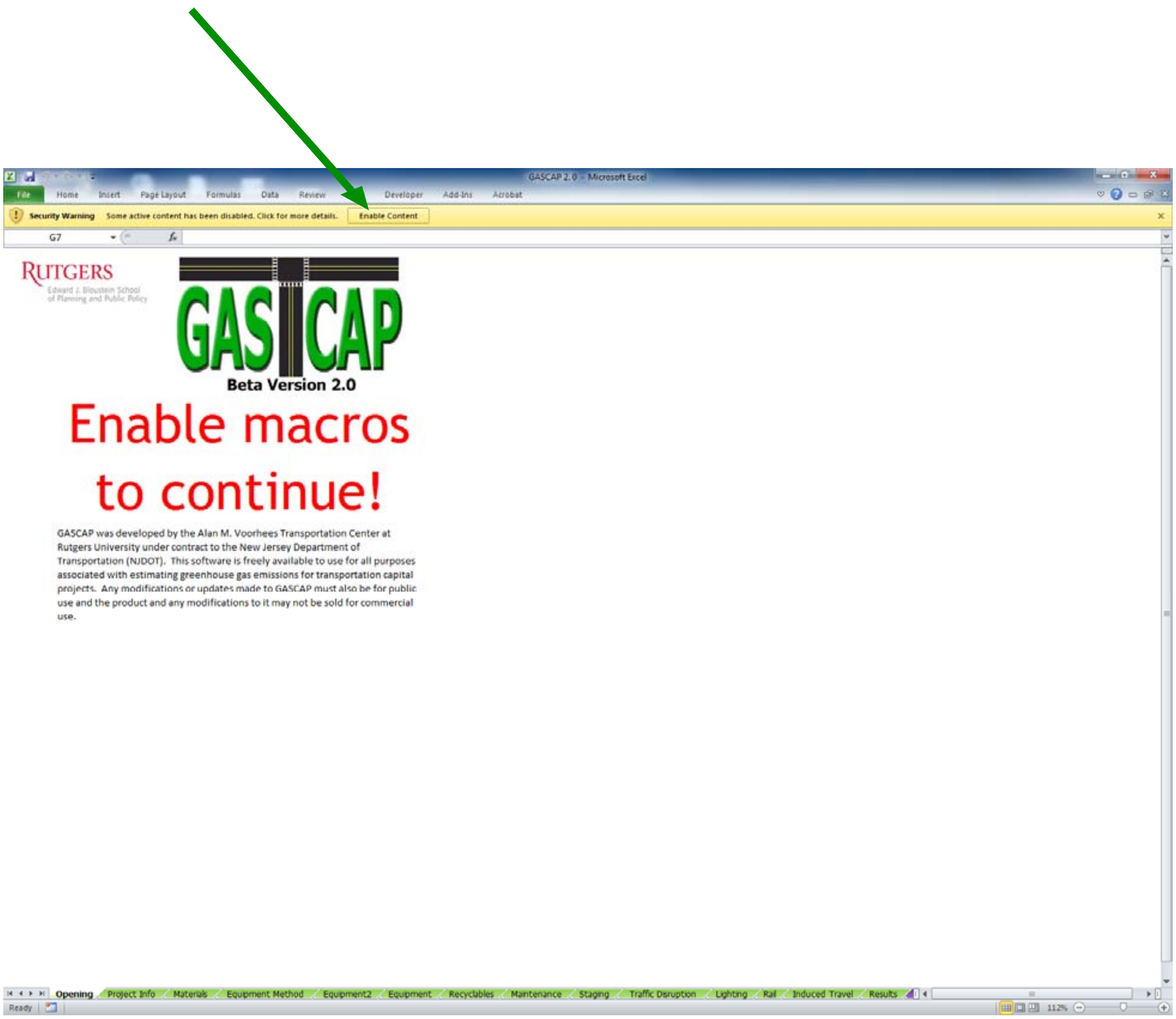
Section 8: Induced Travel - Estimates changes in mobile source emissions caused by changes in road capacity

Maintenance Department Module - Estimates emissions from routine, minor maintenance activities.

Section 9: Updating GASCAP - Procedures for updating background data on energy, vehicles, and materials used by GASCAP when estimating emissions.

Enabling Macros

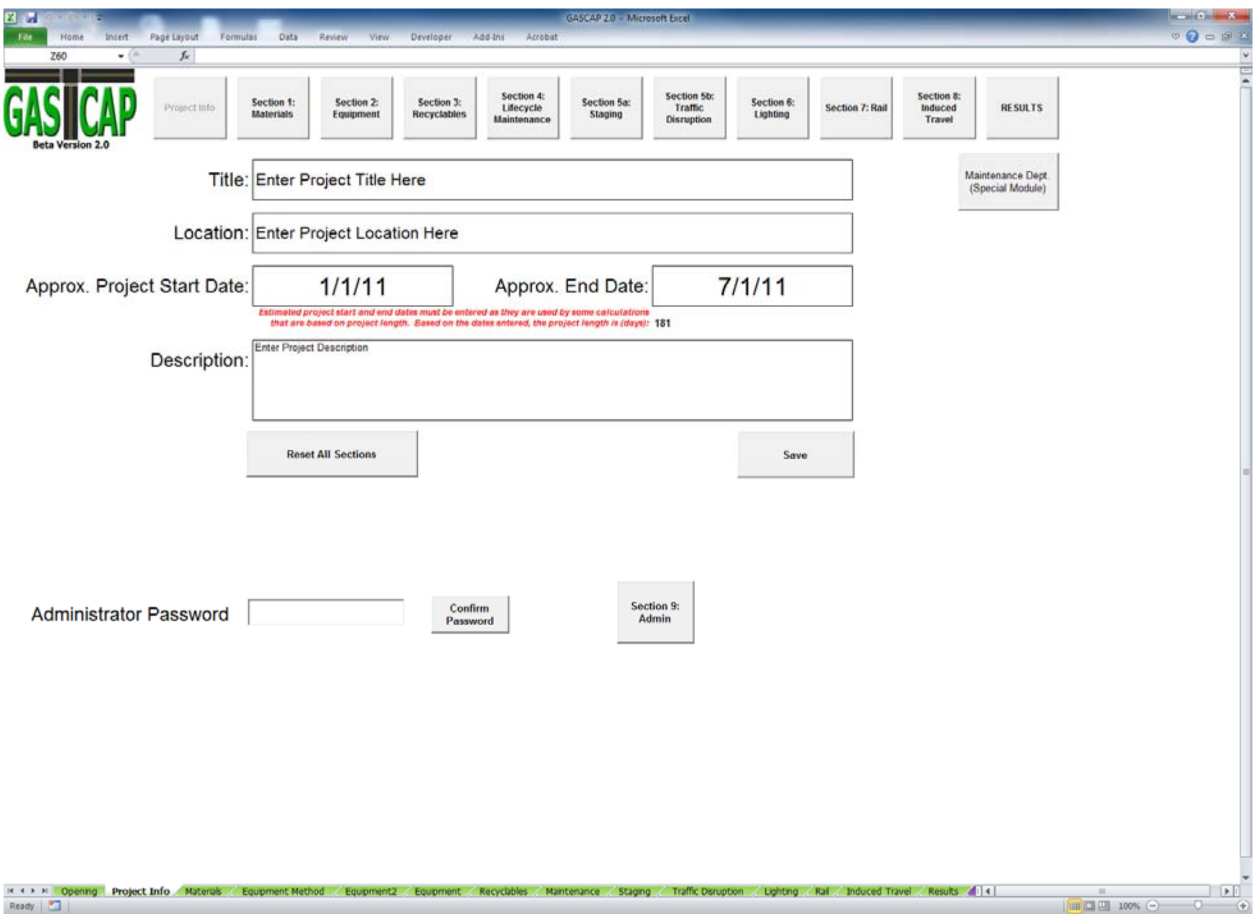
Most of the functionality of GASCAP is contained within macros, which are scripts that automate calculations and other program functionality. By default, macros are usually disabled in Excel. After opening the spreadsheet, a prompt will ask if the user wishes to enable macros or will present a security warning that some content is disabled. This prompt should be followed to enable macros. Macros must be enabled to load and run GASCAP.



Project Info

The first worksheet displayed after enabling macros is the Project Info page. Basic information about the project (title, location, start and end dates, and description) should be entered here. The Reset button can also be used to reset the entire workbook and remove all items added in all sections. The project title displayed on other sheets is linked to the one entered on this page.

It is ***critical to program functionality*** that estimated project start and end dates are entered, even if they are very rough estimates. The dates are used to calculate project length (displayed on the Project Info page for reference) which is used in several emission calculation functions.



Section 1: Materials

Material inputs to GASCAP are based on NJ DOT bid sheet item codes. The first step in entering a material is to input the 7-digit item code from the bid sheet. After inputting the item code, clicking ‘Go’ will display the appropriate unit of measurement for the item and pre-populate default variables for that item.

If you do not know an item’s 7-digit code, you can click “Find Codes” to look up codes by item name. Then click “Ok” to send the code to Input Item Code box and click “Go.”

The second step is to input the quantity of the item, which is located next to the item code on the bid sheet. Additionally, in step 3, default variables related to asphalt and concrete are displayed. These variables can be changed if desired. Variables that do not apply to the item selected will be greyed out. Clicking the Add Material button creates a new line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all materials. Individual line items can be removed by their respective buttons, or the entire sheet can be reset with the appropriate button. Total emissions can be viewed in grams or metric tons.

New Jersey Department of Transportation

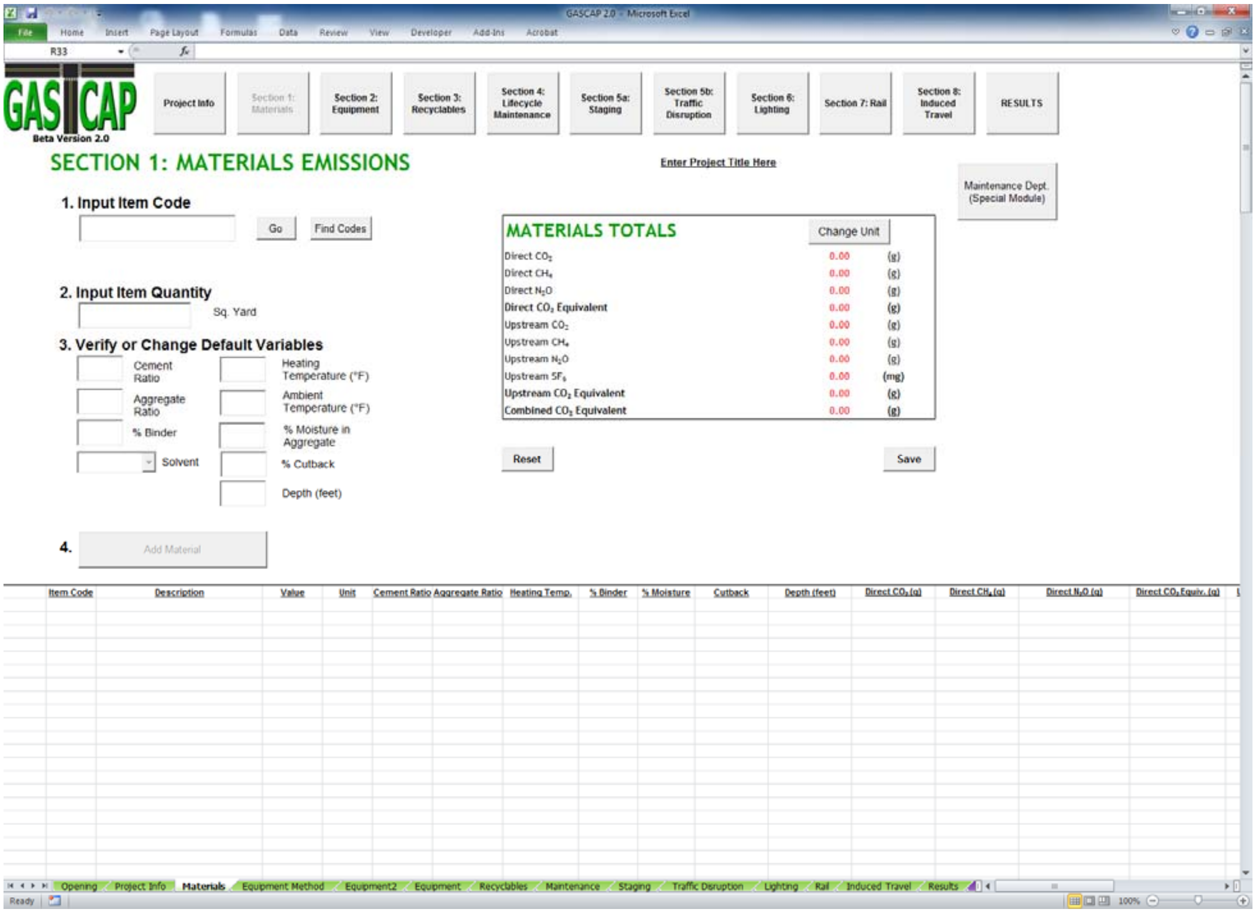
TABULATION OF BIDS

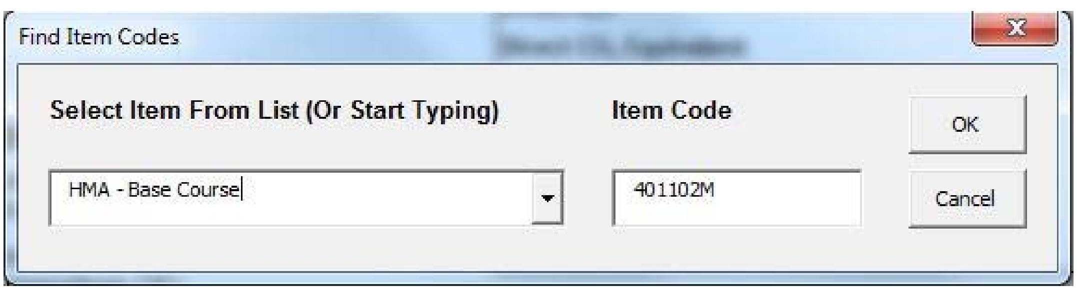
DATE : 04/19/11
PAGE : 109 -3

CALL ORDER : 109
LETTING DATE : 04/14/11 10:00AM
CONTRACT ID : 11109
DISTRICT : C1
COUNTIES : MERCER

SET-ASIDE :

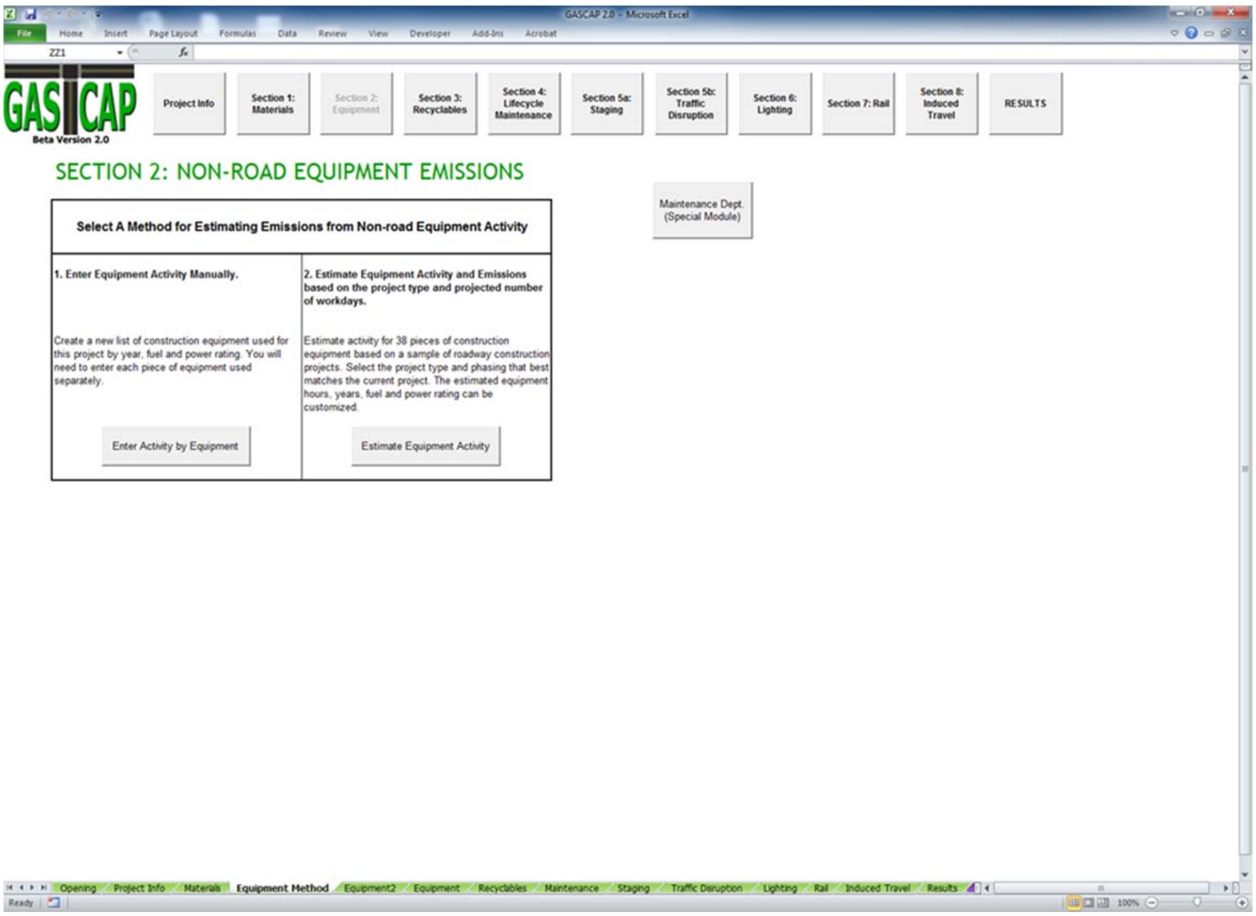
LINE NO / ITEM CODE / ALT ITEM DESCRIPTION	QUANTITY		(1) E0622 EARLE ASPHALT COMPANY UNIT PRICE	AMOUNT	(2) D2206 JOSEPH DEFINO TRUCKING CO IN UNIT PRICE	AMOUNT	(3) G7305 GREEN CONSTRUCTION INC. UNIT PRICE	AMOUNT
0038 202021P REMOVAL OF PAVEMENT	73.000	SY	17.00000	1241.00	15.00000	1095.00	30.00000	2190.00
0039 203041P GEOTEXTILE, ROADWAY STABILIZATION	115.000	SY	3.50000	402.50	5.00000	575.00	0.01000	1.15
0040 302036P DENSE-GRADED AGGREGATE BASE COURSE, 6" THICK	1233.000	SY	8.00000	9864.00	12.00000	14796.00	7.50000	9247.50
0041 302060P COARSE AGGREGATE, SIZE NO. 57	77.000	CY	50.00000	3850.00	25.00000	1925.00	0.01000	0.77
0042 401009P HMA MILLING, 3" OR LESS	2774.000	SY	3.80000	10541.20	8.00000	22192.00	4.00000	11096.00
0043 401021M HOT MIX ASPHALT PAVEMENT REPAIR	140.000	SY	60.00000	8400.00	1.00000	140.00	0.01000	1.40
0044 4010[illegible]M POLYMERIZED JOINT ADHESIVE	3175.000	LF	0.01000	31.75	2.00000	6350.00	0.50000	1587.50
0045 [illegible] TACK COAT	225.000	GAL	0.01000	2.25	0.01000	2.25	4.00000	900.00
0046 401036M PRIME COAT	435.000	GAL	0.01000	4.35	0.01000	4.35	0.01000	4.35
0047 401063M HOT MIX ASPHALT 12.5 H 76 SURFACE COURS	990.000	T	83.00000	82170.00	100.00000	99000.00	85.00000	84150.00
0048 401099M HOT MIX ASPHALT 25 M 64 BASE COURSE	579.000	T	73.00000	42267.00	100.00000	57900.00	75.00000	43425.00
0049 401108M CORE SAMPLES, HOT MIX ASPHALT	5.000	U	60.00000	300.00	75.00000	375.00	125.00000	625.00
0050 601122P 15" REINFORCED CONCRETE PIPE	32.000	LF	50.00000	1600.00	120.00000	3840.00	85.00000	2720.00
0051 601404P SUBBASE OUTLET DRAIN	33.000	LF	32.00000	1056.00	20.00000	660.00	80.00000	2640.00
0052 602012M INLET, TYPE B	2.000	U	3500.00000	7000.00	4000.00000	8000.00	2250.00000	4500.00
0053 602099M RESET EXISTING CASTING	3.000	U	190.00000	570.00	250.00000	750.00	450.00000	1350.00
0054 602117M SET SQUARE FRAMED MANHOLE CASTING, CIRCULAR COVER	2.000	U	2500.00000	5000.00	3000.00000	6000.00	1500.00000	3000.00
0055 602153M RECONSTRUCTED INLET, TYPE B, USING NEW CASTING	1.000	U	1500.00000	1500.00	2500.00000	2500.00	1000.00000	1000.00


GASCAP
Beta Version 2.0
Project Info
Section 1: Materials
Section 2: Equipment
Section 3: Recyclables
Section 4: Lifecycle Maintenance
Section 5a: Staging
Section 5b: Traffic Disruption
Section 6: Lighting
Section 7: Rail
Section 8: Induced Travel
RESULTS
SECTION 1: MATERIALS EMISSIONS
Enter Project Title Here
Maintenance Dept. (Special Module)
1. Input Item Code
Go
Find Codes
MATERIALS TOTALS
Change Unit
2. Input Item Quantity
Sq. Yard
3. Verify or Change Default Variables
Cement Ratio
Aggregate Ratio
% Binder
Solvent
Heating Temperature (°F)
Ambient Temperature (°F)
% Moisture in Aggregate
% Cutback
Depth (feet)
Reset
Save
4.
Add Material


Find Item Codes
Select Item From List (Or Start Typing)
Item Code
OK
HMA - Base Course
401102M
Cancel

Section 2: Equipment

Section 2 is where all non-road equipment used during construction should be entered.
There are two methods for entering equipment as shown below. Click the button for the method you want to use.



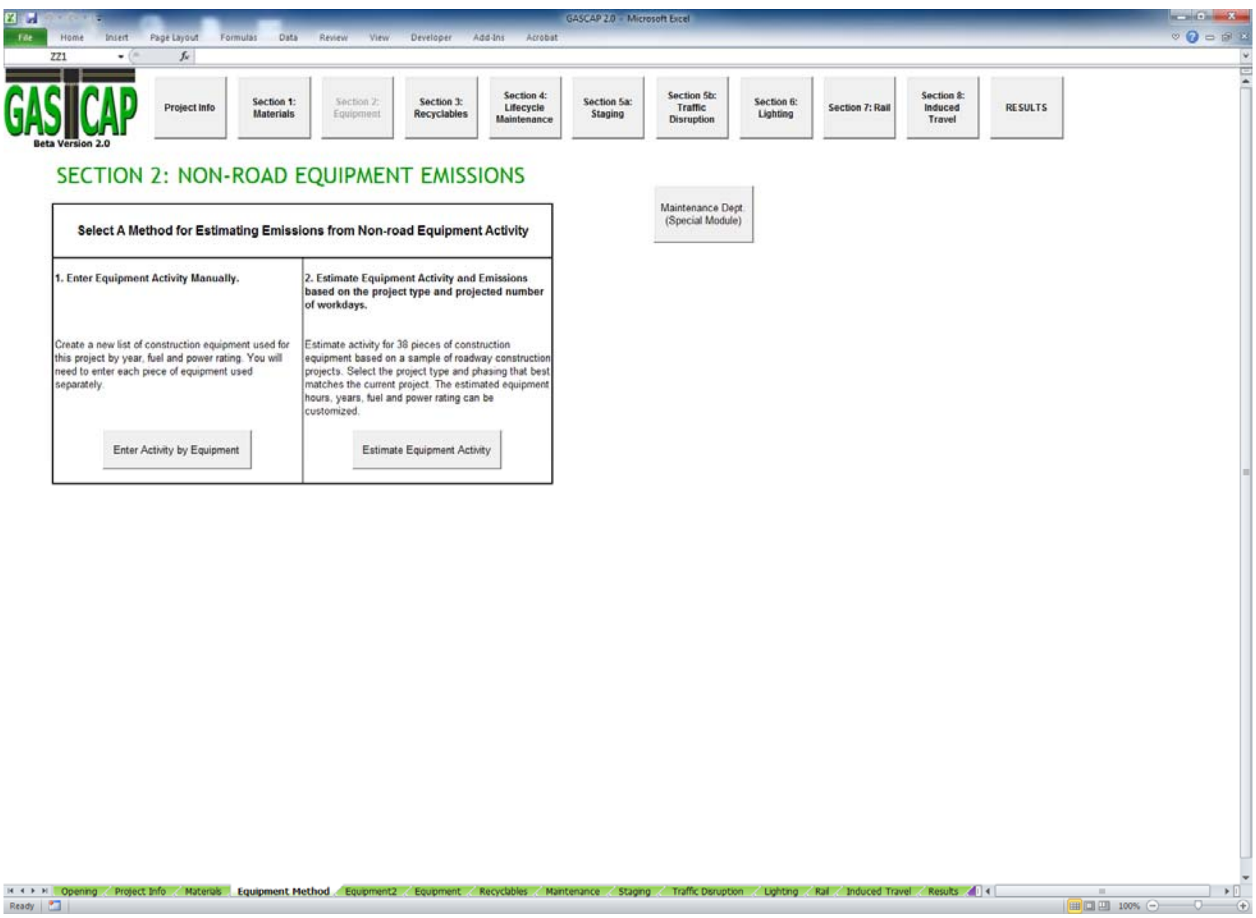
Method 1: Enter Equipment Activity Manually
Choose Method 1 if you know what pieces of non-road equipment will be used in the project and how long each piece of equipment will be operating. Equipment is selected through a series of drop down boxes that must be selected in order.

Method 2: Estimate Equipment Activity
Choose Method 2 if you do not know what pieces of equipment will be used or for what period of time. GASCAP will allow you to estimate the number of hours of equipment activity for 38 pieces of non-road equipment based on a sample of projects.

***Method 1** Enter Equipment Activity Manually*

Step 1: Select the year the vehicle was manufactured
Step 2: Select the type of equipment
Step 3: Select the type of fuel used
Step 4: Select the vehicle's power rating
Step 5: Enter the number of hours the vehicle will be used in total during construction
Step 6: The 'Add Equipment' button will add a line item on the spreadsheet with emissions factors
(in grams) for that item, and updates the total emissions for all equipment.

Before hitting the 'Add Equipment' button, the box labeled 'Air Conditioning?' should be checked if the equipment has it. Individual line items can be removed by their respective buttons, or the entire sheet can be reset with the appropriate button. Total emissions can be viewed in grams or metric tons.



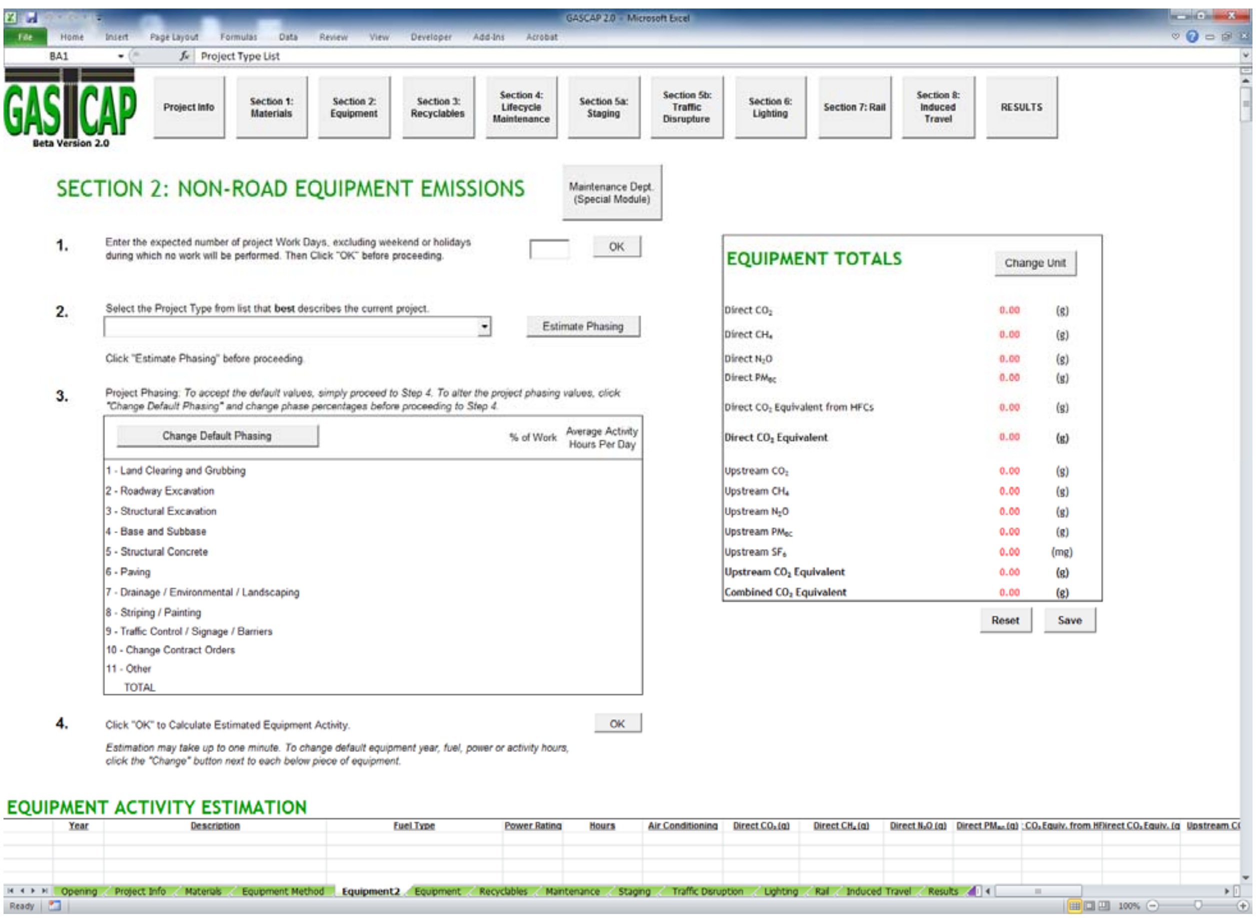
Method 2: Estimate Equipment Activity

Step 1: Enter the expected number of workdays in the textbox and click “OK.” (Remember workdays do not include holidays or weekends on which no work will be performed).

Step 2: Select one of six project types from the dropdown menu. Choose which of the following *best* describes the current project:

1. Resurface Existing Highway
2. Construct Freeway / Extra Lane
3. Pavement Rehabilitation / Widening
4. Construct / Reconstruct Bridge
5. Construct Median, Thrie Beam Barrier
6. Landscaping

Then click “Estimate Phasing.”



Step 3: The phasing describes what portion of the project work (in hours) is allocated to each phase – or general category of activity. To accept the default phasing, simply go to Step 4. To alter the default phasing, click the "Change Default Phasing" button to bring up the below menu. Enter new values for the percent of time devoted to each phase. To account for rounding errors, the total may range from 99.8% to 100.2%.

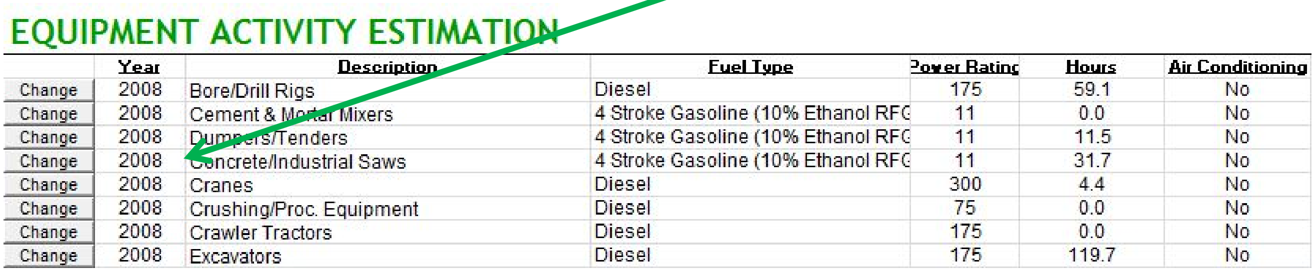
Click the "Update Phasing Values" button to update the value.

Different mixes of equipment are used in each phase, so accurate phasing helps GASCAP to more closely approximate the specific project.

"Change Contract Orders" is an allowance for extra construction time due to changes in the contract. "Other" accounts for time that is spent performing uncategorized activities.

Step 4: Click the “OK” Button on the main screen to populate a default list of equipment activity and emissions.

Step 5: If you need to change the default hours of activity, model year, fuel type, or power of equipment, click the “Change” button next to the piece of equipment you would like to alter, as shown below.

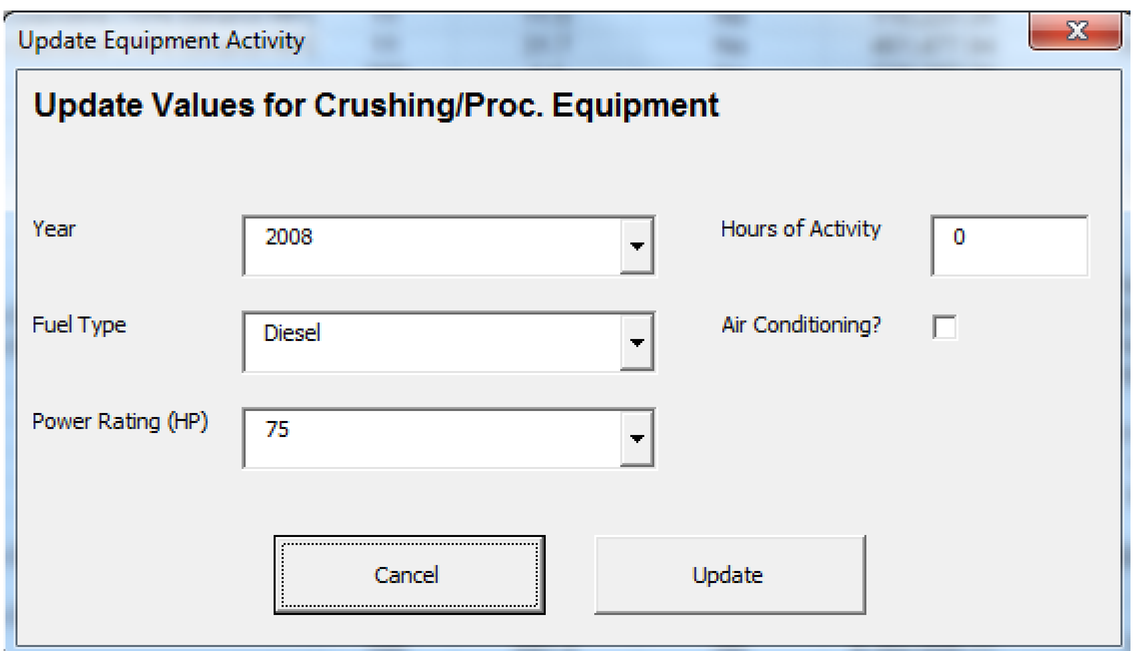

EQUIPMENT ACTIVITY ESTIMATION

	Year	Description	Fuel Type	Power Rating	Hours	Air Conditioning
Change	2008	Bore/Drill Rigs	Diesel	175	59.1	No
Change	2008	Cement & Mortar Mixers	4 Stroke Gasoline (10% Ethanol RFG	11	0.0	No
Change	2008	Dumpers/Tenders	4 Stroke Gasoline (10% Ethanol RFG	11	11.5	No
Change	2008	Concrete/Industrial Saws	4 Stroke Gasoline (10% Ethanol RFG	11	31.7	No
Change	2008	Cranes	Diesel	300	4.4	No
Change	2008	Crushing/Proc. Equipment	Diesel	75	0.0	No
Change	2008	Crawler Tractors	Diesel	175	0.0	No
Change	2008	Excavators	Diesel	175	119.7	No

The “Change” button will bring up a menu for selecting the equipment model year, fuel type and horsepower (which you must change in that order). Check the Air Conditioning box if the specific equipment model uses air conditioning.

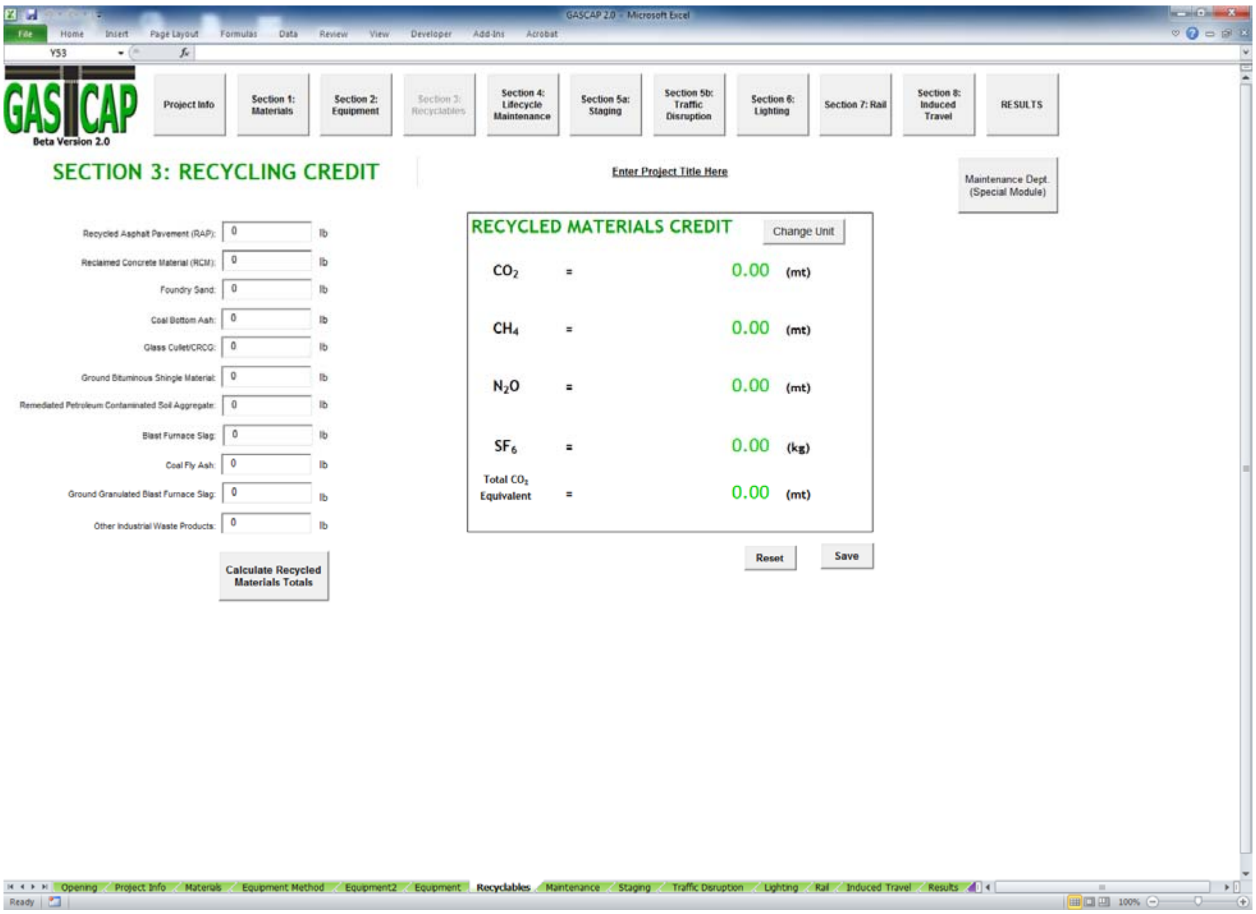
To change the Hours of Activity, simply overwrite the previous value. There is no way to remove equipment from the list. If the equipment *will not be used at all*, specify 0 as the Hours of Activity.

Then click “Update.”



Section 3: Recyclables

The Recyclables worksheet displays a list of recycled materials that will give a credit against emissions if used in the project. The amount of each material used in pounds should be entered in the respective cell. Pressing the 'Calculate Recycled Materials Credit' button will update the Recycled Materials Credit totals to reflect the amount of the credit. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.



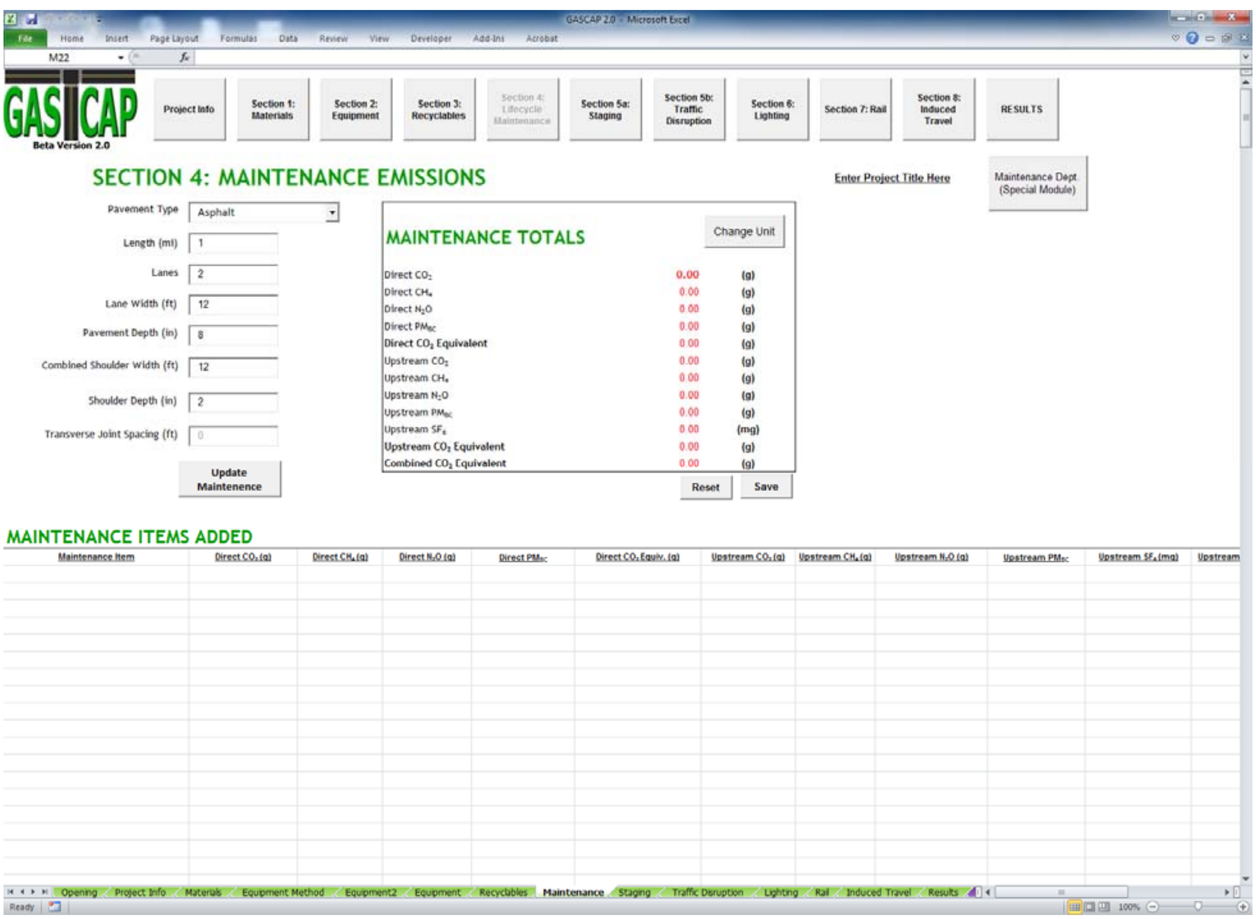
Section 4: Lifecycle Maintenance

The Lifecycle Maintenance section is designed to estimate direct and upstream emissions based on expected materials and equipment that will be used in maintaining the completed product over its lifespan. *Bridge lifecycle maintenance is not estimated in the current version.*

Each field in the steps below is populated with default values that may be changed.

Step 1: Select the Pavement Type from the dropdown (Asphalt, Concrete, or Asphalt Overlay Concrete)
Step 2: Enter the Length of the project in miles.
Step 3: Enter the number of Lanes
Step 4: Enter the Pavement Depth (in inches) of the main roadway
Step 5: Enter the Combined Width (in feet) of both shoulders of the roadway
Step 5: Enter the Pavement Depth for the shoulders of the roadway
Step 6: Enter the distance (feet) for Transverse Joint Spacing
(Step 6 does not apply when the Pavement Type is Asphalt).

Click “Update Maintenance.”


GASCAP 2.0 - Microsoft Excel
GASCAP
Beta Version 2.0
Project Info
Section 1: Materials
Section 2: Equipment
Section 3: Recyclables
Section 4: Lifecycle Maintenance
Section 5a: Staging
Section 5b: Traffic Disruption
Section 6: Lighting
Section 7: Rail
Section 8: Induced Travel
RESULTS
SECTION 4: MAINTENANCE EMISSIONS
Enter Project Title Here
Maintenance Dept. (Special Module)
Pavement Type
Asphalt
Length (mi)
Lanes
Lane Width (ft)
Pavement Depth (in)
Combined Shoulder Width (ft)
Shoulder Depth (in)
Transverse Joint Spacing (ft)
Update Maintenence
MAINTENANCE TOTALS
Change Unit
Direct CO2
Direct CH4
Direct N2O
Direct PMBC
Direct CO2 Equivalent
Upstream CO2
Upstream CH4
Upstream N2O
Upstream PMBC
Upstream SF6
Upstream CO2 Equivalent
Combined CO2 Equivalent
Reset
Save
MAINTENANCE ITEMS ADDED
Maintenance Item
Direct CO2 (g)
Direct CH4 (g)
Direct N2O (g)
Direct PMBC
Direct CO2 Equiv. (g)
Upstream CO2 (g)
Upstream CH4 (g)
Upstream N2O (g)
Upstream PMBC
Upstream SF6 (mg)
Opening
Project Info
Materials
Equipment Method
Equipment2
Equipment
Recyclables
Maintenance
Staging
Traffic Disruption
Lighting
Rail
Induced Travel
Results

	Asphalt Pavement	Concrete Pavement	Asphalt Overlay Concrete Pavement
Total Lifecycle	50 Years	50 Years	30 Years
5 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Crack seal 500 ft. per lane mile (PA)	
10 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Clean and seal 100% of longitudinal joints Clean and seal 100% of transverse joints Crack seal 500 ft. per lane mile (PA)	Concrete patch 2 - 10% of pavement area Crack seal 500 ft. per lane mile (PA) Bituminous overlay to 4 in. depth
20 years	Mill wearing course to 2 in. depth Bituminous inlay to 2 in. depth micro surface shoulders	Concrete patch 2 - 10% of pavement area Diamond grind 100% of total area Clean and seal 100% of longitudinal joints Clean and seal 100% of transverse joints	Concrete patch 2 - 10% of pavement area Mill wearing course to 2 in. depth Bituminous inlay to 2 in. depth
30 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Concrete patch 2 - 10% of pavement area Diamond grind 100% of total area Clean and seal 100% of longitudinal joints Clean and seal 100% of transverse joints	
40 years	Full depth patch 5% of pavement area Mill wearing course to 4 in. depth Bituminous inlay to 4 in. depth micro surface shoulders	Concrete patch 2 - 10% of pavement area Crack seal 500 ft. per lane mile (PA) Bituminous overlay to 4 in. depth	
50 years	Clean and seal 100% of longitudinal joints Crack seal 500 ft. per lane mile (PA) Micro surface all lanes and shoulders	Concrete patch 2 - 10% of pavement area Mill wearing course to 2 in. depth Bituminous inlay to 2 in. depth	

Section 5a: Staging

Transportation

The Staging worksheet allows emissions to be estimated for activities involved in staging the construction site. The first box, Transportation, is similar in function to the Equipment worksheet, except with on-road vehicles.

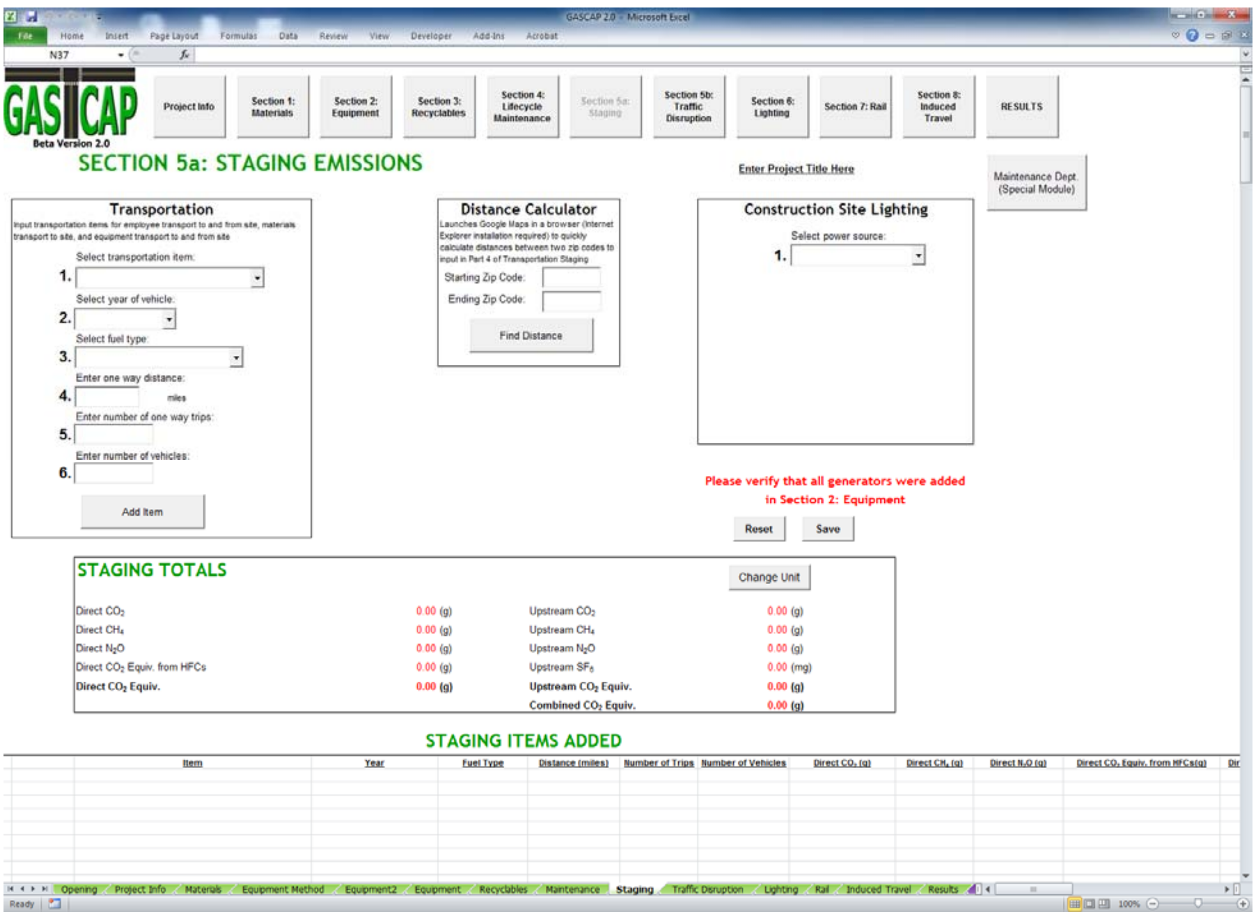
Step 1: Select the vehicle type
Step 2: Select the year the vehicle was manufactured
Step 3: Select the type of fuel used
Step 4: Enter the one way distance of a trip with that vehicle type
Step 5: Enter the number of one way trips made with that vehicle type
Step 6: Enter the number of vehicles of that type
Step 7: The 'Add Item' button will add a line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all equipment.

To assist in determining distance traveled, a quick Distance Calculator box accepts the input of a starting and ending 5-digit zip code; clicking the 'Find Distance' button will bring up the user's web browser with a Google Maps page giving the driving miles between the two zip codes.

Construction Site Lighting

The second part of calculating construction staging emissions involves estimating the use of lighting for nighttime work at the site. By default, the power is generator based. In this event, please verify that generators were added as equipment items in Section 2.

If the power is grid-based, choose that option in the drop down box. The sheet then prompts for the number of fixtures, watts per fixture, and operating hours per day. Multiple line items can be added. The operating hours box is prepopulated with an estimated figure based on the actual daylight hours expected based on the dates of the project. This default number can be changed if desired. Pressing the 'Add Lighting' button creates a new line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all materials. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.


GASCAP 2.0 - Microsoft Excel
GASCAP
Beta Version 2.0
Project Info
Section 1: Materials
Section 2: Equipment
Section 3: Recyclables
Section 4: Lifecycle Maintenance
Section 5a: Staging
Section 5b: Traffic Disruption
Section 6: Lighting
Section 7: Rail
Section 8: Induced Travel
RESULTS
SECTION 5a: STAGING EMISSIONS
Enter Project Title Here
Maintenance Dept. (Special Module)
Transportation
Input transportation items for employee transport to and from site, materials transport to site, and equipment transport to and from site
Select transportation item:
Select year of vehicle:
Select fuel type:
Enter one way distance:
miles
Enter number of one way trips:
Enter number of vehicles:
Add Item
Distance Calculator
Launches Google Maps in a browser (Internet Explorer installation required) to quickly calculate distances between two zip codes to input in Part 4 of Transportation Staging
Starting Zip Code:
Ending Zip Code:
Find Distance
Construction Site Lighting
Select power source:
Please verify that all generators were added in Section 2: Equipment
Reset
Save
STAGING TOTALS
Change Unit
Direct CO_2 0.00 (g)
Direct CH_4 0.00 (g)
Direct N_2O 0.00 (g)
Direct CO_2 Equiv. from HFCs 0.00 (g)
Direct CO_2 Equiv. 0.00 (g)
Upstream CO_2 0.00 (g)
Upstream CH_4 0.00 (g)
Upstream N_2O 0.00 (g)
Upstream SF_6 0.00 (mg)
Upstream CO_2 Equiv. 0.00 (g)
Combined CO_2 Equiv. 0.00 (g)
STAGING ITEMS ADDED
Item
Year
Fuel Type
Distance (miles)
Number of Trips
Number of Vehicles
Direct CO_2 (g)
Direct CH_4 (g)
Direct N_2O (g)
Direct CO_2 Equiv. from HFCs(g)
Opening
Project Info
Materials
Equipment Method
Equipment2
Equipment
Recyclables
Maintenance
Staging
Traffic Disruption
Lighting
Rail
Induced Travel
Results
Ready

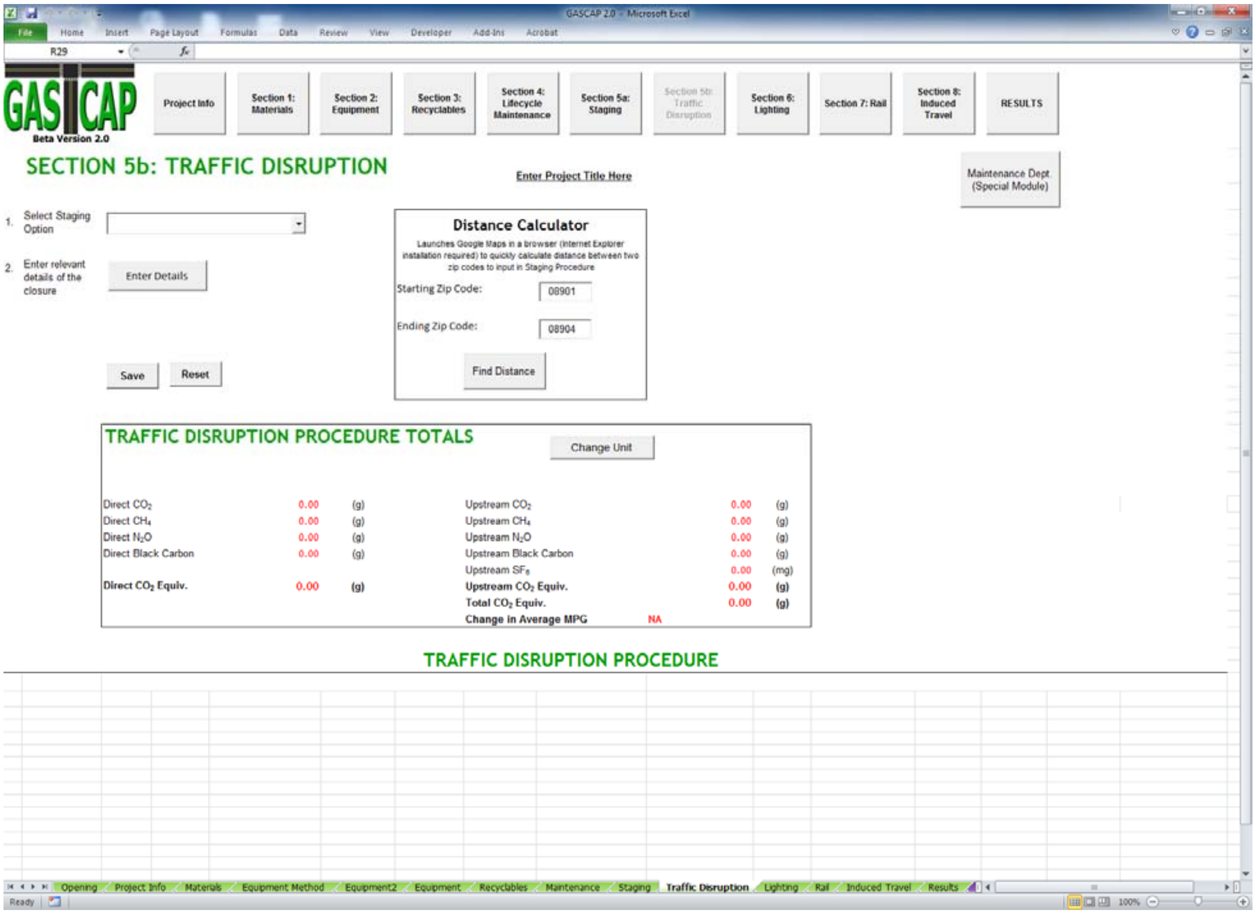
Section 5b: Traffic Disruption

Section 5b estimates the emissions from six project staging options, which result in changes in traffic patterns that occur during roadway construction and maintenance. GASCAP classifies staging procedures as one of the following work zone types:

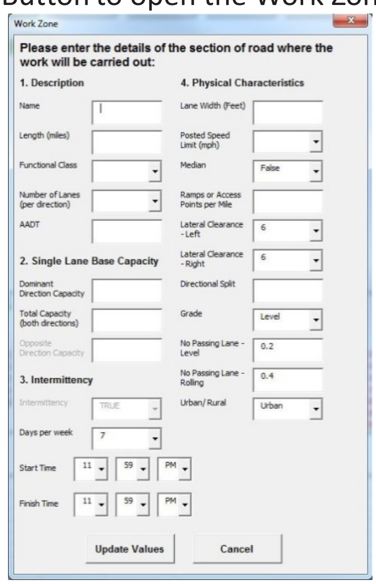
1.	Work Zone Only	*No lanes closed, with workers present during construction for the duration of the project*
2.	Lane Closure	*One or more, but fewer than all, lanes are closed for the duration of the project*
3.	Intermittent Lane Closure	*One or more, but fewer than all, lanes are closed during specific periods each day or week, but otherwise open, for the duration of the project*
4.	Full Road Closure	*Road is fully closed (all lanes) for the duration of the project, with a signed diversion route*
5.	Combination Road and Lane Closure	*Road is fully closed (all lanes) during specified periods each day or week, with a signed diversion route; otherwise one or more, but fewer than all, lanes are closed.*
6.	Intermittent Road Closure	*Road is fully closed (all lanes) during specific periods each day or week, with a signed diversion route, but otherwise open, for the duration of the project*
7.	Intermittent Work Zone	*No lanes closed, with workers present during construction during specific periods each day or week, for the duration of the project*

Traffic flow changes in GASCAP are based on calculations from the 2010 Highway Capacity Manual. Because different emissions impacts must be calculated for each staging procedure, this is the most complex module in GASCAP. Some staging procedures will require entering additional data, as noted in the procedures below.

Step 1: Select the Staging Option from the dropdown menu



Step 2: Click the Enter Details Button to open the Work Zone details window.



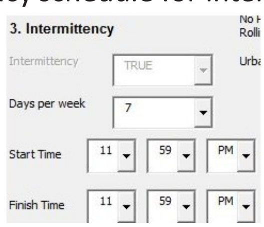
Step 3.1: Enter the following Descriptions of the roadway at the site of the Work Zone:

a. Name of the roadway
b. Length (in miles) of the segment of the roadway affected by the work zone
c. The functional class of the roadway at the work zone.
   Note: Selecting a functional class will populate default values for Physical Characteristics of the roadway. These may be changed in Step 3.4
d. The number of lanes per direction of that road segment at the work zone
e. The Annual Average Daily Traffic (AADT) for the roadway

Step 3.2: Accept Default Values for the Single Base Lane Capacity of the Work Zone, or enter:

a. The dominant direction of traffic flow at the work zone
b. The total flow at the work zone
c. The opposite direction flow at the work zone is then calculated automatically

Step 3.3: Enter the Intermittency schedule for intermittent lane/road closures:



Note: Step 3.3 applies only for intermittent work zones. During Step 1, if you selected any staging options other than 3 (Intermittent Lane Closure), 5 (Combination Road and Lane Closure), 6 (Intermittent Road Closure) or 7 (Intermittent Work Zone) this section will appear as "grayed out" and the fields will be inactive.

a. The number of days per week the lane/road closure is expected to take place
b. The start time at which the lane/road closure is expected to begin each day
c. The finish time at which the lane/road closure is expected to end each day.

Step 3.4: Enter the following Physical Characteristics of the Roadway around the site of the work zone:

a. The lane width (in US Feet)
b. The posted speed limit (in miles per hour)
c. Select TRUE if there is a median within the work zone; otherwise select FALSE
d. The number of ramps per mile within the work zone plus three miles upstream and downstream of the work zone for Freeways, or the number of access points per mile (driveways and unsignalized intersections within the work zone for other road types)
e. The lateral clearance (shoulder width) on the left and right sides of the roadway at the work zone
f. The directional split of traffic (proportion from 0.00 to 1.00 of traffic flowing in the

dominant direction) at the work zone

g. The grade (either Level, Rolling, or Mountainous) of the roadway at the work zone
h. No passing Lane – Level
i. No Passing Lane – Rolling
j. Whether the work zone is in an Urban or a Rural location

Step 3.5: Click the Update Values button.

Step 4: Accept the default values or enter custom values for the proportion (from 0.000 to 1.000) of vehicles using the roadway that are:

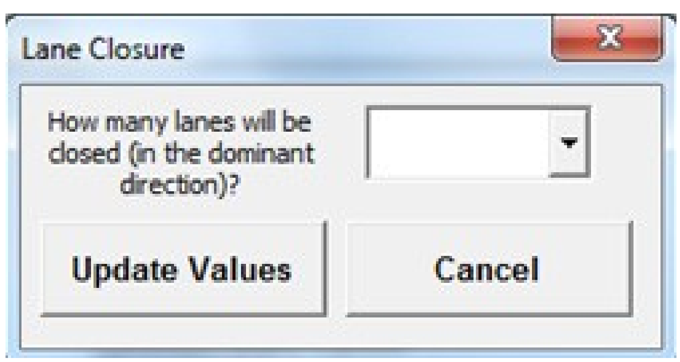
a. Passenger Cars
b. Trucks or Buses
c. Recreational Vehicles (RVs)

Note: Entered values must add up to 1.000

Click "Update Values."

If staging procedure 1 (Work Zone Only) is selected, this is all of the information that is required.

If staging procedure 2 (Lane Closure), 3 (Intermittent Lane Closure) is selected, you will be prompted to enter the number of lanes affected by closures in the following dialogue:

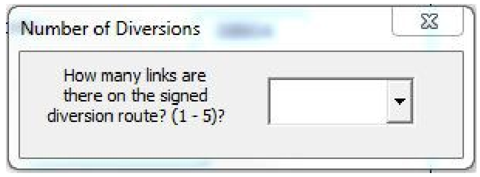


Step 5.1: Enter the number of lanes to be closed in the dominant direction. The maximum number of lanes that can be closed is one less than the total number of lanes in the work zone. If all of the lanes are to be closed, this would be classified as a Road Closure.

If staging procedure 4 (Full Road Closure) or 6 (Intermittent Road Closure) is

selected, you will be prompted to enter further information for establishing a detour.

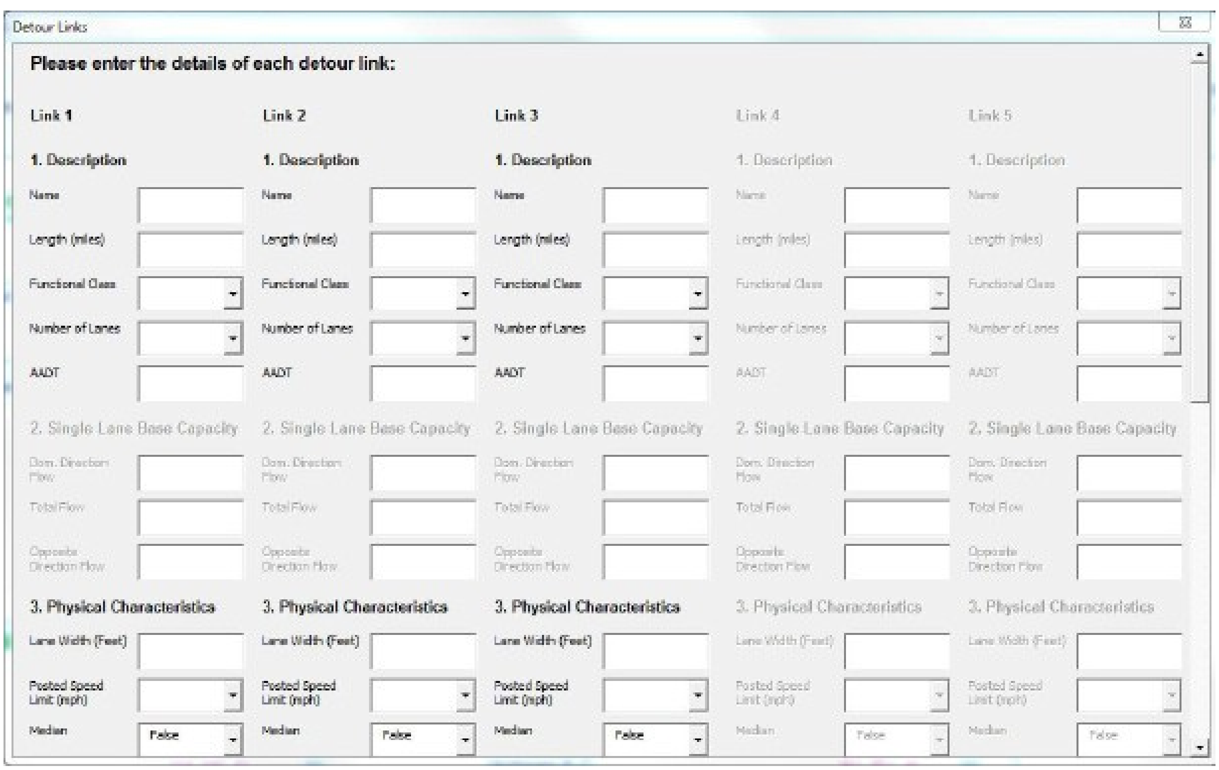
Step 6.1: Enter the number of links (1 – 5) for the signed diversion route resulting from any road closures.



Step 6.2: Enter the following details for each diversion route link into the dialogue box shown below:

a. Enter the Description, Single Lane Base Capacity, and Physical Characteristics for each link in the detour, as in Step 3
b. Accept, for each detour link, the default values or enter custom values for the proportion (from 0.000 to 1.000) of vehicles using the roadway that are:
    1) Passenger Cars
    2) Trucks or Buses
    3) Recreational Vehicles (RVs)

    Note: Entered values must add up to 1.000



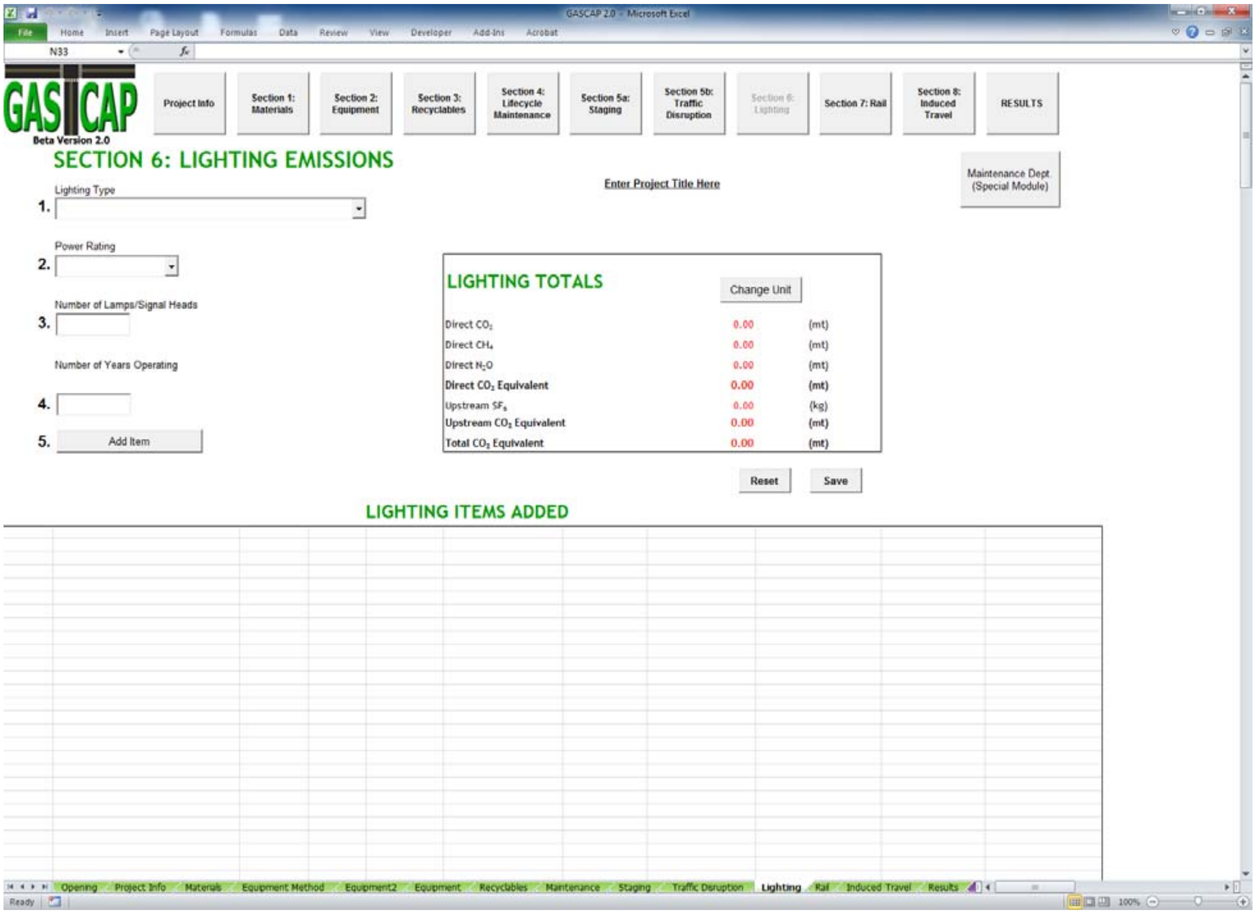
If staging procedure 5 (Combination Road and Lane Closure) is selected, you will be prompted to enter information about BOTH a road closure with detour and a lane closure. Refer to Steps 5.1 - 6.2.

Section 6: Lighting

The Lighting worksheet estimates direct emissions from traffic lights and street lights that are installed as part of the project over their operating lifespan.

Step 1: Select the lighting type
Step 2: Select the power rating for the light if necessary
Step 3: Enter the number of lamps or signal heads
Step 4: Enter the anticipated number of operating years

Pressing the 'Add Item' button creates a new line item on the spreadsheet with emissions factors (in grams) for that item, and updates the total emissions for all materials. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.



Section 7: Rail

Section 7 estimates emissions from the construction of railway projects.

Step 1: Select the category of rail item to

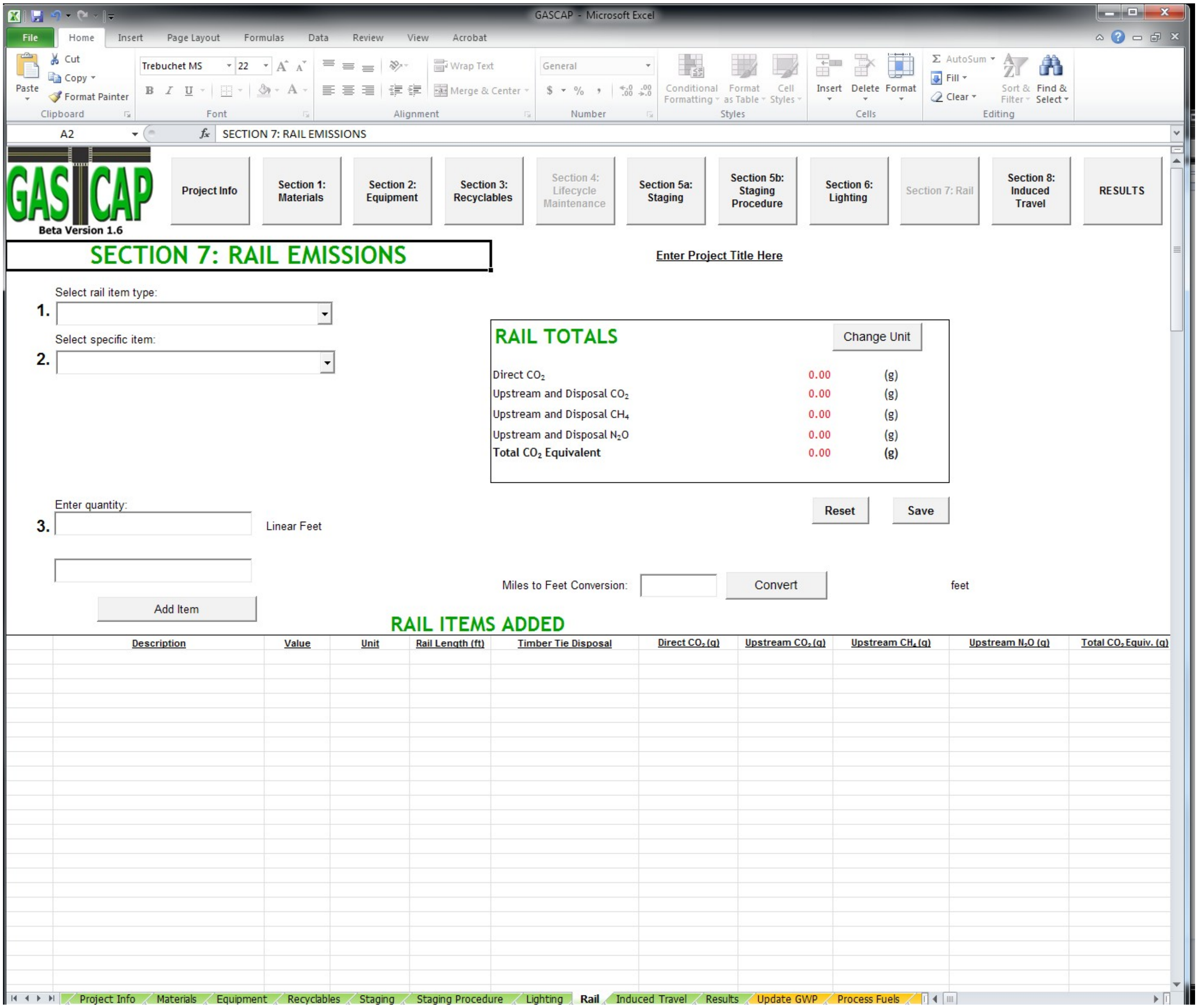
be added.
Step 2: Select the specific item within that category.

Step 2 will determine the remaining steps, dependent on the variables involved with the selected item. Variables for specific items include:

Joint Bars: When selecting joint bars, the user will be prompted for rail length in order to determine how many joint bars are required. Rail length options are 39 feet, 80 feet, or continuous. If continuous is selected, the user will be prompted to enter the continuous rail length.

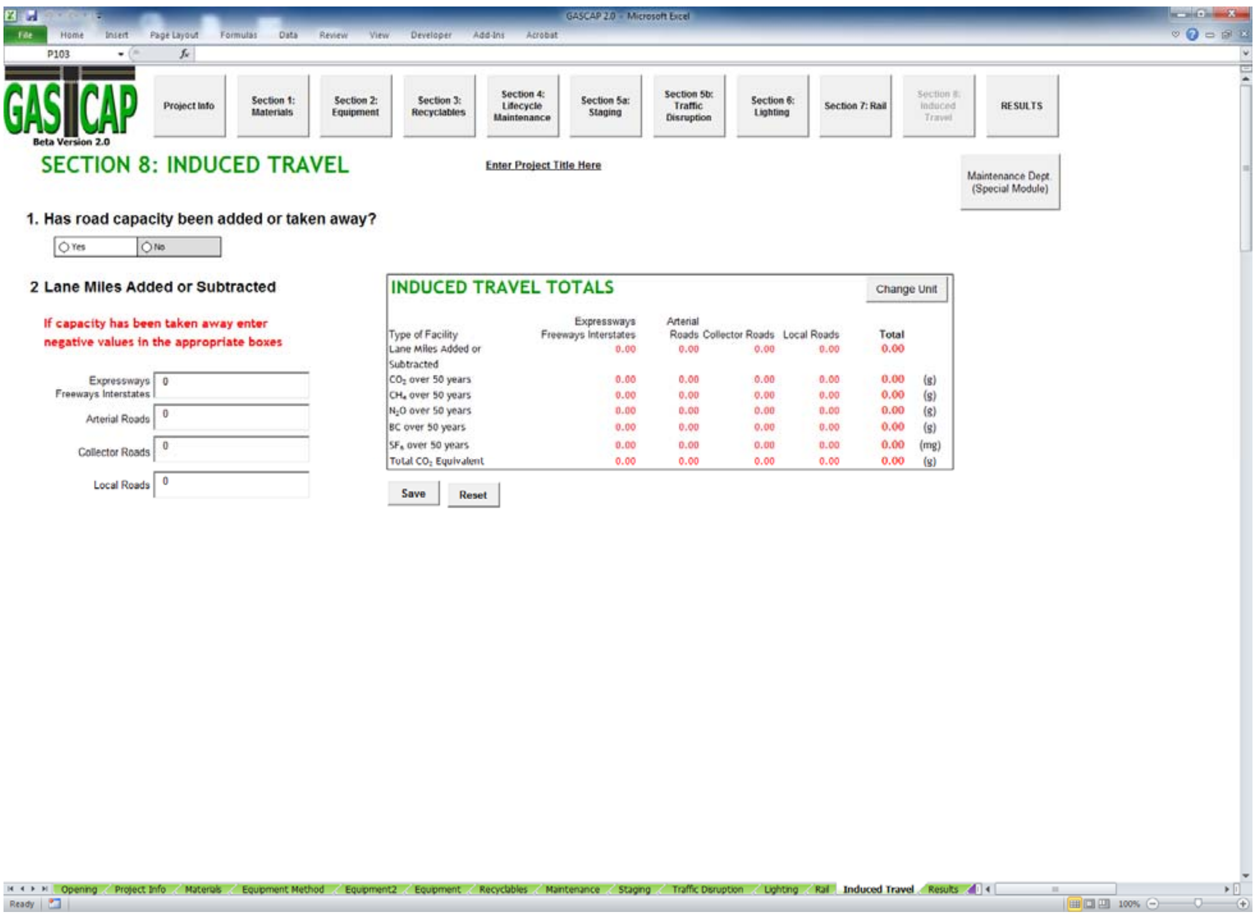
Timber Ties: For timber ties, the user is prompted to choose a timber disposal method. The disposal method will result in a credit against emissions due to either the burning of the timber as fuel or the storing of it in a landfill (carbon sequestration).

For all items that are dependent on length of track, the user will be prompted to enter the number of parallel tracks. As most items require an input in feet, there is a simple calculator on the page that can be used to convert miles into feet. Pressing Reset returns all values to zero. Total emissions can be viewed in grams or metric tons.


GASCAP - Microsoft Excel
SECTION 7: RAIL EMISSIONS
GASCAP
Beta Version 1.6
Project Info
Section 1: Materials
Section 2: Equipment
Section 3: Recyclables
Section 4: Lifecycle Maintenance
Section 5a: Staging
Section 5b: Staging Procedure
Section 6: Lighting
Section 7: Rail
Section 8: Induced Travel
RESULTS
SECTION 7: RAIL EMISSIONS
Enter Project Title Here
Select rail item type:
1.
Select specific item:
2.
RAIL TOTALS
Change Unit
Direct CO2 0.00 (g)
Upstream and Disposal CO2 0.00 (g)
Upstream and Disposal CH4 0.00 (g)
Upstream and Disposal N2O 0.00 (g)
Total CO2 Equivalent 0.00 (g)
Enter quantity:
3.
Linear Feet
Reset
Save
Miles to Feet Conversion:
Convert
feet
Add Item
RAIL ITEMS ADDED
Description
Value
Unit
Rail Length (ft)
Timber Tie Disposal
Direct CO2 (g)
Upstream CO2 (g)
Upstream CH4 (g)
Upstream N2O (g)
Total CO2 Equiv. (g)
Project Info
Materials
Equipment
Recyclables
Staging
Staging Procedure
Lighting
Rail
Induced Travel
Results
Update GWP
Process Fuels

Section 8: Induced Travel

Section 8 of GASCAP estimates the additional impact of mobile emissions from induced travel —the increase (or decrease) in travel activity that occurs in response to adding (or removing) capacity from a roadway, assuming that the project life is 50 years.

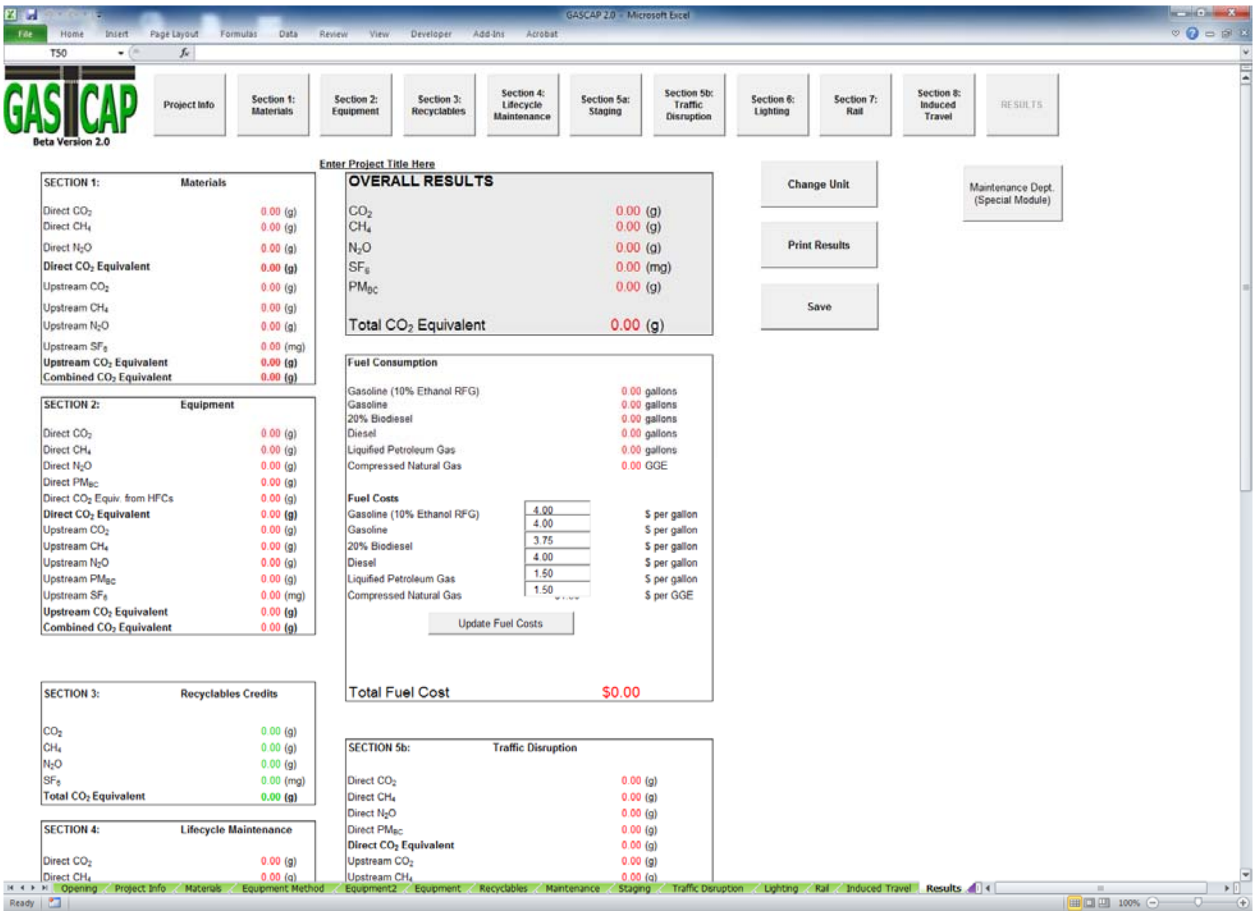


Step 1: Select "Yes" if the project has either added or reduced road capacity; otherwise select "No."

Step 2: Enter the additional capacity in lane-miles for each class of road (Expressways/Freeways/Interstates, Arterial Roads, Collector Roads, Local Roads) that will result from the project. If capacity has been reduced, enter the change as negative lane-miles.

Results

The Results worksheet displays the cumulative results from all sections of GASCAP. In addition to results from each individual section, the worksheet contains emission estimation totals for the entire project, and an estimated fuel consumption box based on the Equipment and Staging sections. Current fuel prices can be entered and the total cost updated by pressing the 'Update Fuel Costs' button. The 'Print Results' button will print all results in a two page format.



Maintenance Department Module

GASCAP's Maintenance module addresses planned rehabilitations of NJDOT facilities, but not routine maintenance, such as pothole filling and crack sealing. To address this gap, GASCAP includes a special module for estimating direct and upstream emissions from equipment fuels and materials from routine maintenance activities to enable a more complete life-cycle analysis with respect to capital projects. The results from this data gathering module are treated as separate section from other GASCAP modules.

Maintenance Equipment

Step 1: Click the “Equipment” radio button to begin adding equipment.

Step 2: Enter (in the following order) the type; quantity of pieces; model year; fuel; time spent idling; miles travelled; horse power rating; and air conditioning for each equipment item you would like to add. Not all fields are applicable to every equipment item, and may appear grey.

Step 3: Click “Update Maintenance” to add equipment. The item will appear in list the bottom of the spreadsheet (once for running emission and once for idling emissions). Click the “Remove” button to the right of the item to remove it from the equipment list.

Maintenance Materials

Step 1: Click the “Materials” radio button to begin adding materials.

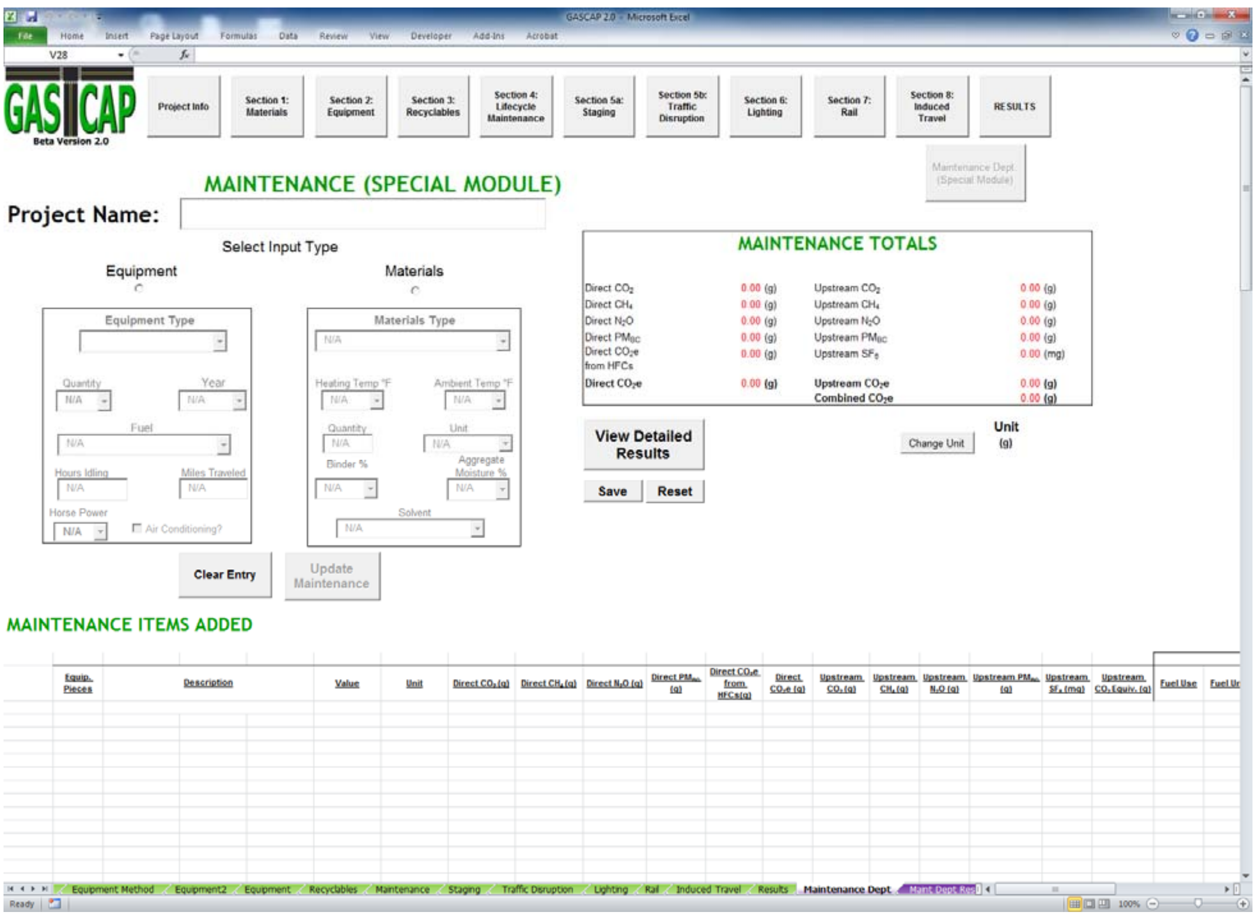
Step 2: Enter (in the following order) the type; heating temperature; outdoor ambient temperature; quantity; percentage of binder; percentage of aggregate moisture; and solvent type for each material item you would like to add. Not all fields are applicable to every material and may appear grey.

Step 3: Click “Update Maintenance” to add materials. The item will appear in list the bottom of the spreadsheet. Click the “Remove” button to the right of the item to remove it from the materials list.

Viewing and Saving Detailed Results

A summary of the maintenance emissions appears on main worksheet. You can also view emissions separately for materials; generators; idling vehicles; and running vehicles. To see separate results, click “View Detailed Results” to navigate to the results page.

Clicking “Save” on the data entry sheet opens a dialogue to save the results in a new workbook. The first sheet will contain the list of equipment and materials. The second sheet will contain detailed results from the module. *Once the results are saved, the module will automatically reset.*



CURRENT MAINTENANCE RESULTS

Materials

Direct CO_2	0.00	(g)	Upstream CO_2	0.00	(g)
Direct CH_4	0.00	(g)	Upstream CH_4	0.00	(g)
Direct N_2O	0.00	(g)	Upstream N_2O	0.00	(g)
Direct PM_{BC}	0.00	(g)	Upstream PM_{BC}	0.00	(g)
Direct CO_2 Equiv. from HFCs	0.00	(g)	Upstream SF_6	0.00	(mg)
Direct CO_2 Equiv.	0.00	**(g)**	**Upstream CO_2 Equi**	0.00	**(g)**
			Combined CO_2 Equ	0.00	**(g)**

Change Unit

Unit

(g)

Return to Data Entry

Generators

Direct CO_2	0.00	(g)	Upstream CO_2	0.00	(g)
Direct CH_4	0.00	(g)	Upstream CH_4	0.00	(g)
Direct N_2O	0.00	(g)	Upstream N_2O	0.00	(g)
Direct PM_{BC}	0.00	(g)	Upstream PM_{BC}	0.00	(g)
Direct CO_2 Equiv. from HFCs	0.00	(g)	Upstream SF_6	0.00	(mg)
Direct CO_2 Equiv.	0.00	**(g)**	**Upstream CO_2 Equi**	0.00	**(g)**
			Combined CO_2 Equ	0.00	**(g)**

Change Unit

Unit

(g)

Return to Data Entry

Vehicle Idling Emissions

Direct CO_2	0.00	(g)	Upstream CO_2	0.00	(g)
Direct CH_4	0.00	(g)	Upstream CH_4	0.00	(g)
Direct N_2O	0.00	(g)	Upstream N_2O	0.00	(g)
Direct PM_{BC}	0.00	(g)	Upstream PM_{BC}	0.00	(g)
Direct CO_2 Equiv. from HFCs	0.00	(g)	Upstream SF_6	0.00	(mg)
Direct CO_2 Equiv.	0.00	**(g)**	**Upstream CO_2 Equi**	0.00	**(g)**
			Combined CO_2 Equ	0.00	**(g)**

Change Unit

Unit

(g)

Return to Data Entry

Vehicle Running Emissions

Direct CO_2	0.00	(g)	Upstream CO_2	0.00	(g)
Direct CH_4	0.00	(g)	Upstream CH_4	0.00	(g)
Direct N_2O	0.00	(g)	Upstream N_2O	0.00	(g)
Direct PM_{BC}	0.00	(g)	Upstream PM_{BC}	0.00	(g)
Direct CO_2 Equiv. from HFCs	0.00	(g)	Upstream SF_6	0.00	(mg)
Direct CO_2 Equiv.	0.00	**(g)**	**Upstream CO_2 Equi**	0.00	**(g)**
			Combined CO_2 Equ	0.00	**(g)**

Change Unit

Unit

(g)

Return to Data Entry

Total Emissions

Direct CO2	0.00	(g)	Upstream CO2	0.00	(g)
Direct CH4	0.00	(g)	Upstream CH4	0.00	(g)
Direct N2O	0.00	(g)	Upstream N2O	0.00	(g)
Direct PMBC	0.00	(g)	Upstream PMBC	0.00	(g)
Direct CO2 Equiv. from HFCs	0.00	(g)	Upstream SF6	0.00	(mg)
Direct CO2 Equiv.	0.00	**(g)**	**Upstream CO2 Equi**	0.00	**(g)**
			Combined CO2 Equ	0.00	**(g)**

Change Unit

Unit

(g)

Section 9: Updating GASCAP

Periodically, it may be necessary to update GASCAP with new data with emissions factors, new vehicles, etc. There are several, password-protected modules which allow administrators to easily update the software.

There are 9 modules for updating data in GASCAP:

- Section 9a: Update Global Warming Potential Values
- Section 9b: Process Fuels
- Section 9c: Electricity Production
- Section 9d: Steel
- Section 9e: Other Materials
- Section 9f: Equipment Year
- Section 9g: Staging
- Section 9h: Induced Travel

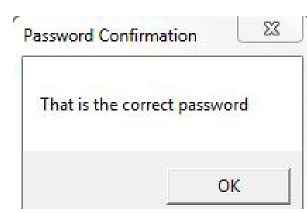
Before updating Sections 9b - 9e, it is necessary to extract new emissions factors from the latest version of Argonne National Laboratory's GREET model. For detailed instructions for obtaining these factors, see the Technical Memorandum **Updating GASCAP with Revised Greet Vehicle and Fuel Cycle Values.**

Other Sections may require extracting data from other models, such as NONROAD or MOVES. This will be noted in the instructions for updating these sections.

Accessing the Update Modules

To access GASCAP's updating modules, type the administrator password into the box on the Project Info tab.

Click Confirm Password. If the password is correct, the confirmation window to the right will appear.

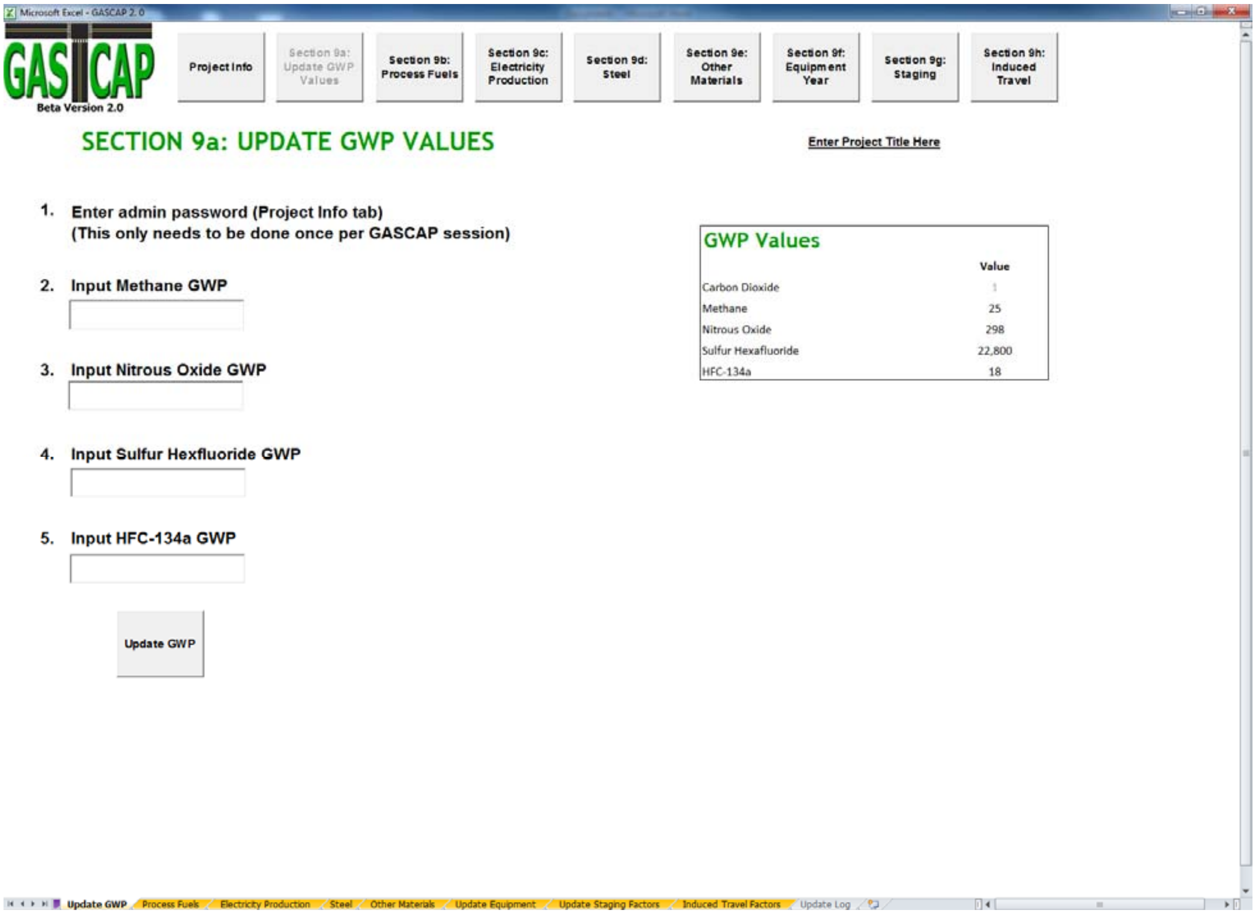


Click OK. Then click the Section 9:

Admin button.

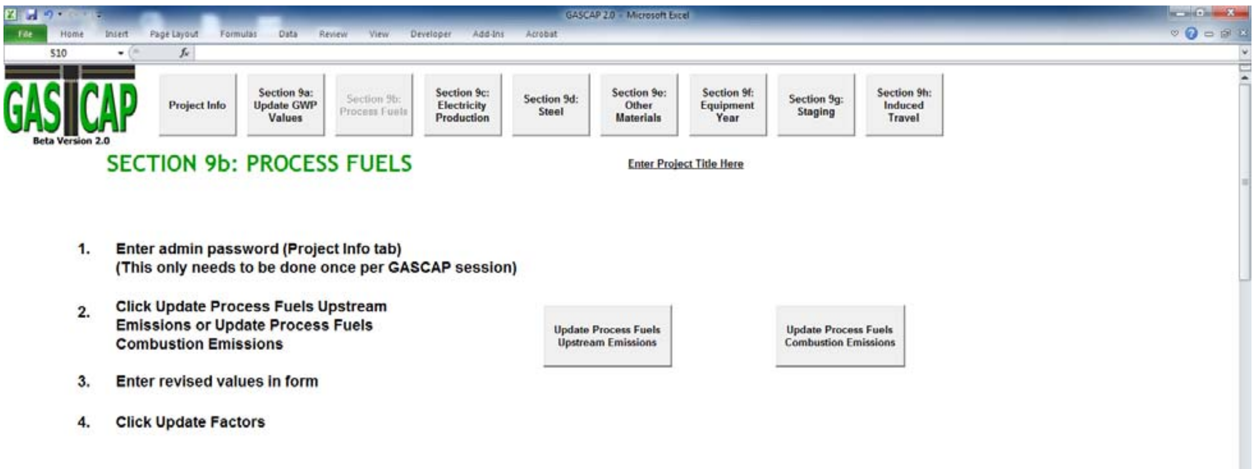
Section 9a: Global Warming Potential Values

Click the “Section 9a: Update GWP Values” button at the top of the screen to navigate to the correct worksheet. To update GWP values, replace the existing values for Methane, Nitrous Oxide, Hexafluoride, and HFC-134a. Then click the “Update GWP” button at the bottom.

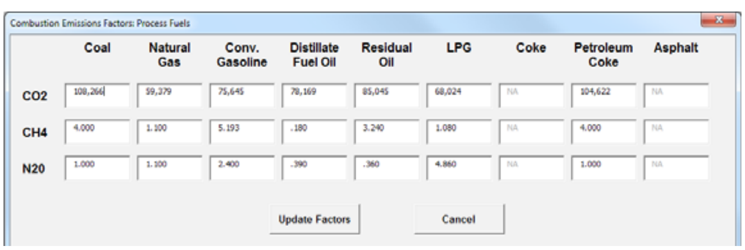


Section 9b: Process Fuels Emissions Factors

GASCAP allows you to update upstream emissions and combustion emissions for process fuels. Click the
"Section 9b: Process Fuels" button to navigate to the correct updating worksheet, shown below.



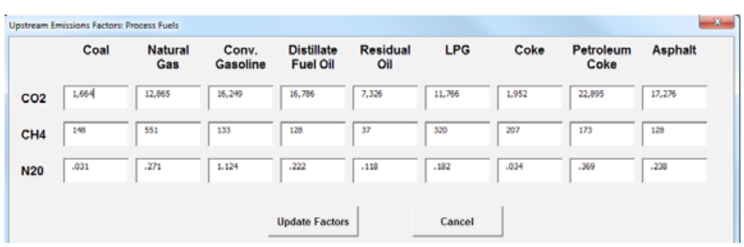
To update the upstream emissions, click the "Update Process Fuels Upstream Emissions" button. Enter new values for each greenhouse gas and process fuel in the dialogue box shown below. Click Update Factors.


Combustion Emissions Factors: Process Fuels

	Coal	Natural Gas	Conv. Gasoline	Distillate Fuel Oil	Residual Oil	LPG	Coke	Petroleum Coke	Asphalt
CO2	108,266	59,379	75,645	78,169	85,045	68,024	NA	104,622	NA
CH4	4.000	1.100	5.193	.180	3.240	1.080	NA	4.000	NA
N20	1.000	1.100	2.400	.390	.360	4.860	NA	1.000	NA

Update Factors | Cancel

To update the combustion emissions, click the "Update Process Fuels Upstream Emissions Button." Enter new values for each greenhouse gas and process fuel in the dialogue box shown below. Click Update Factors.

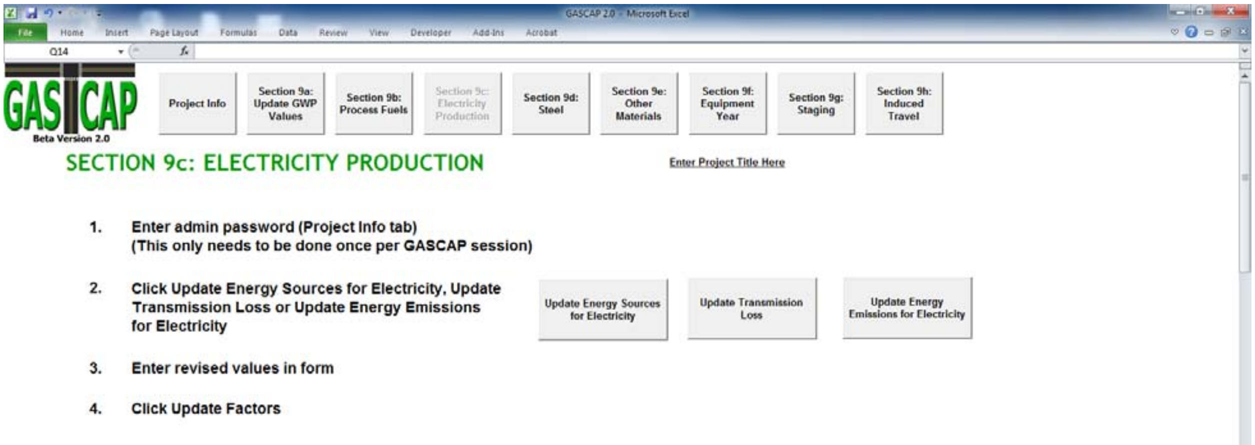

Upstream Emissions Factors: Process Fuels

	Coal	Natural Gas	Conv. Gasoline	Distillate Fuel Oil	Residual Oil	LPG	Coke	Petroleum Coke	Asphalt
CO2	1,664	12,865	16,249	16,786	7,326	11,766	1,952	22,895	17,276
CH4	148	551	133	128	37	320	207	173	128
N20	.031	.271	1.124	.222	.118	.182	.034	.369	.238

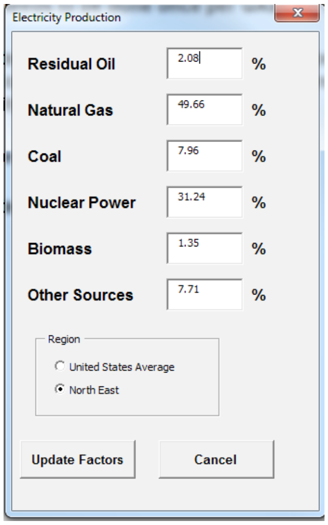
Update Factors | Cancel

Section 9c: Electricity Production Emissions Factors

Click the “Section 9c: Electricity Production” button to navigate to the correct worksheet, shown below.

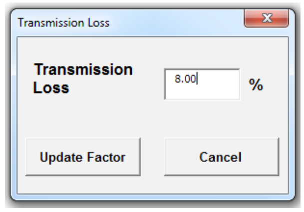


First click the “Update Energy Sources for Electricity” button to update the mix of fuels used to generate
electricity. The dialogue below will appear.

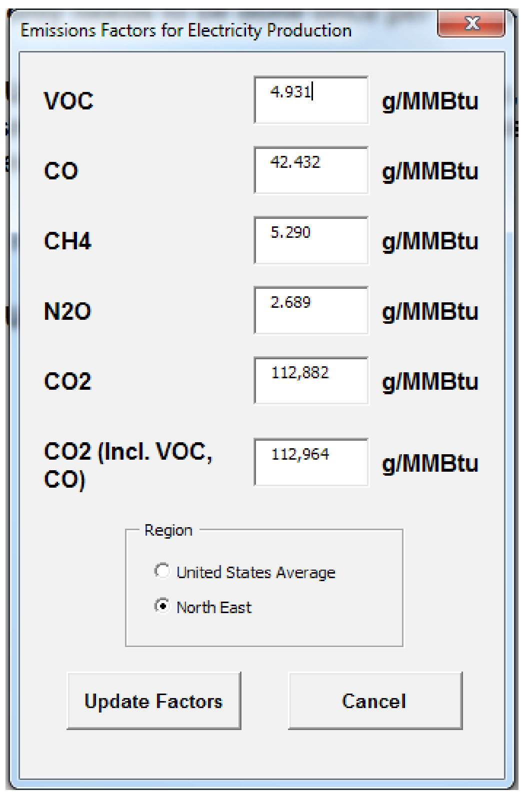


Select your region to load default data, either the United States Average or for Northeast. Enter the new values and click Update Factors.

Click the “Update Transmission Loss” button, opening the dialogue box below. Enter the new value for the percentage of electricity lost in transmission. Click Update Factor.

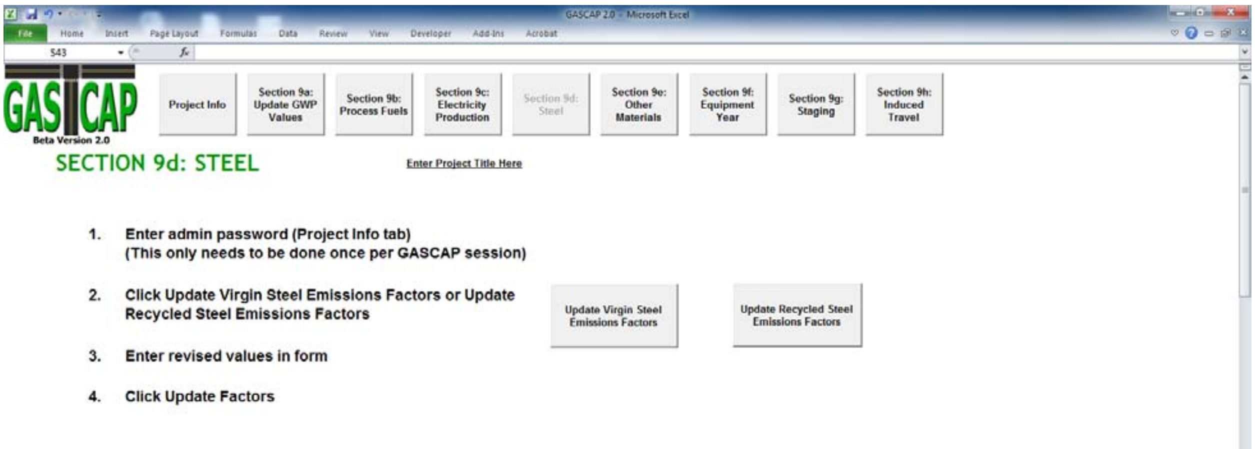


Click the “Update Energy Emissions for Electricity” button to open the updating dialogue box shown below. Select a region to load the default data for either the United States Average or the Northeast. Enter the new emissions factors in grams per million BTUs. Click Update Factors.

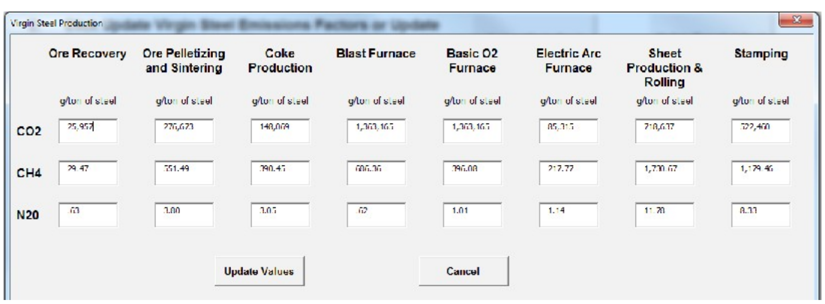


Section 9d: Emissions Factors for Steel

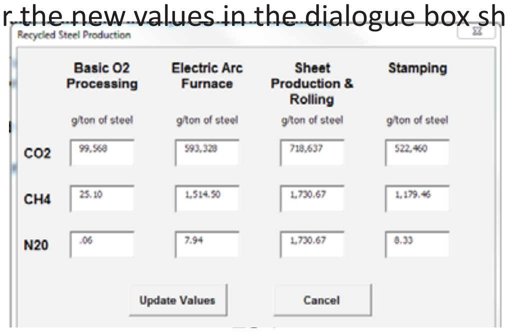
Click the “Section 9d: Steel” button to navigate to the worksheet for updating emissions factors associated with virgin and recycled steel, shown below.



To update factors for virgin steel, click the “Update Virgin Steel Emissions Factors” button. Enter the new values in the dialogue box shown below. Click “Update Values.”

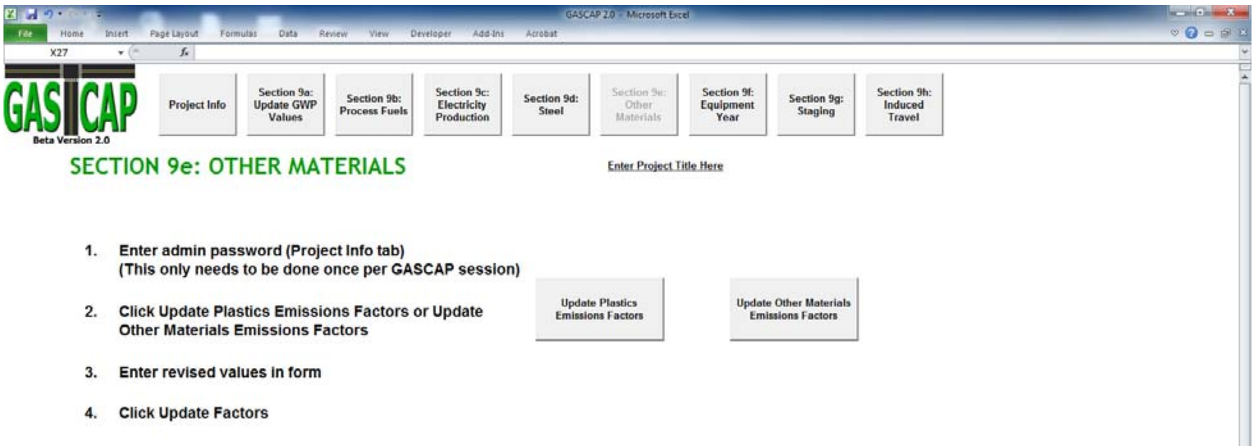


To update factors for recycled steel, click the “Update Recycled Steel Emissions Factors” button. Enter the new values in the dialogue box shown below. Click “Update Values.”



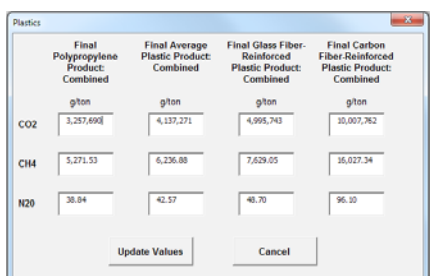
Section 9e: Emissions Factors for Other Materials

Click the Section 9e: Other Materials button to navigate to the worksheet for updating emissions factors associated with plastics or other materials,

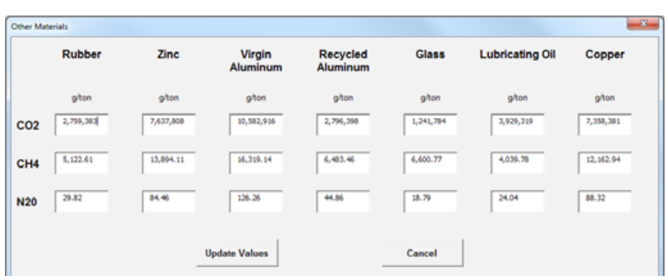


shown below.

Click the "Update Plastics Emissions Factors" button. Enter the new values for carbon dioxide, methane, and nitrous oxide emissions (in grams per ton) for each plastic product type in the dialogue box shown below. Click "Update Values."



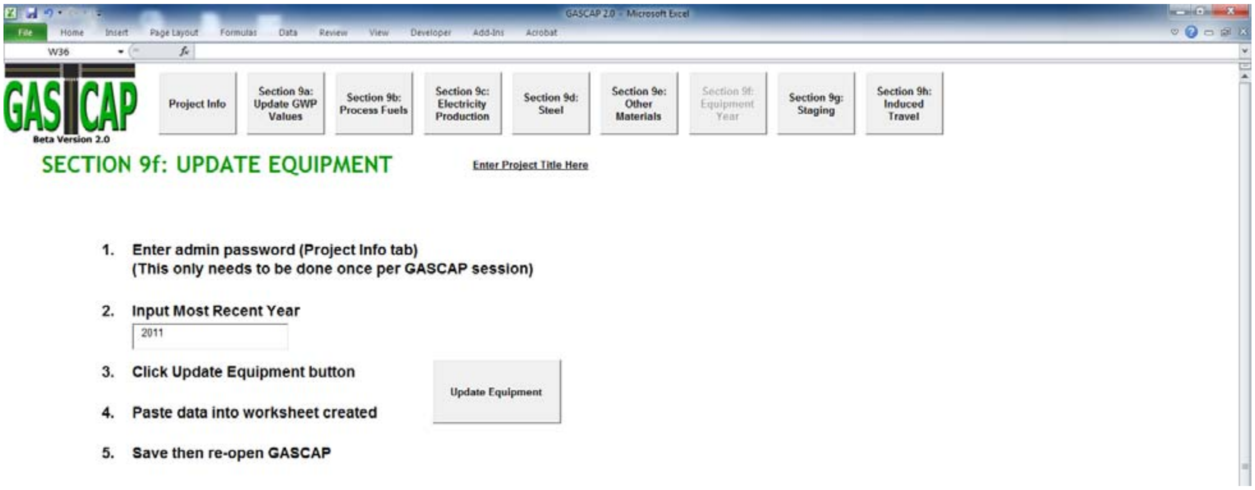
Click the "Update Other Materials Emissions Factors." Enter the new values for carbon dioxide, methane, and nitrous oxide emissions (in grams per ton) for each other material product type in the dialogue box shown below. Click "Update Values."



Section 9f: Equipment Data

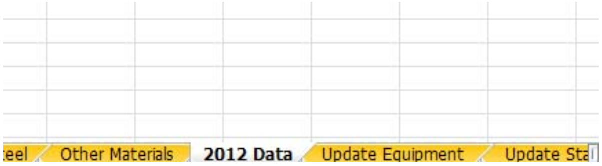
GASCAP can be updated with new models of construction equipment. Emissions factors for new equipment must be extracted from EPA's NONROAD model. VTC has prepared scripts for extracting this data using MySQL. See the Technical Memorandum "**Updating Equipment Data in GASCAP"** for step by step directions for preparing a spreadsheet with updated equipment data for new model years. Then follow the instructions below.

Click the "Section 9f: Equipment" button to navigate to the worksheet for updating



equipment, shown below.

Enter the most recent year for new equipment in the box labeled Input Most Recent Year. Click Update Equipment. This will create and open a new worksheet tab called "20xx Data," as shown below.

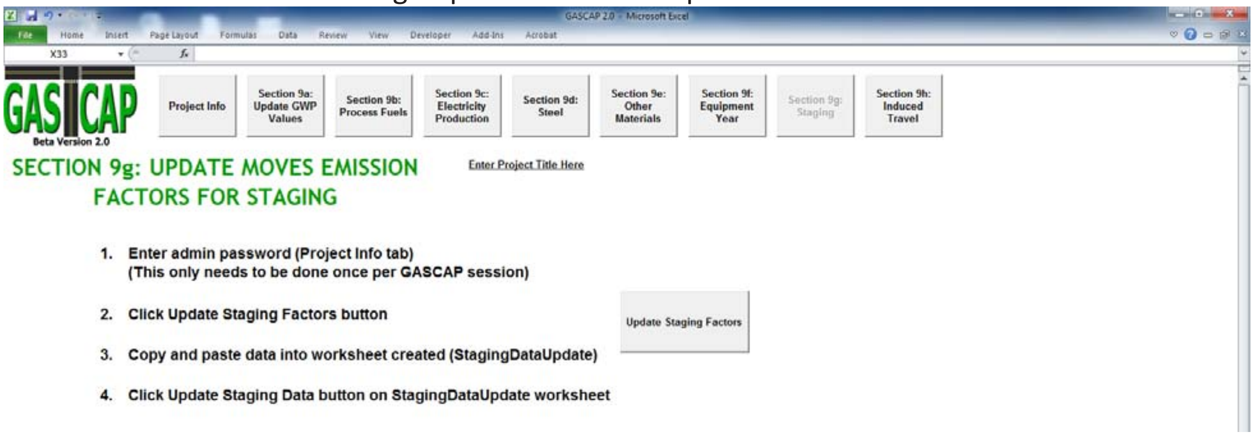


Copy and paste the data from the spreadsheet created using NONROAD into the "20xx Data" worksheet. Save and then re-open GASCAP.

You do not need to do anything else. GASCAP will then be able to estimate emissions from new construction equipment.

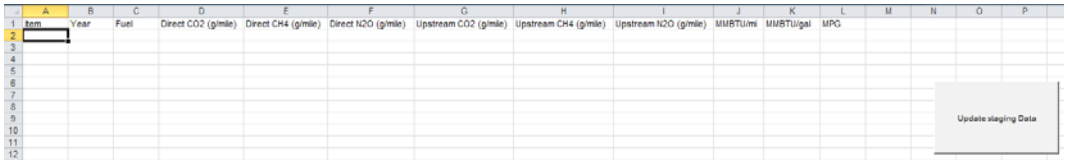
Section 9g: Staging Emissions Factors

Before updating Staging emissions factors, it is necessary to extract updated data from the latest version of EPA's MOVES software. See the Technical Memorandum "**Updating Staging Emissions Factors in GASCAP"** for detailed instructions for creating a spreadsheet with updated data.



Click the "Section 9g: Staging" button to navigate to the worksheet for updating emissions factors associated with transportation of vehicles and personnel to and from construction sites, shown below.

Click the Update Staging Factors button to create and open a new worksheet tab called "Staging Data Update," shown below.

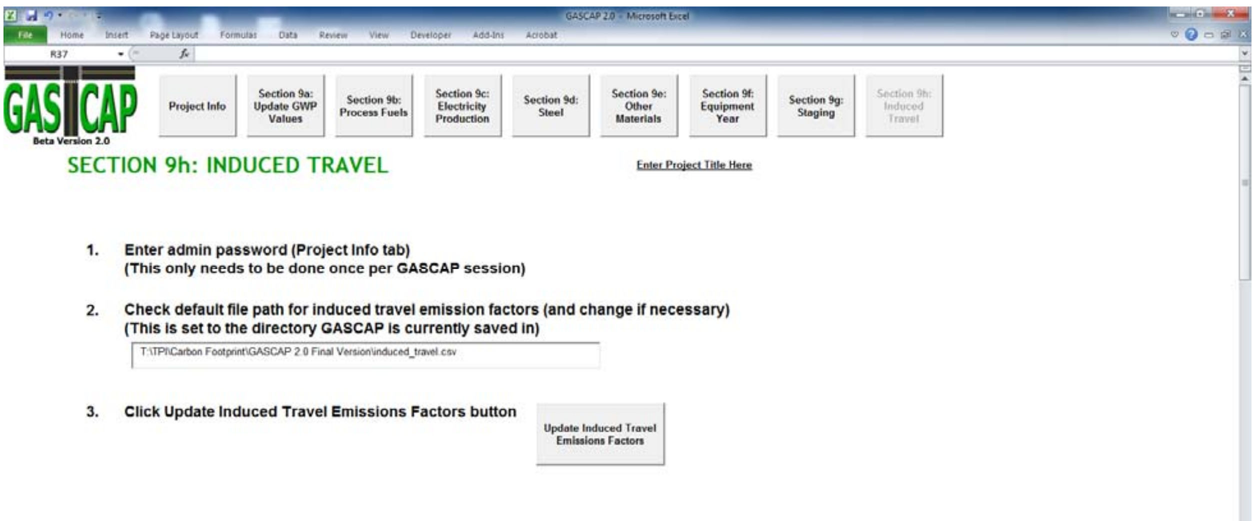


Copy and paste the updated data from the spreadsheet created with MOVES into the "Staging Data Update" worksheet. Then click the "Update Staging Data" button.

Section 9h: Induced Travel Emissions Factors

Before updating Induced Travel emissions factors, it is necessary to extract updated data from the latest
version of EPA's MOVES software. See the Technical Memorandum "**Updating Induced Travel Emissions Factors in GASCAP"** for detailed instructions for creating a spreadsheet with updated data.

Click the Section 9h: Induced Travel button to navigate to the worksheet for updating emissions factors for Induced Travel, shown below.



Locate the spreadsheet created with MOVES on your computer. Copy and paste complete file path into the box provided.

Click the "Update Induced Travel Emissions Factors" button.