California Environmental Protection Agency

Air Resources Board

PROCEDURE FOR MOTOR VEHICLE EMISSIONS DATA MANAGEMENT

Standard Operating Procedure No. MLD 127
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Organic Analysis Section
Southern Laboratory Branch
Monitoring and Laboratory Division
9528 Telstar Avenue
El Monte, CA

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SOP No. MLD 127 - PROCEDURE FOR MOTOR VEHICLE EMISSIONS DATA MANAGEMENT

1 Introduction

1.1 This document describes the data management steps taken to produce analytical reports for the Organic Analysis Section (OAS), a chemical laboratory in the Southern Laboratory Branch (SLB) of the Monitoring and Laboratory Division (MLD). Samples are taken primarily from automotive sources, though the following procedure may be used to report samples from other sources.

1.1.1 An overview of the OAS activities is shown in Figure A-2 in the appendix.
1.1.1.1 A key to the flow chart shapes is given in Figure A-1.

1.2 For motor vehicle emissions tests, sampling is conducted by the Mobile Source Operations Division (MSOD) or Mobile Source Control Division (MSCD) according to the Federal Register (Ref. 11.1) and the California Non-methane Organic Test Procedures (Ref. 11.2). These tests may be exhaust tests or evaporative emissions tests. This method does not include sample collection or analytical procedures.

1.3 Vehicles are tested and samples analyzed by MSOD/MSCD dynamometer (dyno), or “bench”, instruments. Parameters measured include:

1.3.1 Total hydrocarbons (THC)

1.3.2 Methane (CH_4)

1.3.3 Carbon monoxide (CO)

1.3.4 Carbon dioxide (CO_2)

1.3.5 Oxides of nitrogen (NO_x)

1.4 Emissions samples are taken by MSOD/MSCD and brought to the OAS laboratory for analysis. These samples include:

1.4.1 Hydrocarbon samples, contained in Tedlar bags or stainless steel canisters
- 1.4.1.1 Light-end hydrocarbons [analyzed by gas chromatography (GC), SOP 102/103 (Ref. 11.3.2)]
- 1.4.1.2 Mid-range hydrocarbons [GC, SOP 102/103 (Ref. 11.3.2), including ethers (e.g., MTBE)]
- 1.4.1.3 Methane by mole sieve method and both methane and non-methane hydrocarbons by cryotrap method [GC with pre-concentration, direct injection flame ionization detector (PDFID), SOP 119 (Ref. 11.3.4)]
- 1.4.1.4 GC/mass spectroscopy [(GC/MS), SOP 120A (Ref. 11.3.5)]

1.4.2 Carbonyl (aldehyde and ketone) samples
- 1.4.2.1 Collected on 2,4-dinitrophenylhydrazine (DNPH) cartridges (or impingers)
- 1.4.2.2 Analyzed by high performance liquid chromatography (HPLC), SOP 104 (Ref. 11.3.3)

1.4.3 Alcohol samples
- 1.4.3.1 Collected in impingers
- 1.4.3.2 Analyzed by GC, SOP 101 (Ref. 11.3.1)
- 1.4.3.3 The alcohol analysis is required only for alcohol-based fuels. Additional tests are analyzed for alcohol at the clients' request.

1.4.4 Analyses by PDFID and GC/MS are confirmatory tests.
- 1.4.4.1 PDFID is used to quantitatively verify the total NMHC result.
  - 1.4.4.1.1 PDFID analysis is not required; however, it is performed on most tests.
- 1.4.4.2 GC/MS is used to qualitatively confirm NMHC compound identifications.
  - 1.4.4.2.1 Periodic GC/MS confirmation analyses are required; typically, one sample per day is analyzed, with a formal report prepared on one sample per week.

1.4.5 Each analysis generates hard copies and electronic files, which are converted to appropriate reporting formats, and stored.

1.5 An overview of the data flow is shown in Figure A-3.

1.6 A "Motor Vehicle Emissions Report" is generated for each test.

1.6.1 Each report consists of data from up to six different sources of analysis. These are:
- 1.6.1.1 Light-end hydrocarbons
- 1.6.1.2 Mid-range hydrocarbons
- 1.6.1.3 Methane and NMHC (PDFID)
- 1.6.1.4 Carbonyls
- 1.6.1.5 Alcohols
- 1.6.1.6 Dynamometer instruments [Federal Test Procedure (FTP), Ref. 1], operated by Mobile Source Control Division (MSCD) and Mobile Source Operations Division (MSOD)

1.6.2 The data are merged to form the Motor Vehicle Emissions Report in one of the following two ways:
- 1.6.2.1 Data is input into a spreadsheet template provided by MSCD.
- 1.6.2.2 Data is input into the MLD Emissions Test System (METS).

1.6.3 Tests for which there are no corresponding dyno data are reported in an appropriate format, which varies according to project and sample type.
- 1.6.3.1 Examples of these are audit cylinders and zero air generator check samples.
- 1.6.3.2 Typically, individual analysis reports (see Section 3) or Excel spreadsheets are used to report the data from these samples.

1.6.4 GC/MS results are compared to light-end and mid-range results in a separate report.

1.7 Various quality control (QC) procedures are performed and are documented in the individual Motor Vehicle Emissions Reports and/or quarterly QC reports.

1.8 Productivity reports are prepared quarterly.

1.9 This document describes the generation, reporting and storage of this data.

2 Sample Handling

2.1 Figure A-4 shows an overview of the OAS sample handling and log-in procedures.

2.2 Samples are received from the client (MSCD, MSOD or other source).

2.3 Chain of Custody

2.3.1 Samples must have chain-of-custody forms attached (see Figure A-5).

2.3.2 Each analyst who handles a sample must sign the corresponding chain-of-custody form.

2.3.3 After all analyses are completed, chain-of-custody forms are retained for at least five years by the Environmental Studies and Operations Support Section (ES&OSS) of SLB.

2.4 Sample Log-in

2.4.1 Two access databases, “ET_Login” and “ET_Track,” are used to log in samples and track corresponding data.

2.4.2 Samples are logged in using an SLB program, "ET_LOGIN.” (See Figure 1, below and Figure A-6 in the appendix.)

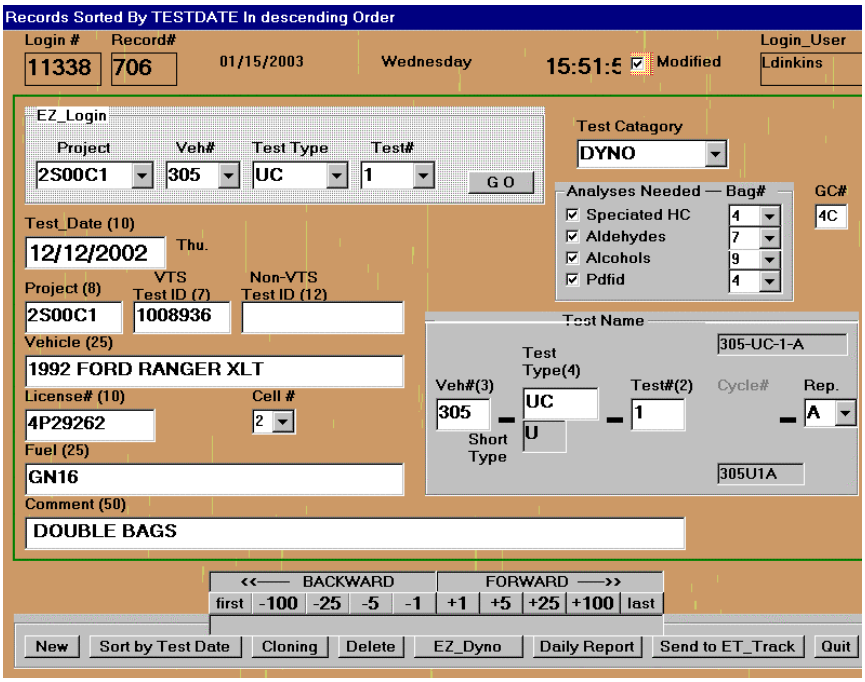


Figure 1. Screen Print of ET Login

2.4.3 For motor vehicle emission tests, the “EZ_Login” feature is used to automatically retrieve sample information from the Vehicle Testing System (VTS), which collects and stores dynamometer data.

2.4.3.1 The “New” button is clicked to log in a new motor vehicle test or other sample(s).

2.4.3.1.1 Each new test is automatically flagged as having been “modified.”

2.4.3.2 Using “drop-down” boxes, the project number, vehicle number, test type, test number and test category (dyno, SHED or special) are selected.

2.4.3.3 The “go” button is clicked and the corresponding test date, VTS number, vehicle description, license number, fuel, cell (dyno) number, comments, analyses needed and number of samples are automatically retrieved.

2.4.3.4 The “Short Type” box is also automatically filled in with a one-character abbreviation for the test type.

2.4.3.4.1 Test types may be up to four characters long.

2.4.3.4.2 The practice of abbreviating the test type was initiated when prior versions of software would allow only 8 characters for a file name.

2.4.3.4.3 For continuity with old data, the current system tracks both long and short file names.

2.4.3.5 The “Analyses Needed—Bag#” box is visually checked to confirm that the MSOD test scheduling accurately reflected the number and types of samples delivered to the OAS laboratory.

2.4.3.6 The number of the GC analyzing the test and chemist’s one-character initial are entered into the “GC#” box.

2.4.3.7 Comments may be typed in the “Comment” box.

2.4.3.8 If there are duplicate samples (“double bags”), “A” (or “B”) is selected in the “Rep.” drop-down box.

2.4.3.8.1 Using the “cloning” button, a duplicate record is created.

2.4.3.8.2 The “Rep.” selection is manually changed to “B” (or “A”).

2.4.4 For special tests, all of the sample information is manually entered in the appropriate boxes.

2.4.4.1 A non-VTS Test ID number is entered, if applicable.

2.4.4.1.1 This is used primarily for off-site tests where the testing facility assigns its own sample number.

2.4.4.2 Similar tests/samples can be duplicated using the “cloning” button.

2.4.4.2.1 The duplicate record is then modified by the chemist, as appropriate.

2.4.5 “Send to ET_Track” is clicked when the chemist is finished logging in samples for the current log-in session.

2.4.5.1 New test records from the current session are created and automatically appended to and saved in an ASCII file (“SAMPLE3.MUM) in X:\HSL\MLD_SCHEDULE.

2.4.5.1.1 This file is a running log of test records.

2.4.5.1.2 It is used in the process of generating individual analysis reports (Section 3).

2.4.5.2 The new test records are also automatically appended to and saved in “ET_Login” and “ET_Track” (“Emission Test Track”) databases..

2.4.5.3 If the chemist does not click “Send to ET_Track,” the “modified” flag remains and the next time anyone clicks “Send to ET_Track,” all modified tests are sent to ET Track.

2.4.6 A printout containing a given day’s test records is obtained by clicking “Daily Report.”

2.4.6.1 Each daily report created is saved in X:\HSL\MLD_SCHEDULE\ MM-DD-YY.MLD (ASCII), where “MM” is the month, “DD” is the day and “YY” is the year.

2.4.6.2 A report for a different day can be obtained by clicking on the “backward” or “forward” navigational keys.

2.4.7 A dyno report for a given test is obtained by clicking “EZ_Dyno.”

2.4.7.1 The “EZ_Dyno” program downloads and converts the VTS data for each dyno test into three files:

2.4.7.1.1 ”XTEST.MDD” (ASCII)

2.4.7.1.2 “YTEST.MDD” (quotation delimited)

2.4.7.1.3 “ZTEST.MDD” (semi-colon delimited)

2.4.7.2 The files are saved in “C:\DYN”on the login PC and the data coordinator’s local drive.

2.4.7.3 The ASCII file is used to print out a dyno report.

2.4.7.4 The quotation delimited file is used to merge with other data (see Section 4).

2.4.7.5 The semi-colon delimited file can be imported into Excel for formatting into a freestanding report or for specialized data processing.

2.5 Sample and Data Tracking

2.5.1 ET Track is used to document and track sample receipt, QC status, report completion and comments. (See Figure 2.)

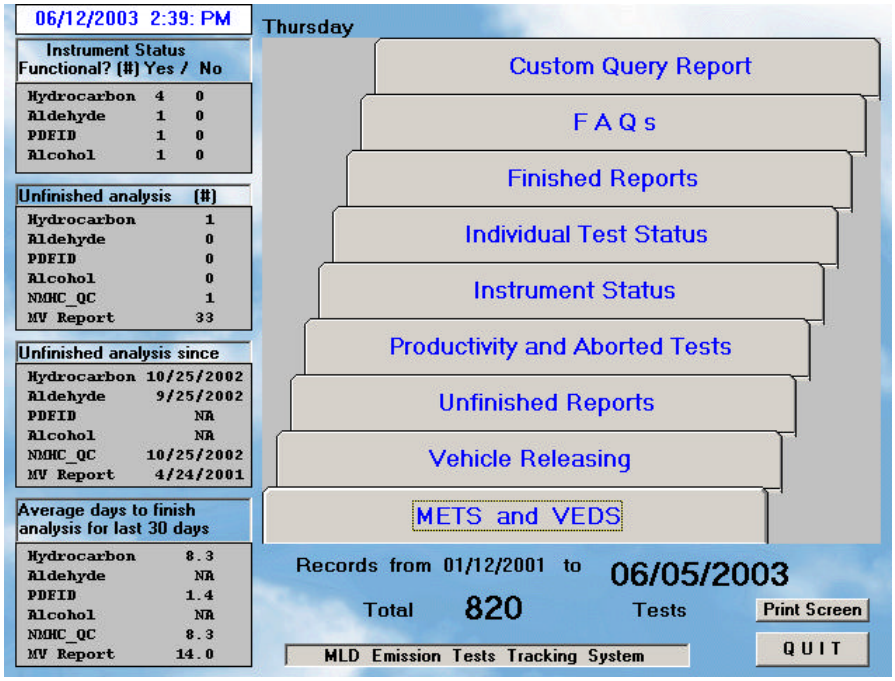


Figure 2. Screen Print of ET Track

2.5.2 Test records are created by ET Login, as explained in Section 2.4.

2.5.3 Figure A-7 shows an overview of the utilization of ET Track.

2.5.4 Chemists manually update ET Track at several stages during analysis and data processing, using the “Individual Test Status” page (see Figure 3).

2.5.4.1 For any given test, the test information automatically sent to ET Track by ET Login appears in the top portion of the screen.

2.5.4.2 The various “QC Review” and “Reporting” boxes are checked off as the data is processed, reviewed and released.

2.5.4.3 An “Individual Test Status Report” is generated by clicking “Status.”

2.5.4.3.1 An example is given in Figure A-8.

2.5.4.3.2 This text file can be printed out and/or saved.

2.5.5 Chemists, management and MSCD/MSOD clients can access ET Track to see the status of any given test.

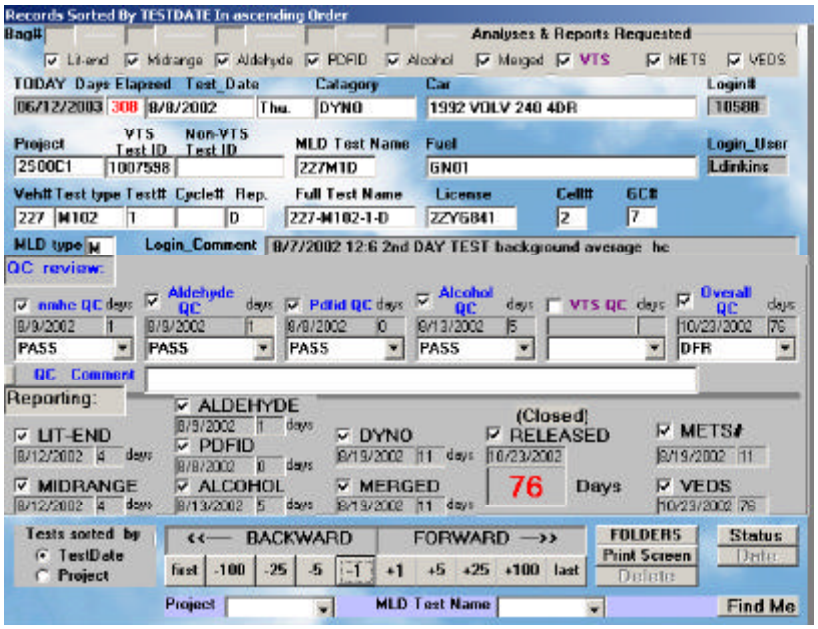


Figure 3. ET Track Individual Test Status page

2.5.6 ET Track can also be used to compile reports using different database fields, such as GC number, finished or unfinished, and data status, and employing various criteria.

2.5.6.1 Standard reports are provided by the “Vehicle Releasing”, “Unfinished Reports”, “Productivity and Aborted Tests” and “Finished Reports” pages.

2.5.6.1.1 An example of the “Unfinished Reports” page and its corresponding report are provided in Figure 4, below, and Figure A-9 in the Appendix.

2.5.6.1.2 This text file can be printed out and/or saved.

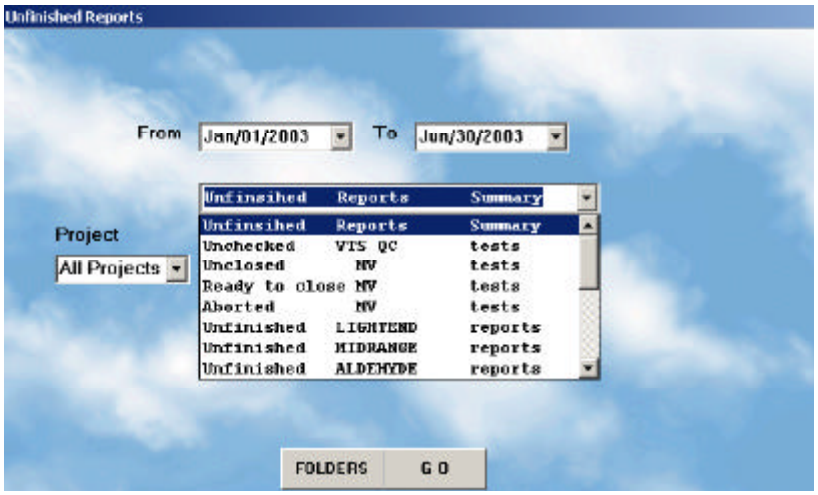


Figure 4. ET Track Unfinished Reports Page

2.5.6.2 “Custom Query Report” is used to create user-defined reports.

3 Individual Analyses

3.1 An overview of the sample analyses is illustrated in Figure A-10.

3.2 Light-end and Mid-range Hydrocarbon

3.2.1 The light-end report generation process is shown in Figure A-11.
- 3.2.1.1 The light-end electronic data file management is diagramed in Figure A-12.

3.2.2 The mid-range report generation process is shown in Figure A-13.
- 3.2.2.1 The mid-range electronic data file management is diagramed in Figure A-14.

3.2.3 Sample Analysis
- 3.2.3.1 For a regular Federal Test Procedure (FTP) test, four samples are received.
  - 3.2.3.1.1 One sample for each of the three phases of the test, plus one composite background sample are received.
  - 3.2.3.1.2 In lieu of a composite background, individual backgrounds may be sampled.
- 3.2.3.2 For non-FTP tests, the number of samples received may be fewer than four.
- 3.2.3.3 For SHED tests, four to six samples are received.
  - 3.2.3.3.1 For the “hot soak” portion of the test, a background and one sample are received.
  - 3.2.3.3.2 For the “diurnal” portion of the test, a background and a 24-hour sample are received.
    - 3.2.3.3.2.1 The test may be continued for a second day; a 48-hour diurnal sample may be received.
    - 3.2.3.3.2.2 The test may be continued for a third day; in addition to the 48-hour sample, a 72-hour diurnal sample may be received.
- 3.2.3.4 The analysis is controlled by a Varian Star data system.
- 3.2.3.5 Raw data files ("SAMPLE.RUN," proprietary file format) are automatically generated by the data system.
- 3.2.3.6 From the raw files, report files in ASCII format ("SAMPLE_A.TXT" for light-end; "SAMPLE_B.TXT" for mid-range) are automatically generated by the Varian software.
- 3.2.3.7 Hard copies of the chromatograms and peak tables are printed out by the chemist.
- 3.2.3.8 The peak identifications assigned by the data system are evaluated by the chemist and any misidentifications corrected by reprocessing the “SAMPLE_A.RUN”/”SAMPLE_B.RUN” file with the Varian Star software.
  - 3.2.3.8.1 The previous version of the “SAMPLE_A.TXT”/ ”SAMPLE_B.TXT” file is overwritten by the reprocessed version.

3.2.4 QC Data Reporting

3.2.4.1 Data from QC runs are entered in the appropriate QC charts (Excel) and evaluated for compliance with QC requirements, as detailed in SOP 102/103.

3.2.4.2 QC status of pass, fail or information only (FYI) is manually updated in ET Track. (See Section 7 for a discussion of QC status.)

3.2.5 Sample Data Reporting

3.2.5.1 Using an SLB program called "MIDLIT" (Figure 5, below), the "SAMPLE_A.TXT"/"SAMPLE_B.TXT" files of a given motor vehicle test are accessed and merged to generate a report.

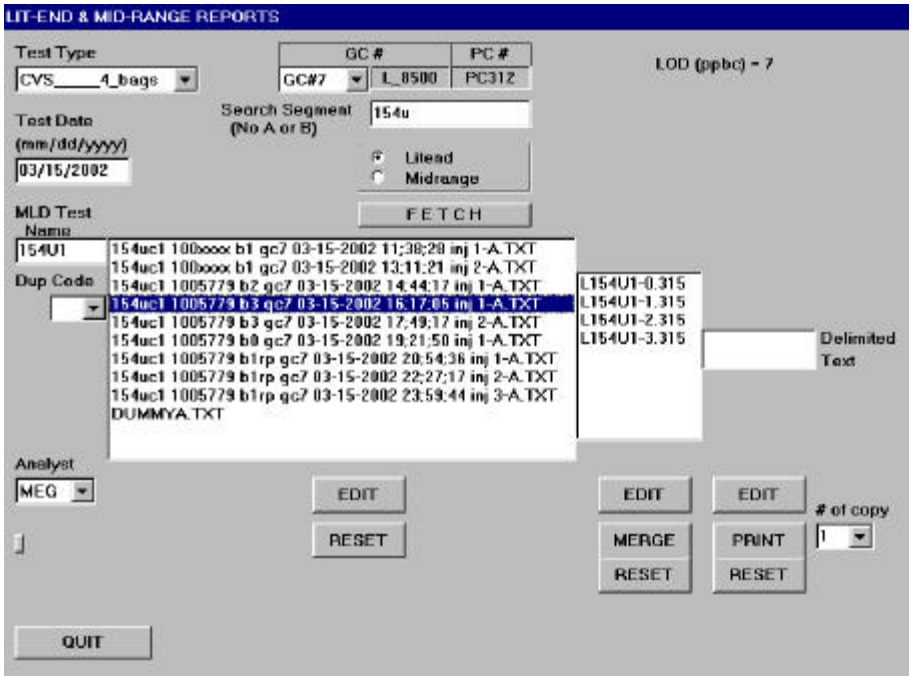


Figure 5. "MIDLIT" Data Merging Program

3.2.5.2 In this program, the test date and test number are entered, light-end or mid-range analysis is chosen, and the GC# and chemist are selected from drop-down boxes.

3.2.5.3 When "FETCH" is clicked by the chemist, the "SAMPLE_A.TXT (or SAMPLE_B.TXT)" files corresponding to this motor vehicle test are accessed and retrieved.

3.2.5.3.1 The file names appear in the leftmost field, the raw files box.

3.2.5.3.2 Each of these files can be edited, in WordPad, by selecting the file with the cursor and clicking "EDIT."

3.2.5.4 The files corresponding to the background, bag 1, bag 2 and bag 3 are dragged and dropped sequentially from the raw files box to the intermediate files box, the center of the three fields displayed.

3.2.5.4.1 The files are converted to an intermediate format [ASCII files named "LTEST-#.MDD"/"MTEST-#.MDD," where "TEST" is the MLD test number, "#" is the test phase, "M" is the month (using the numbers 1 through 9 for January through September and the letters A through C for October through December) and "DD" is the date].

3.2.5.4.2 The order in which the files are dragged and dropped determines which files the program uses for each test phase.

3.2.5.4.3 For non-FTP tests with fewer than four samples, or SHED tests with fewer than six samples, the "DUMMYA.TXT" (or "DUMMYB.TXT") file is selected as a substitute (place holder) for the missing test phase(s).

3.2.5.4.4 Each of these intermediate files can be edited, in WordPad, by selecting the file and clicking "EDIT."

3.2.5.4.5 The configuration file SOURCE.TXT (ASCII) is automatically accessed.

3.2.5.4.5.1 This file contains the LOD and the path to the "SAMPLE3.NUM" (ASCII) file created by ET Login.

3.2.5.4.5.2 The LOD is accessed so that those peaks below the LOD are excluded from the report.

3.2.5.4.5.3 The "SAMPLE3.NUM" file is accessed to obtain vehicle, fuel and other test information.

3.2.5.4.5.4 The LOD and "SAMPLE3.NUM" path can be changed here, if the current (default) settings require updating.

3.2.5.4.5.4.1 The untitled "secret" button, located in the lower left, above the "QUIT" button, is clicked.

3.2.5.4.5.4.2 The "SOURCE" button is revealed, below the "Reset" button.

3.2.5.4.5.4.3 "SOURCE" is clicked to open the configuration file (ASCII)

3.2.5.4.5.4.4 The LOD can be manually changed.

3.2.5.4.5.4.5 The file is saved and closed.

3.2.5.5 Each set of intermediate files (usually corresponding to the three modes, plus background, of an FTP test) is merged by clicking "Merge."

3.2.5.5.1 The merged file name ("LTEST.MDD") appears in the rightmost box.

3.2.5.5.2 This file can be edited, in WordPad, by selecting the file and clicking "EDIT."

3.2.5.6 The merged light-end product is saved onto the local drive (C:\ MIDLIT) into three separate files:

3.2.5.6.1 "TTEST.MDD" (ASCII)

3.2.5.6.1.1 This file is used to print out a light-end report (Figure A-15) by clicking "PRINT."

3.2.5.6.2 “LTEST.MDD” (quotation delimited)
3.2.5.6.2.1 This file is used to merge with other data (see Section 4).
3.2.5.6.3 “KTEST.MDD” (semi-colon delimited)
3.2.5.6.3.1 This file (“KTEST.MDD”) may be imported into Excel for formatting into a freestanding report or for specialized data processing.
3.2.5.7 The merged mid-range product is saved onto the local drive (C:\MIDLIT) into three separate files:
3.2.5.7.1 “DTEST.MDD” (ASCII)
3.2.5.7.1.1 This file is used to print out a mid-range report (Figure A-16) by clicking “Print.”
3.2.5.7.2 “MTEST.MDD” (quotation delimited)
3.2.5.7.2.1 The quotation delimited file is used to merge with other data (see Section 4).
3.2.5.7.3 “NTEST.MDD” (semi-colon delimited)
3.2.5.7.3.1 The semi-colon delimited file can be imported into Excel for formatting into a freestanding report or for specialized data processing.
3.2.5.8 The program accepts only compound names that it has been programmed to recognize.
3.2.5.8.1 Adding new compounds requires programming changes.
3.2.5.9 ET Track is manually updated to reflect that the light-end and mid-range reports have been completed.
3.2.5.10 A hardcopy report is submitted.
3.2.5.10.1 For data that will be combined with data from other analyses, the report is submitted to the Data Coordinator.
3.2.5.10.2 For data that will not be combined with data from other analyses, the report is submitted to the QC Coordinator.

3.3 <u>Carbonyls</u>

3.3.1 The carbonyl report generation process is shown in Figure A-17.
3.3.1.1 The electronic data file management is diagramed in Figure A-18.

3.3.2 Sample Analysis
3.3.2.1 For a regular FTP test, seven or eight samples are received:
3.3.2.1.1 One primary sample and one background from each of the three modes
3.3.2.1.2 One backup cartridge for phase 1 sample (only necessary for extremely high concentration samples)
3.3.2.1.3 One blank cartridge
3.3.2.2 For non-FTP tests, the number of test phases, and corresponding carbonyl cartridges collected, may be fewer than three.
3.3.2.3 For SHED tests, carbonyl samples are not typically collected.
3.3.2.4 The analysis is controlled by a Waters Millennium data system.

3.3.2.5 Raw data are collected and stored by the HPLC's data processing software in a Waters proprietary database, rather than as discrete files for each run.

3.3.2.5.1 Each sample is run on two different HPLC configurations, System 1 and System 2, to measure all of the desired carbonyl compounds.

3.3.2.6 Hard copies of the chromatograms and peak tables are printed out by the chemist.

3.3.2.7 The peak identifications assigned by the data system are evaluated by the chemist and any misidentifications corrected by reprocessing the sample with the Millennium software.

3.3.2.7.1 Each time a sample run is reprocessed and saved, a new (additional) record is created by the Millennium software.

3.3.2.7.2 The previous version is retained.

3.3.2.8 The data are then exported to the data processing PC.

3.3.2.8.1 A sample or group of samples is selected from a given day's sample list.

3.3.2.8.1.1 Sample runs must be transferred from both System 1 and System 2.

3.3.2.8.1.2 Care must be taken to ensure that the most recent version of each sample is selected, as explained in Section 3.3.2.9.

3.3.2.8.2 "Export" is selected from the "Database" menu.

3.3.2.8.3 The data processing PC is mapped to the Millennium PC, so that "export" automatically sends the file(s) to this location.

3.3.2.8.3.1 The files are saved in C:\LC_FILE.

3.3.2.8.3.2 For each sample, a text file (delimited) is automatically generated by the Millennium software and transferred to the data processing PC.

3.3.2.8.3.3 The file is saved as "ALD1####.ARS" (System 1) or "ALD2####.ARS" (System 2), where "####" is a sequential number assigned by the Millennium software (e.g., "ALD15432.ARS").

3.3.3 QC Data Reporting

3.3.3.1 Data from QC runs are entered in the appropriate QC charts (Excel) and evaluated for compliance with QC requirements, as detailed in SOP 104.

3.3.3.2 QC status (pass, fail or FYI) is manually updated in ET Track.

3.3.4 Sample Data Reporting

3.3.4.1 The "ALD1####.ARS"/"ALD2#####.ARS files of a given motor vehicle test are then merged by SLB program "ALD7" to generate a combined report. (See Figures 6 through 9, below.)

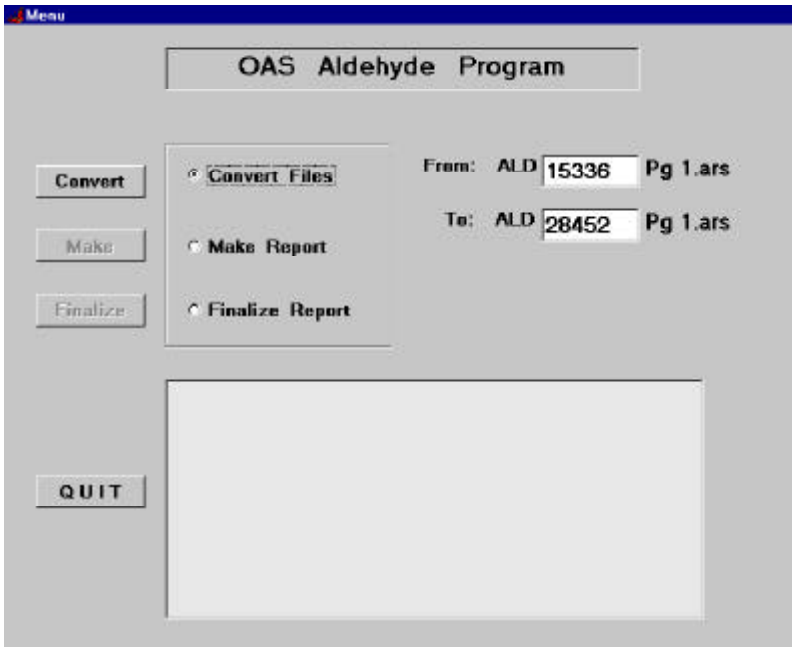


Figure 6. Carbonyl Data Merging Program, Page 1

3.3.4.2 First, the "ALD1####.ARS"/"ALD2####.ARS" files are converted to ASCII format.

3.3.4.2.1 "Convert Files" option (Figure 6) is selected.

3.3.4.2.2 "Convert" is clicked.

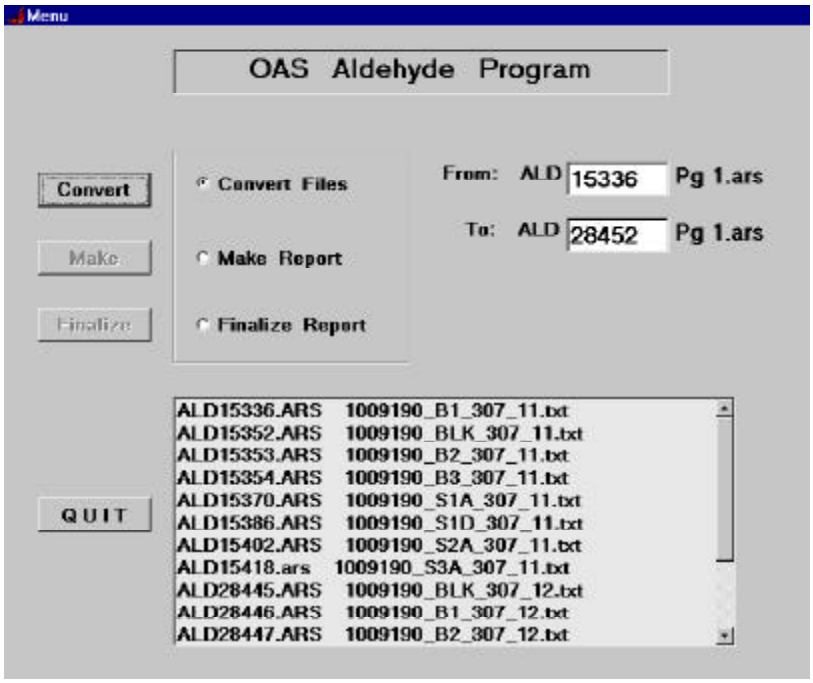


Figure 7. Carbonyl Data Merging Program, File Conversion Page

3.3.4.2.3 All “ALD1####.ARS”/”ALD2####.ARS files that have been exported to the PC will be converted to the new format.

3.3.4.2.4 Files are saved as the sample name assigned by the chemist when the samples were analyzed, with a “.TXT” extension.

3.3.4.2.4.1 Vehicular tests are typically named “#######_P#_MDD_IS.TXT”, where “#######” is the VTS number, “P#” is the test phase (e.g., “S1” is phase 1 sample, “B2” is phase 2 background), “M” is the month and “DD” is the date the test was conducted, “I” is the injection number and “S” is the system number.

3.3.4.2.4.2 Non-vehicular tests, or vehicular tests with any other naming system, are similarly converted.

3.3.4.2.4.3 System 1 samples are saved as ASCII files in C:\LCSYS1.

3.3.4.2.4.4 System 2 samples are saved as ASCII files in C:\LCSYS2.

3.3.4.2.5 Converted files are displayed in the file name box (Figure 7), with the old file names on the left and new file names on the right.

3.3.4.2.6 “QUIT” is clicked to end the program.

3.3.4.3 The files corresponding to the different test phases are then merged together.

3.3.4.3.1 “Make Report” option (Figure 6) is selected.

3.3.4.3.2 “Make” is clicked.

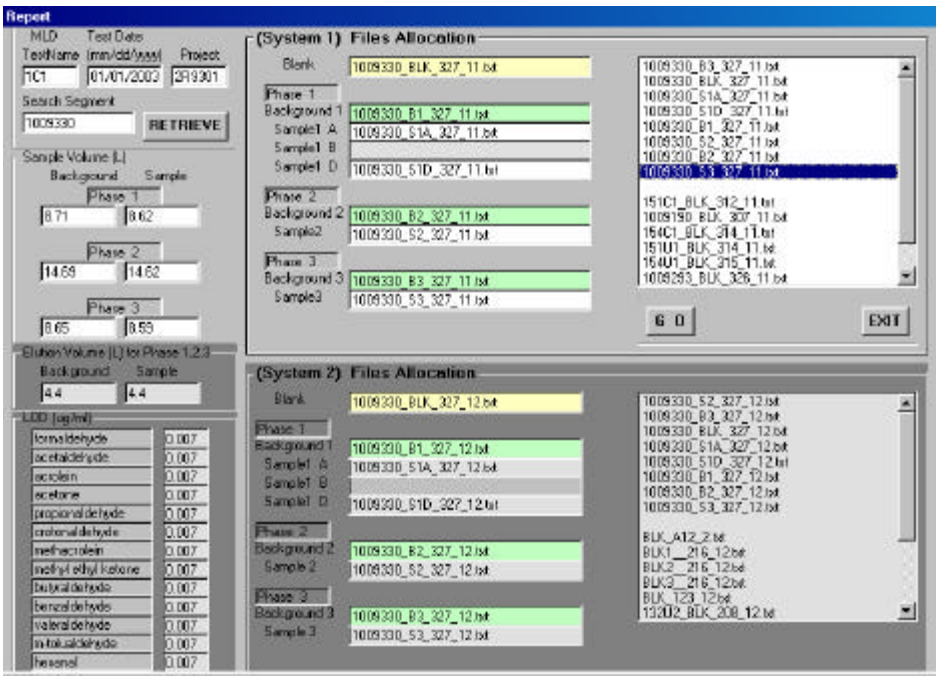


Figure 8. Carbonyl Data Merging Program, Merging Page

3.3.4.3.3 The test name, test date, project number and search segment are manually entered (Figure 8).

3.3.4.3.3.1 The search segment corresponds to the VTS test number or other unique identifier contained in each sample name.

3.3.4.3.4 “RETRIEVE” is clicked.

3.3.4.3.5 All files containing the characters specified in the search segment are retrieved and displayed.

3.3.4.3.6 The sample volume (volume of air pulled through the cartridges during sampling) for each test phase is manually entered.

3.3.4.3.6.1 These measurements are written on the chain-of-custody form by MSCD/MSOD testing personnel.

3.3.4.3.7 The cartridge elution volume and LOD can be changed here, if the current (default) values require updating.

3.3.4.3.7.1 The cartridge elution volume is the amount of solvent that was used to extract the carbonyls from the cartridge, minus the solvent retained by the cartridge after elution.

3.3.4.3.7.2 This volume is not measured for each sample.

3.3.4.3.7.3 This volume was experimentally determined by extracting a number of cartridges and measuring the volume of the extract; the default value is set to that amount.

3.3.4.3.8 The appropriate System 1 files are dragged and dropped from the upper right box to the corresponding boxes in the upper center portion of the screen.

3.3.4.3.8.1 For non-FTP tests with fewer than three test phases, the “DUMMY.TXT” file is selected as a substitute (placeholder) for the missing test phase(s).

3.3.4.3.9 Each file can be opened in WordPad, by selecting it and double clicking, and compared to the hardcopy report to ensure that the most recent version of each run was exported.

3.3.4.3.10 The System 2 boxes in the lower center portion of the screen are automatically filled in with the corresponding files from the list in the lower right box, as each system 1 file is dropped.

3.3.4.3.11 “GO” is clicked.

3.3.4.3.12 The “SAMPLE3.NUM” (ASCII) file created by ET Login is accessed to obtain vehicle, fuel and other test information.

3.3.4.3.13 The LOD is accessed so that those peaks below the LOD are excluded from the report.

3.3.4.3.14 The blank values are automatically subtracted from the sample values.

3.3.4.3.15 The merged report is automatically opened in WordPad.

3.3.4.3.15.1 The report is printed.
3.3.4.3.15.2 This file can be edited.
3.3.4.3.15.3 To return to the previous page, the WordPad file is closed and “EXIT” is clicked.

3.3.4.3.16 The merged data are automatically saved in C:\DATA as three separate files:
3.3.4.3.16.1 “TTEST.MDD" (ASCII), which is used to print out a carbonyl report (Figure A-19).
3.3.4.3.16.2 “UTEST.MDD” (quotation delimited), which is used to merge with other data.
3.3.4.3.16.3 “CTEST.MDD” (semi-colon delimited), which can be imported into Excel for formatting into a freestanding report or for specialized data processing.

3.3.4.4 The report is proofread and finalized.
3.3.4.4.1 The report is proofread and corrections, if any, are made.
3.3.4.4.2 “Finalize Report” (Figure 6) is selected.
3.3.4.4.3 The list of reports appears on screen (Figure 9).
3.3.4.4.4 The desired test is selected.
3.3.4.4.5 “Finalize” is clicked.

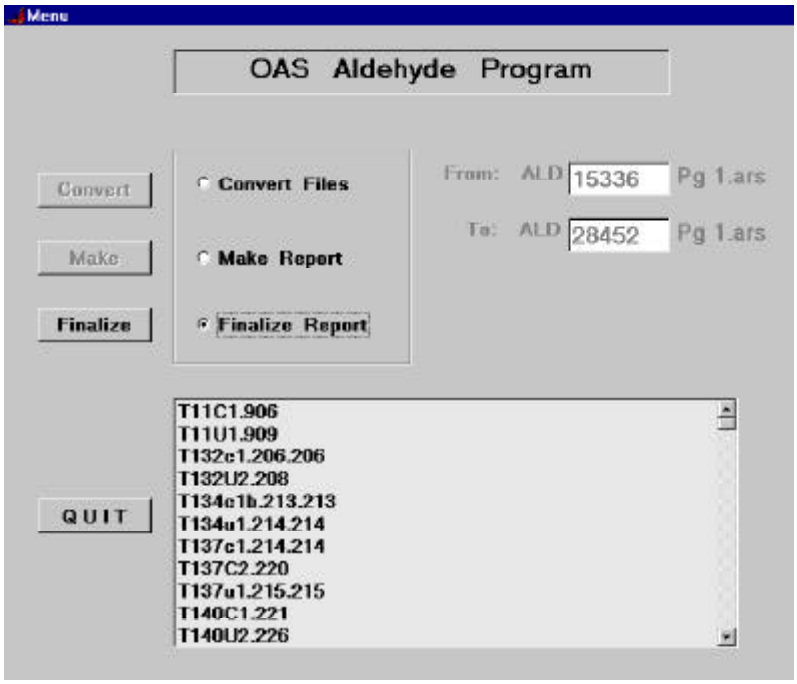


Figure 9. Carbonyl Data Merging Program, Finalizing Page

3.3.4.4.6 The files are copied to the C:\FINAL directory.
3.3.4.4.6.1 “TTEST.MDD” is saved to C:\FINAL.
3.3.4.4.6.2 “UTEST.MDD” (quotation delimited) is saved to C:\FINAL\DLM.

3.3.4.4.6.3 “CTEST.MDD” (semi-colon delimited) is saved to C:\FINAL\EXC.

3.3.4.5 The “ALD7” program accepts only compound names that it has been programmed to recognize.

3.3.4.5.1 Adding new compounds requires programming changes.

3.3.4.6 ET Track is manually updated to reflect that the report has been completed.

3.3.4.7 A hardcopy report is submitted.

3.3.4.7.1 For data that will be combined with data from other analyses, the report is submitted to the Data Coordinator.

3.3.4.7.2 For data that will not be combined with data from other analyses, the report is submitted to the QC Coordinator.

3.4 <u>Alcohols</u>

3.4.1 The alcohol report generation process is shown in Figure A-20.

3.4.1.1 The electronic data file management is diagramed in Figure A-21.

3.4.2 Analysis

3.4.2.1 Nine samples are received for each normal FTP test:

3.4.2.1.1 Primary and backup samples for each of the three modes

3.4.2.1.2 Primary and backup impingers for the background sample

3.4.2.1.3 One traveling blank impinger

3.4.2.2 For non-FTP tests, the number of test phases, and corresponding alcohol impingers collected, may be fewer than three.

3.4.2.3 For SHED tests, ten to fourteen samples are received.

3.4.2.3.1 For the “hot soak” portion of the test, five samples are received:

3.4.2.3.1.1 Primary and backup impingers for the background sample

3.4.2.3.1.2 Primary and backup sample (hot soak sample)

3.4.2.3.1.3 One traveling blank impinger

3.4.2.3.2 For the “diurnal” portion of the test, five to nine samples are received:

3.4.2.3.2.1 Primary and backup impingers for the background sample

3.4.2.3.2.2 Primary and backup sample (24-hour diurnal sample)

3.4.2.3.2.3 Primary and backup sample (48-hour diurnal sample, for 2-day extended test only)

3.4.2.3.2.4 Primary and backup sample (72-hour diurnal sample, for 3-day extended test only)

3.4.2.3.2.5 One traveling blank impinger

3.4.2.4 The analysis is controlled by a Varian Star data system.

3.4.2.5 Raw data files ("SAMPLE.RUN," proprietary file format) are generated by the data system.

3.4.2.6 From the raw files, report files in ASCII format ("SAMPLE.TXT") are automatically generated by the Varian software.

3.4.2.7 Hard copies of the chromatograms and peak tables are printed out by the chemist.

3.4.2.8 The peak identifications assigned by the data system are evaluated by the chemist and any misidentifications corrected by reprocessing the “SAMPLE.RUN” file with the Varian Star software.

3.4.2.8.1 The previous version of the “SAMPLE.TXT” file is overwritten by the reprocessed version.

3.4.3 QC Data Reporting

3.4.3.1 Data from QC runs are entered in the appropriate QC charts (Excel) and evaluated for compliance with QC requirements, as detailed in SOP 101.

3.4.3.2 QC status (pass, fail or FYI) is manually updated in ET Track.

3.4.4 Sample Data Reporting

3.4.4.1 Using an SLB program "ALC_2015," the "SAMPLE.TXT" files of a given motor vehicle test are accessed and merged to generate a report, as shown in Figures 10 through 12.

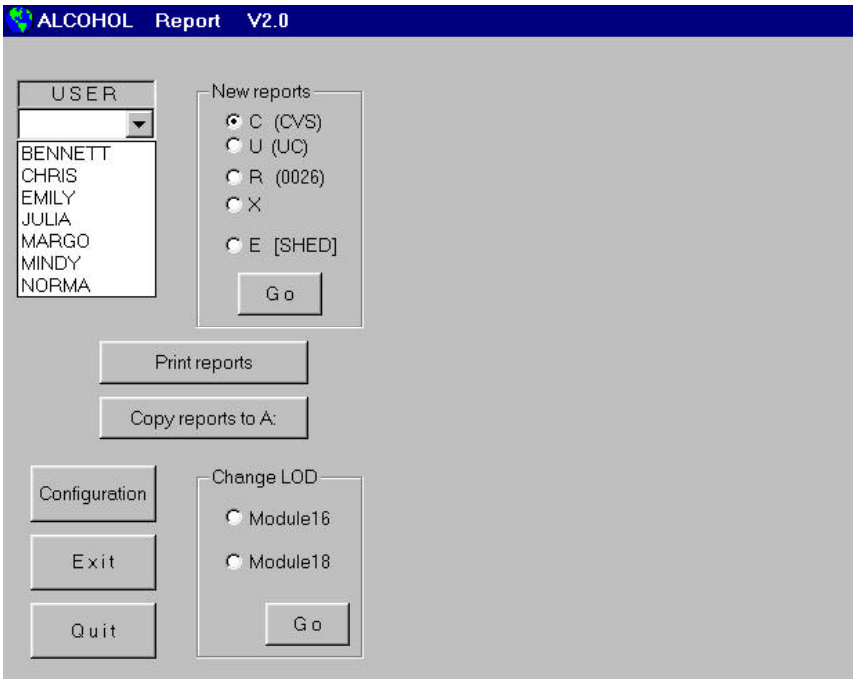


Figure 10. “ALC_2015” Alcohol Data Merging Program, Page 1

3.4.4.2 The analyst is selected from a drop-down box (Figure 10).

3.4.4.3 The test type is selected.

3.4.4.4 “Go’ is clicked to continue to the next page.

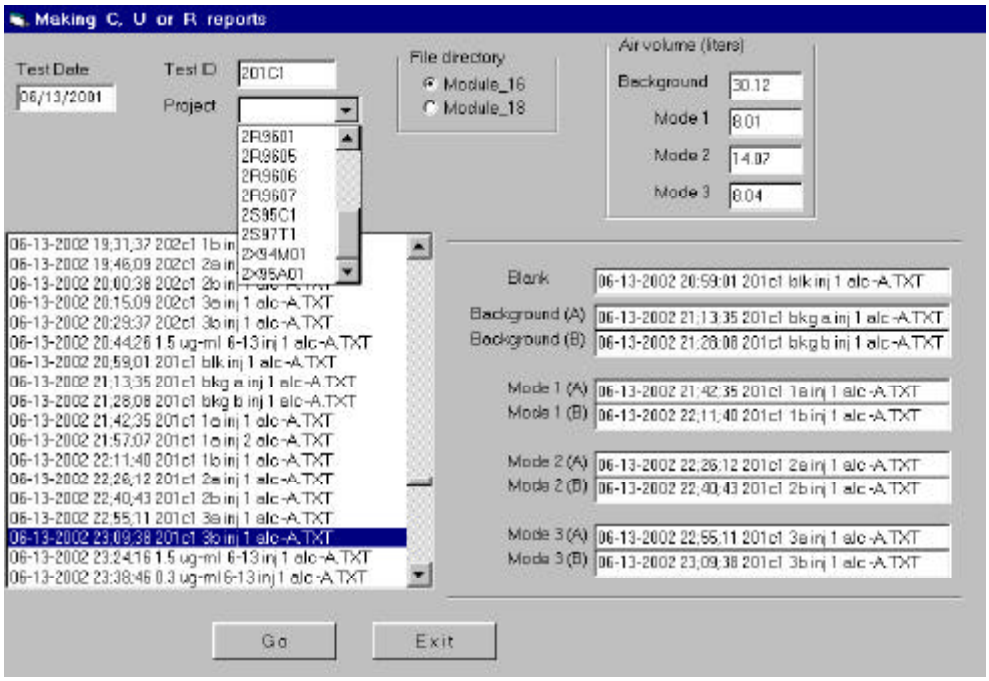


Figure 11. "ALC_2015" Alcohol Data Merging Program, Page 2

3.4.4.5 The test date and test ID (test number) are manually entered (Figure 11).

3.4.4.6 The project number is selected from a drop-down box.

3.4.4.7 The sample volume (volume of air pulled through the impingers during sampling) for each test phase is manually entered by the chemist.

3.4.4.7.1 These measurements are written on the chain-of-custody form by MSCD/MSOD testing personnel.

3.4.4.8 The files corresponding to each test phase, plus blank, are manually dragged and dropped into the appropriate boxes.

3.4.4.8.1 For non-FTP tests with fewer than nine samples, or SHED test with fewer than fourteen samples, the "DUMMY.TXT" file is selected as substitute (placeholder) for the missing test phase(s).

3.4.4.9 "Go" is clicked to merge the data files.

3.4.4.9.1 The "SAMPLE3.NUM" (ASCII) file created by ET Login is accessed to obtain vehicle, fuel and other test information.

3.4.4.9.2 The configuration file CONFIG.TXT (ASCII) is automatically accessed.

3.4.4.9.2.1 This file is displayed by clicking "Configuration" on page 1 (Figure 10).

3.4.4.9.2.2 This file contains paths to the LOD, the GC files and the report files.

3.4.4.9.2.3 The LOD is accessed so that those peaks below the LOD are excluded from the report.

3.4.4.9.2.4 The LOD can be changed, if the current (default) settings require updating.

3.4.4.9.2.4.1 The LOD values are located in ASCII files C:\ALCOHOL\LOD\M16.LOD (methanol) and C:\ALCOHOL\LOD\E16.LOD (ethanol).

3.4.4.9.2.4.2 The LOD can be manually changed in each file.

3.4.4.9.2.4.3 The file is saved and closed.

3.4.4.9.3 The blank values are automatically subtracted from the sample values.

3.4.4.10 The merged report is saved into three separate files:

3.4.4.10.1 “ATEST.MDD" (ASCII)

3.4.4.10.1.1 This file is saved into C:\ALCOHOL\ASC and used to print out an alcohol report (Figure A-22).

3.4.4.10.1.2 On page 1 (Figure 10), “Print reports” is selected.

3.4.4.10.1.3 On the printing page (Figure 12), the appropriate file is selected and “Print” clicked.

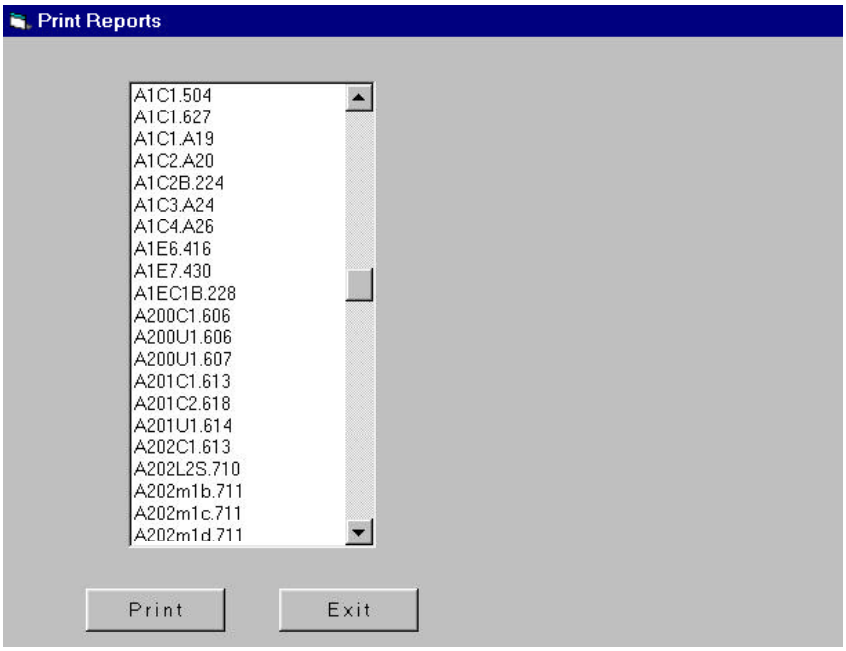


Figure 12. “ALC_2015” Alcohol Data Merging Program, Printing Page

3.4.4.10.2 “DTEST.MDD” (quotation delimited)

3.4.4.10.2.1 This file is saved into C:\ALCOHOL\DLM and used to merge with other data (see Section 4).

3.4.4.10.3 “ETEST.MDD” (semi-colon delimited)

3.4.4.10.3.1 This file is saved into C:\ALCOHOL\EXC and can be imported into Excel for formatting into a freestanding report or for specialized data processing.

3.4.4.11 The program accepts only compound names that it has been programmed to recognize.
3.4.4.11.1 Adding new compounds requires programming changes.
3.4.4.12 ET Track is manually updated to reflect that the report has been completed.
3.4.4.13 A hardcopy report is submitted.
3.4.4.13.1 For data that will be combined with data from other analyses, the report is submitted to the Data Coordinator.
3.4.4.13.2 For data that will not be combined with data from other analyses, the report is submitted to the QC Coordinator.

3.5 PDFID

3.5.1 The PDFID report generation process is shown in Figure A-23.
3.5.1.1 The electronic data file management is diagramed in Figure A-24.

3.5.2 Analysis
3.5.2.1 For a regular Federal Test Procedure (FTP) test, four samples are received.
3.5.2.1.1 One sample for each of the three phases of the test, plus one composite background sample are received.
3.5.2.1.2 In lieu of a composite background, individual backgrounds may be sampled.
3.5.2.2 For non-FTP tests, the number of samples received may be less than four.
3.5.2.3 For SHED tests, four to six samples are received.
3.5.2.3.1 For the “hot soak” portion of the test, a background and one sample are received.
3.5.2.3.2 For the “diurnal” portion of the test, a background and a 24-hour sample are received.
3.2.5.3.2.1 The test may be continued for a second day; a 48-hour diurnal sample may be received.
3.2.5.3.2.2 The test may be continued for a third day; in addition to the 48-hour sample, a 72-hour diurnal sample may be received.
3.5.2.4 The analysis is controlled by a Varian Star data system.
3.5.2.5 Raw data files ("SAMPLE_A.RUN" for cryotrap, "SAMPLE_B.RUN" for mole sieve, proprietary file format) are generated by the data system.
3.5.2.5.1 The cryogenic methane results are corrected for the decreased oxygen content of the exhaust samples, compared with ambient air. The correction assumes a 10:1 dilution ratio for each test phase (background sample needs no correction).
3.5.2.5.2 This correction factor is entered in the GC method used by the Star data system to analyze the samples, so that results need no additional correction.

3.5.2.5.3 Methane by mole sieve column needs no oxygen correction.

3.5.2.6 From the raw files, the Varian software automatically generates report files in ASCII format ("SAMPLE_A.TXT"/"SAMPLE_B.TXT").

3.5.2.7 Hard copies of the chromatograms and peak tables are printed out by the chemist.

3.5.2.8 The peak identifications assigned by the data system are evaluated by the chemist and any misidentifications corrected by reprocessing the “SAMPLE_A.RUN”/”SAMPLE_B.RUN” file with the Varian Star software.

3.5.2.8.1 The previous version of the “SAMPLE_A.TXT”/ ”SAMPLE_B.TXT” file is overwritten by the reprocessed version.

3.5.3 QC Data Reporting

3.5.3.1 Data from QC runs are entered in the appropriate QC charts (Excel) and evaluated for compliance with QC requirements, as detailed in SOP 119.

3.5.3.2 QC status (pass, fail or FYI) is manually updated in ET Track.

3.5.4 Sample Data Reporting

3.5.4.1 Using SLB program “PDFID,” the "SAMPLE_A.TXT"/"SAMPLE_B.TX "SAMPLE.TXT" of a given motor vehicle test are accessed and merged to generate a report, as shown in Figures 13 through 15.

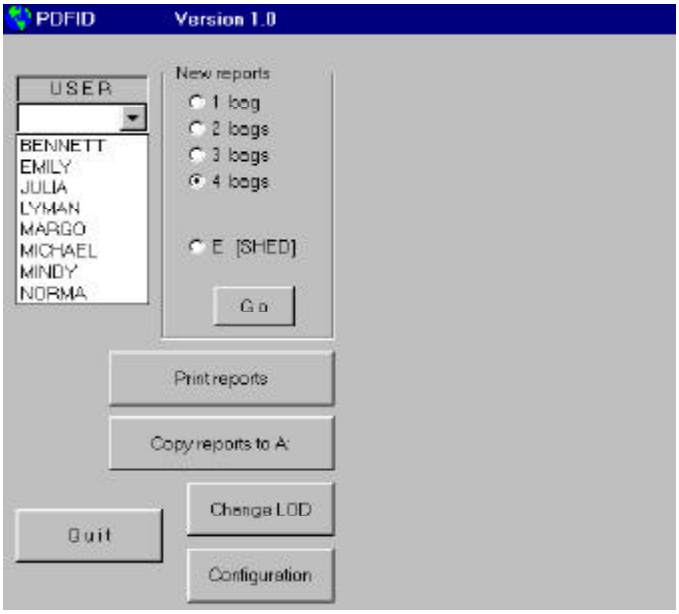


Figure 13. “PDFID” Data Merging Program, Page 1

3.5.4.2 The analyst is selected from a drop-down box (Figure 13).

3.5.4.3 The test type is selected.

3.5.4.4 “Go’ is clicked to continue to the next page.

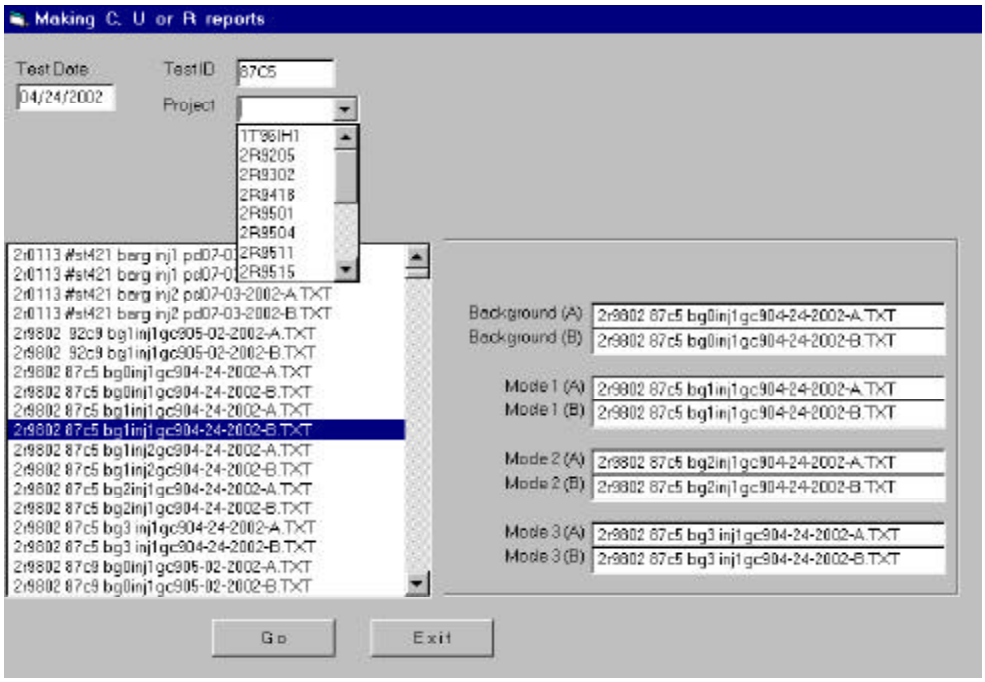


Figure 14. "PDFID" Data Merging Program, Page 2

3.5.4.5 The test date and test ID (test number) are manually entered (Figure 14).

3.5.4.6 The project number is selected from a drop-down box.

3.5.4.7 The files corresponding to each test phase, plus blank, are manually dragged and dropped into the appropriate boxes.

3.5.4.7.1 For non-FTP tests with fewer than four samples, or SHED test with fewer than six samples, the "DUMMY_A.TXT"/ "DUMMY_B.TXT files are selected as substitutes (place holders) for the missing test phase(s).

3.5.4.8 "Go" is clicked to merge the data files.

3.5.4.8.1 The "SAMPLE3.NUM" (ASCII) file created by ET Login is accessed to obtain vehicle, fuel and other test information.

3.5.4.8.2 The configuration file CONFIG.TXT (ASCII) is automatically accessed.

3.5.4.8.2.1 This file is displayed by clicking "Configuration" on page 1 (Figure 13).

3.5.4.8.2.2 This file contains paths to the LOD, the GC files and the report files.

3.5.4.8.2.3 The LOD is accessed so that those peaks below the LOD are excluded from the report.

3.5.4.8.2.4 The LOD can be changed, if the current (default) settings require updating.

3.5.4.8.2.4.1 From page 1 (Figure 13), "Change LOD" is clicked.

3.5.4.8.2.4.2 The old LOD values are displayed.

3.5.4.8.2.4.3 The new LOD values are entered.

3.5.4.9 This program generates three files for each test:

3.5.4.9.1 "ATEST.MDD" (ASCII)

3.5.4.9.1.1 The ASCII file (“ATEST.MDD”) is saved into C:\PDFID\ASC and is used to print out a PDFID report (Figure A-25).

3.5.4.9.1.2 On page 1 (Figure 13), “Print reports” is selected.

3.5.4.9.1.3 On the printing page, (Figure 15) the appropriate file is selected and “Print” clicked.

3.5.4.9.2 “PTEST.MDD” (quotation delimited)

3.5.4.9.2.1 The quotation delimited file (“PTEST.MDD”) is saved into C:\PDFID\DLM and is used to merge with other data (see Section 4).

3.5.4.9.3 “FTEST.MDD” (semi-colon delimited)

3.5.4.9.3.1 The semi-colon delimited file (“FTEST.MDD”) is saved into C:\PDFID\EXC and can be imported into Excel for formatting into a freestanding report or for specialized data processing.

3.5.4.10 ET Track is manually updated to reflect that the report has been completed.

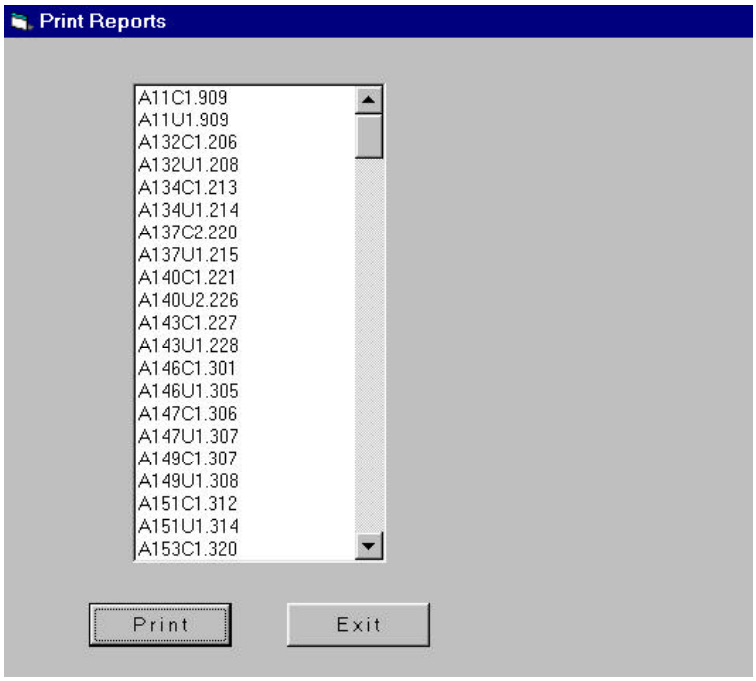


Figure 15. “PDFID” Data Merging Program, Printing Page

3.5.4.11 A hardcopy report is submitted.

3.5.4.11.1 For data that will be combined with data from other analyses, the report is submitted to the Data Coordinator.

3.5.4.11.2 For data that will not be combined with data from other analyses, the report is submitted to the QC Coordinator.

3.6 GC/MS Analysis

3.6.1 An exhaust sample is analyzed.

3.6.2 A raw data file (a total ion chromatogram, ThermoFinnigan proprietary format) is generated and stored on the ThermoFinnigan Xcalibur GC/MS data system. The file names are assigned by the chemist and are numbered sequentially, "####.RAW" (e.g., "2014.RAW").

3.6.3 Using the total ion chromatogram, each peak is examined and identified.

3.6.4 Each peak is assigned a relative peak size.
3.6.4.1 It is important to note that this GC/MS method generates qualitative, not quantitative, data.

3.6.5 A GC/MS Analysis Report listing all compounds, molecular formulae, CAS numbers, retention times and relative peak sizes is typed manually in Microsoft Word and saved as a text file “MS####.TXT” (e.g., “MS2014.TXT”).

3.7 Dynamometer Analyses

3.7.1 Analyses performed by the dyno instrumentation are:
3.7.1.1 Carbon Monoxide (CO)
3.7.1.2 Carbon Dioxide (CO_2)
3.7.1.3 Oxides of nitrogen (NO_x)
3.7.1.4 Methane (CH_4)
3.7.1.5 Total hydrocarbons (THC)

3.7.2 Dyno data is collected and processed by VTS.

3.7.3 Figure A-26 illustrates the dyno data reporting procedure.

3.7.4 SLB program “VTS2DYN2” converts the results of each dyno test into three files:
3.7.4.1 ”XTEST.MDD” (ASCII)
3.7.4.2 “YTEST.MDD” (quotation delimited)
3.7.4.3 “ZTEST.MDD” (semi-colon delimited)

3.7.5 The files are saved on the data coordinator’s local drive in C:\DYN.

3.7.6 The ASCII file is used to print out a dyno report (see Figure A-27).

3.7.7 The ASCII file or quotation delimited file is used to merge with other data (see Section 4).

3.7.8 The semi-colon delimited file may be imported into Excel for formatting into a freestanding report or for specialized data processing.

3.7.9 ET Track is manually updated to reflect that the dyno data has been retrieved.

4 Merging Data from Individual Analyses

4.1 The data merging and report generation processes are demonstrated in Figures A-28 and A-29.

4.2 File Retrieval

4.2.1 Light-end, mid-range, PDFID, alcohol, and carbonyl data are retrieved via local area network (LAN) from the instrument PCs and copied onto the data coordinator's local drive.

- 4.2.1.1 "GETLM.BAT" retrieves light-end and mid-range quotation delimited files.
  - 4.2.1.1.1 Light-end file ("LTEST.MDD") is saved to C:\LIT.
  - 4.2.1.1.2 Mid-range file ("MTEST.MDD") is saved to C:\MID.
- 4.2.1.2 "GETALC.BAT" retrieves alcohol quotation delimited file.
  - 4.2.1.2.1 Alcohol file ("DTEST.MDD") is saved to C:\ALC.
- 4.2.1.3 "GETALD.BAT" retrieves carbonyl quotation ASCII file.
  - 4.2.1.3.1 Carbonyl file ("TTEST.MDD") is saved to C:\FINAL.
  - 4.2.1.3.2 SLB program "ALN" is then used to generate a quotation delimited file ("UTEST.MDD").
  - 4.2.1.3.3 This retrieval procedure is different than those of the other analyses because the ASCII file is sometimes edited by the chemist and changes would not be reflected in the corresponding delimited files.
- 4.2.1.4 GETPDF.BAT" retrieves PDFID quotation delimited file.
  - 4.2.1.4.1 PDFID file ("PTEST.MDD") is saved to C:\PDF.
- 4.2.1.5 "GETALL.BAT" retrieves light-end, mid-range, alcohol, carbonyl and PDFID quotation delimited files.
  - 4.2.1.5.1 The files are saved to folder corresponding to each analysis, as specified in Sections 4.2.1.1 through 4.2.1.4.

4.2.2 The light-end and mid-range hydrocarbon data are in units of parts per billion Carbon (ppbC).

4.2.3 The PDFID and dyno hydrocarbon data are in units of parts per million Carbon (ppmC).

4.2.4 The alcohol and carbonyl data are in microgram/milliliter (µg/mL) units.

4.3 Spreadsheet Method

4.3.1 A Lotus spreadsheet template is provided by MSCD.

- 4.3.1.1 The current exhaust test template is called "MVTEMP20.WK1."

4.3.1.1.1 This spreadsheet is designed to have exactly three test phases, plus background.

4.3.1.1.2 Non-FTP tests with fewer than three test phases must utilize dummy files, as explained in Section 3.

4.3.1.2 The current evaporative test template is called “EVAP25.WK1.”

4.3.1.2.1 This spreadsheet is designed to have a hot soak sample and background plus three diurnal samples and background.

4.3.1.2.2 Tests with fewer diurnal samples must utilize dummy files, as explained in Section 3.

4.3.1.3 Revisions are named by numerical sequence, e.g. “EVAP26.WK1.”

4.3.1.4 This spreadsheet may also be used in Excel.

4.3.2 Corresponding light-end, mid-range, carbonyl, alcohol, PDFID and dyno data (delimited) are manually imported into pre-assigned cell ranges (loading zones) in the template.

4.3.2.1 The spreadsheet template is opened in Lotus 123.

4.3.2.2 The cursor is moved to first loading zone, e.g., light-ends.

4.3.2.3 Using the Lotus menu commands “(F)ile”, “(I)mport” and “(N)umerical”, and the light-end file name, the light-end data is inserted.

4.3.2.4 The cursor is moved to the second loading zone and the process is repeated until all data corresponding to this test has been loaded.

4.3.2.5 The formulae in the spreadsheet reference the raw data in these loading zones to generate calculated results.

4.3.3 For exhaust tests, the resulting file is saved on the data coordinator’s local drive, in the “LT” folder, as "LTEST.MDD.”

4.3.3.1 This spreadsheet contains Lotus macros to copy imported data into designated cells.

4.3.3.1.1 “M” macro copies raw data from loading zone into designated cells from which calculations are performed.

4.3.3.1.2 “Q” macro is used to transfer data between spreadsheets when the template has been revised and old results need to be recalculated.

4.3.3.2 This file contains raw data, formulae, constants, reference data, and calculated results.

4.3.4 For evaporative tests, the resulting file is saved on the data coordinator’s local drive, in the “SHD” folder, as “ETEST.MDD.”

4.3.4.1 This spreadsheet contains Lotus macros to copy imported data into designated cells.

4.3.4.1.1 This spreadsheet does not have a corresponding “M” macro. The spreadsheet references the loading zone cells to pull the data into the designated cells from the loading zone when calculations are performed.

4.3.4.1.2 "Q" macro is used to transfer data between spreadsheets when the template has been revised and old results need to be recalculated.

4.3.4.2 This file contains raw data, formulae, constants, reference data, and calculated results.

4.3.5 ET Track is manually updated to reflect that the data has been merged.

4.4 METS Database Method

4.4.1 Individual analysis files (quotation delimited) generated according to Section 3 are modified to create METS input files using the program "TESTID0."

4.4.1.1 Each file is automatically accessed from its corresponding folder and modified to add its unique 7-digit VTS test ID to the first line of the file.

4.4.1.2 The VTS number and other test data come from the "XTEST.MDD" dyno file generated in Section 3.7.3.

4.4.1.3 The mid-range file is also modified to split the combined m-/p-xylene peak into 2/3 m-xylene and 1/3-p-xylene.

4.4.1.3.1 This ratio is based on historical fuel data.

4.4.1.4 Each modified delimited file is automatically saved according to the VTS test ID and analysis type.

4.4.1.4.1 "LTEST.MDD" becomes "#######.LIT" (light-end)

4.4.1.4.2 "MTEST.MDD" becomes "#######.MID" (mid-range)

4.4.1.4.3 "UTEST.MDD" becomes "#######.CAB" (carbonyl)

4.4.1.4.4 "ATEST.MDD" becomes "#######.ALC" (alcohol)

4.4.1.4.5 "PTEST.MDD" becomes "#######.PDF" (PDFID)

4.4.1.4.6 "XTEST.MDD" becomes "#######.DYN" (dyno)

4.4.1.4.6.1 Unlike the other analyses, the ASCII file ("XTEST.MDD") is used instead of the quotation delimited file because METS was programmed to accept the dyno data in ASCII format.

4.4.1.5 The files are saved on the data coordinator's local drive (C:\METS\#######), with "\#######" denoting a folder created for each "#######" VTS test.

4.4.1.6 These files are manually copied via Windows Explorer to the G: drive (Vol1 on 'Vds01' (G)\VEDS\Production data\METS\YYYY Tests\#######).

4.4.2 A new test record is created in the MLD Emissions Test System (METS) database by using the "new test" selection under the "file" menu on the toolbar.

4.4.2.1 This test is named according to the 7-digit VTS test ID.

4.4.2.2 The "Dup Code" is used for tests that had more than one set of bags (double bag tests), giving one set of bags the Dup Code of "A" and the other "B."

4.4.2.3 The Dup code is also used for tests that had both individual and composite backgrounds, for comparison purposes, designating the individual background test as “C.”

4.4.2.4 The Dup code can also be used for any case where results are to be handled in two different ways, using higher letters of the alphabet.

4.4.3 METS automatically retrieves corresponding dyno data from VTS.

4.4.3.1 This function will retrieve only data for verified tests.

4.4.3.1.1 Verification of VTS data is the responsibility of the project engineer.

4.4.3.1.2 If the test has not been verified and METS attempts to retrieve the data from VTS, a dyno input error message is generated.

4.4.3.2 Dyno data can also be manually loaded from the “#######.DYN file. (See Section 4.4.1.4 for origin of file).

4.4.3.2.1 This function serves as a back-up to the VTS to METS automated data transfer.

4.4.3.2.2 Data generated off-site would also be input into METS this way, though the “#######.DYN” file would have to be created manually, following the exact format.

4.4.4 Corresponding light-end, mid-range (and all background files), carbonyl, alcohol, PDFID files are imported into METS using the file import selections on the “input” menu on the toolbar. (See Figures 16 and 17, below.)

4.4.4.1 The correct files are automatically selected according to VTS number.

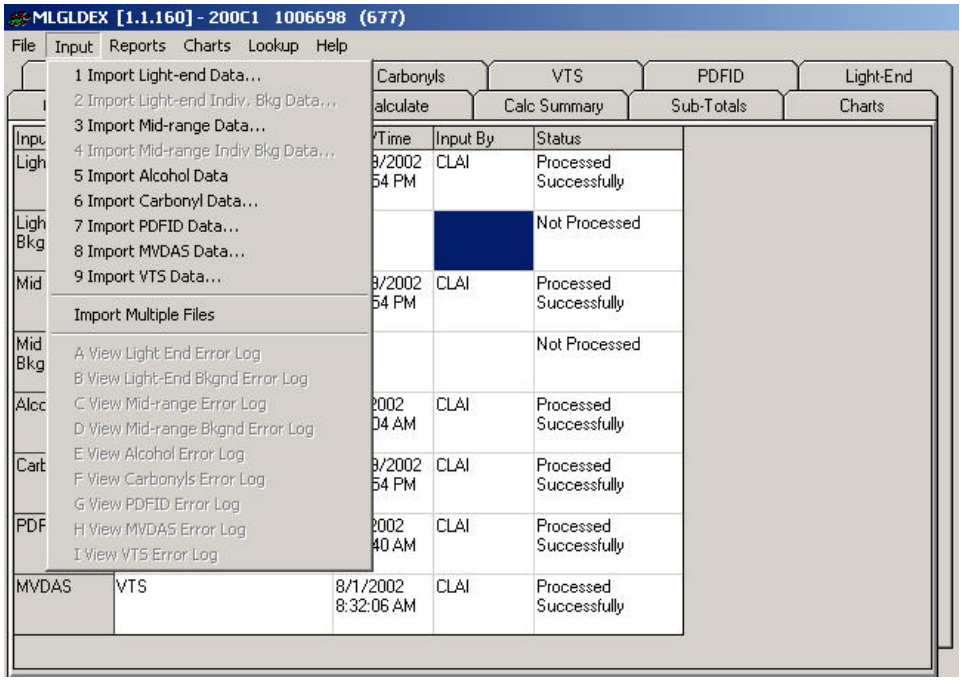
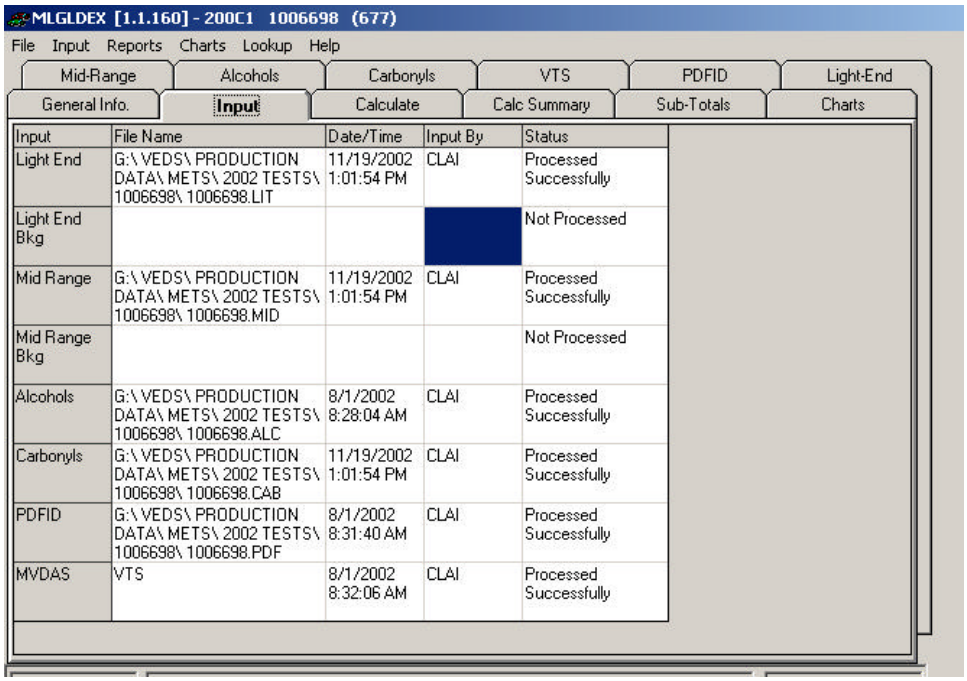


Figure 16. Importing Files into METS



Input	File Name	Date/Time	Input By	Status
Light End	G:\ VEDS\ PRODUCTION DATA\ METS\ 2002 TESTS\ 1006698\ 1006698.LIT	11/19/2002 1:01:54 PM	CLAI	Processed Successfully
Light End Bkg				Not Processed
Mid Range	G:\ VEDS\ PRODUCTION DATA\ METS\ 2002 TESTS\ 1006698\ 1006698.MID	11/19/2002 1:01:54 PM	CLAI	Processed Successfully
Mid Range Bkg				Not Processed
Alcohols	G:\ VEDS\ PRODUCTION DATA\ METS\ 2002 TESTS\ 1006698\ 1006698.ALC	8/1/2002 8:28:04 AM	CLAI	Processed Successfully
Carbonyls	G:\ VEDS\ PRODUCTION DATA\ METS\ 2002 TESTS\ 1006698\ 1006698.CAB	11/19/2002 1:01:54 PM	CLAI	Processed Successfully
PDFID	G:\ VEDS\ PRODUCTION DATA\ METS\ 2002 TESTS\ 1006698\ 1006698.PDF	8/1/2002 8:31:40 AM	CLAI	Processed Successfully
MVDAS	VTS	8/1/2002 8:32:06 AM	CLAI	Processed Successfully

Figure 17. METS Input Page

4.4.5 This database can accommodate up to 99 test phases.

4.4.6 This database can accommodate new compounds, simply by updating the “Speciation Table” look-up table (maintained by MSOD).

4.4.7 This database contains raw data, formulae, constants, reference data, and calculated results.

4.4.8 ET Track is manually updated to reflect that the data has been input to METS.

5 Calculations

5.1 The spreadsheet and METS database contain formulae and constants necessary to perform calculations (Ref 11.1 and 11.2).

5.2 The raw data is corrected, as necessary (e.g., methane response factors, converting ppmC to ppbC, converting µg/mL carbonyl and alcohol raw data to ppbC, yielding final ppbC results, which may be printed out (Section 6).

5.3 The spreadsheet or METS database then subtracts the background concentration(s) from sample concentrations to yield net ppbC results.

5.4 The net ppbC data is then converted to milligram/mile (mg/mile) units, using molecular weights and other constants (contained in the spreadsheet template or METS), dilution factor and distance driven (from the imported VTS data).

5.5 The mg/mile data for each phase is weighted according to duration of the phase (see Ref. 11.2) to yield composite mg/mile results.

5.6 The spreadsheet or METS database also utilizes speciated GC, alcohol, and aldehyde results to calculate non-methane organic gas (NMOG), and the individual reactivities of these compounds to calculate the reactivity (ozone/mile) and specific reactivity (ozone/NMOG).

6 Report Generation

6.1 The data merging and report generation processes are demonstrated in Figures A-28 and A-29.

6.2 Spreadsheet Method

6.2.1 Selected information from the "LTEST.MDD" file is printed out using SLB macros contained in a LOTUS file called "NEW8.WK4". This file is updated periodically, as necessary, to provide additional information or change response factors. The file is then saved under the next sequential number (e.g., "NEW9.WK4").

6.2.2 The "A" macro calls up the "LTEST.MDD" file.

6.2.3 The "B" macro produces the Motor Vehicle Emissions Report in ppbC units.

6.2.4 The "C" macro produces the Motor Vehicle Emissions Report in mg/mile units.

6.3 METS Database Method

6.3.1 Quality control information is obtained from the “Calc Summary” tab, using the “Generate” option.

- 6.3.1.1 The “Include ‘Passing’ Comments” box is checked, if desired.
  - 6.3.1.1.1 The default setting is to list only the failures.
- 6.3.1.2 The file is saved as a text file when “Generate” is clicked.
- 6.3.1.3 The “View with Word” option is clicked.
- 6.3.1.4 The file is printed and manually saved as a Word file (Figure A-30).
- 6.3.1.5 This information may also be printed out directly from the Calc Summary tab using the “Print” function.

6.3.2 Selected information from the METS database file is retrieved using the METS function, “Reports”.

- 6.3.2.1 The "ppbC" function generates the Motor Vehicle Emissions Report in ppbC units.
  - 6.3.2.1.1 The file is automatically saved as a text file.
  - 6.3.2.1.2 The ppbC report is automatically opened in Word.

6.3.2.1.3 The file is printed and manually saved as a Word file (Figure A-31).

6.3.2.2 The "mg/mile" function generates the Motor Vehicle Emissions Report in mg/mile units.

6.3.2.2.1 The file is automatically saved as a text file.

6.3.2.2.2 The mg/mile report is automatically opened in Word.

6.3.2.2.3 The file is printed and manually saved as a Word file (Figure A-32).

6.3.3 These QC and report files are automatically saved on the user's local directory (C:\VEDS\REPORTS) and named according to the METS test number, assigned sequentially as new tests are created.

6.3.3.1 "### QC.DOC" is the QC summary.

6.3.3.2 "### PPBC.DOC" is the ppbC report.

6.3.3.3 "### MGMI.DOC" is the mg/mile report.

6.3.4 Using SLB custom program "METSREPT," the METS test number is entered and the Word files are automatically renamed and saved to the MLD shared drive "Elmclstr_users02_server\Users02\Mld\Branch\Slab," subdirectory "Draft METS Reports."

6.3.4.1 The QC summary is renamed:
"PROJECT V-TEST TYPE (T)-# MM-DD-YYYY M QC.DOC," where "V" is the vehicle number, "T" is the MLD one-digit test-type abbreviation, "#" is the test number and "M" is the METS sequential number.

6.3.4.2 The ppbC report is renamed:
"PROJECT V-TEST TYPE (T)-# MM-DD-YYYY M PPBC.DOC," where "V" is the vehicle number, "T" is the MLD one-digit test-type abbreviation, "#" is the test number and "M" is the METS sequential number.

6.3.4.3 The mg/mile report is renamed:
"PROJECT V-TEST TYPE (T)-# MM-DD-YYYY M MGMI.DOC," where "V" is the vehicle number, "T" is the MLD one-digit test-type abbreviation, "#" is the test number and "M" is the METS sequential number.

6.4 <u>GC/MS Confirmation Reports</u>

6.4.1 The GC/MS confirmation report process is shown in Figures A-33 and A-34.

6.4.2 GC/MS results are merged with light-end and mid-range results, generating a comparison file in Microsoft Word, which is saved on the chemist's data processing PC.

6.4.3 Automated Comparison Report

6.4.3.1 For exhaust tests, the "LTEST.MDD" (Lotus) spreadsheets are converted to ASCII files using SLB program "CONVERT4."

6.4.3.1.1 For SHED tests, the files are converted using SLB program "CONVSHED."

6.4.3.2 For exhaust tests, SLB program "EXHAUST7" combines each GC/MS Analysis Report with the corresponding light-end and mid-range data contained in "LTEST.MDD" (ASCII) and generates a comparison report in ASCII format. This is an intermediate merged file named "FID####.TXT" (e.g., "FID2014.TXT").

6.4.3.2.1 For evaporative (SHED) tests, the program used is "COMSHED1."

6.4.3.3 The "FID###.TXT" file is opened in Word and saved as a Word file, "FID####.DOC" (e.g., "FID2014.DOC).

6.4.4 The comparison process can also be done manually.

6.4.4.1 An automated METS comparison has not yet been finalized; the light-end and mid-range data can be exported to from METS to Excel and manually manipulated to generate an "FID####.XLS file.

6.4.4.2 The "LTEST.MDD" (Lotus) spreadsheet can also be manually combined with the GC/MS report to generate an "FID####.XLS file.

6.4.4.3 The individual light-end and mid-range files can be exported directly from Varian to Excel and manually combined with the GC/MS report to generate an "FID####.XLS file.

6.4.5 The chemist evaluates the data, makes changes, and adds comments to the automated comparison report, as necessary.

6.4.6 Misidentified peaks are reported to the chemist(s) and corrected Motor Vehicle Emissions Reports released.

6.4.7 A sample comparison is shown in Figure A-35.

7 Evaluation

7.1 Motor Vehicle Emissions Reports

7.1.1 Figures A-36 and A-37 show the data evaluation processes.

7.1.2 Several quality control (QC) checks are automatically generated (by the "NEW8.WK4" program or METS database's "Calc Summary" function).

7.1.2.1 NMHC Comparison

7.1.2.1.1 Results from GC, dyno, and PDFID are compared.

7.1.2.1.2 Results that vary by more than 20% or 4 ppmC fail this test.

7.1.2.1.2.1 Exception for the background in high concentration samples

7.1.2.1.2.1.1 If the GC/dyno FID concentration difference for the background bag exceeds 4 ppmC but is less than 5 percent of the lowest of the other bag concentrations for the same test, the results are considered passing, provided that the GC/dyno FID difference for that (lowest) bag is within 15 percent.

7.1.2.1.2.1.2 Greater tolerance is allowed because the dyno instruments analyze all test phases on the same detector range, so that the range that is appropriate for the high concentration samples is insufficiently sensitive to accurately measure the background.

7.1.2.1.3 For most tests, any sample that fails the GC/dyno NMHC comparison is “Aborted”.

7.1.2.1.3.1 For testing CNG-fueled vehicles, the dyno NMHC measurement is considered uncertain due to the large methane contribution; if the GC/dyno criteria are not met, the PDFID results, if available, are used to validate the GC data.

7.1.2.2 Elapsed time between sample collection and analysis is compared with SOP sample holding time requirements:

7.1.2.2.1	Light-ends:	cold start samples	8 hours
		other bags	24 hours
7.1.2.2.2	Mid-range:	all bags	24 hours
7.1.2.2.3	Alcohols:	all samples	6 days (stored < 40°C)
7.1.2.2.4	Carbonyls:	all samples	30 days (stored < 40°C)
7.1.2.2.5	PDFID:	cold start samples	8 hours
		other bags	24 hours

7.1.2.2.6 Any sample that exceeds any of the maximum allowable holding times fails this test.

7.1.2.3 Crossover compound comparisons

7.1.2.3.1 Compounds that are measured by both the light-end and mid-range analyses are compared.

7.1.2.3.2 The pass/fail criteria are:

Average Concentration (ppbC)	Maximum Allowable Relative Percent Difference (RPD)
< 100	150 ppbC
100 to 1000	50%
100 to 5000	25%
> 5000	15%

7.1.2.3.3 Any compound that exceeds these tolerances fails this test.

7.1.2.4 Relative Bag Concentration Test: for normal FTP tests, the relative bag concentrations are:

bag 1 > bag 3 > bag 2 > background

Each compound and phase total is assigned a number from 0 to 4:

0 = all concentrations in order
1 = 1 concentration out of order
2 = 2 concentrations out of order
3 = 3 concentrations out of order
4 = 4 concentrations out of order

7.1.2.5 Of these QC tests (7.1.2.1 through 7.1.2.4), two must be passed to report results as "Data for Record" (DFR):

7.1.2.5.1 GC/DYNO FID comparisons must pass the requirement(s) in Section 7.1.2.1.

7.1.2.5.1.1 Any test that fails the NMHC comparison is “Aborted”.

7.1.2.5.2 Elapsed times must pass the requirements in Section 7.1.2.2.

7.1.2.5.2.1 Any test that fails the elapsed times tests is reported as "Information only” (FYI) or is aborted, depending on the overall data quality.

7.1.2.6 For a test with all six analyses, these required QC checks correspond to 33 QC requirements, with an additional four internal tests passed if GC results match both dyno and PDFID results.

7.1.2.7 The other automatic QC (see Sections 7.1.2.3 and 7.1.2.4) tests are considered when evaluating the overall quality of the test results.

7.1.3 Manual QC Checks

7.1.3.1 The presence or absence or MTBE should be consistent with fuel type.

7.1.3.1.1 This check is automated in METS.

7.1.3.2 The light-end to mid-range ratios should be appropriate for fuel type.

7.1.3.3 GC/DYNO FID/PDFID results are checked for gross differences; for example, the GC results may be consistent with the dyno, but grossly different from the PDFID. The automatic check does not flag this situation.

7.1.3.4 Elapsed times are double-checked.

7.1.3.5 Crossover compound comparisons are visually checked for overall trends.

7.1.3.6 Specific reactivity should be appropriate for fuel type.

7.1.3.7 Duplicate tests of the same vehicle/fuel are checked (as time allows) for:
- 7.1.3.7.1 Consistency of peak identifications
- 7.1.3.7.2 Consistency of NMHC totals
- 7.1.3.7.3 Consistency of specific reactivity

7.1.4 The tests are assigned a final data status of “Data for Record”, “FYI” (For Your Information) or “Aborted” by the OAS QC Leadperson.

7.1.4.1 Data for Record (DFR)
- 7.1.4.1.1 Data that are assigned a status of DFR meet all of the procedural and QC requirements of the standard operating procedures (SOPs).
- 7.1.4.1.2 Data may be used for any purpose, including supporting documentation for Board hearings.

7.1.4.2 FYI
- 7.1.4.2.1 Data that are submitted to clients as FYI, i.e., not data for record, fall into two categories:
  - 7.1.4.2.1.1 they have some minor deviation from the requirements that is not expected to have a significant harmful effect on the overall data quality; or
  - 7.1.4.2.1.2 the client requests the information despite poor quality.
- 7.1.4.2.2 Reports that are designated FYI may not be used for supporting documentation for Board hearings.

7.1.4.3 Aborted
- 7.1.4.3.1 Data that are designated aborted are not released to the client or anyone else outside of the SLB without the written authorization of the Branch Chief.

7.1.4.4 In the spreadsheet method, this status is assigned automatically by the NEW8 print program, though the data status is not contained in the data file itself.

7.1.4.4.1 The assigned status can be manually changed by the QC Coordinator.

7.1.4.5 In METS, the status is recommended in the “Calc Summary” function, but the user manually sets the data status on the “General Information” tab.

7.1.4.5.1 The data status is saved in the database record for each test.

7.1.5 The hard copy reports are approved and signed by the OAS QC Leadperson (or manager).

7.1.6 ET Track is manually updated to reflect the overall data status of the test.

7.2 <u>GC/MS Comparison Reports</u>

7.2.1 The GC/MS Comparison Reports list GC/MS and GC/FID compound comparison information.

7.2.2 This information includes CAS numbers, molecular formulae, compound names and corresponding FID concentrations, in ppbC, MS relative peak sizes and remarks.

7.2.3 The comparison is evaluated by the chemist, and any anomalies are checked and reported.

7.2.4 The GC chemist is notified of any errors in his report.

7.2.5 For inadvertent errors, the peak identification(s) is corrected in the GC data and a corrected Motor Vehicle Emissions Report issued.

7.2.6 In cases where the chemist had believed the peak to be the wrong compound, all chemists in the laboratory are informed so that they can make any necessary correction to their GC methods.

8 Reporting Results

8.1 Figure A-38 illustrates the data release procedure.

8.2 Spreadsheet

8.2.1 For “data for record” tests:
- 8.2.1.1 The electronic file, "LTEST.MDD" or “ETEST.MDD,” is copied onto a diskette.
- 8.2.1.2 The diskette and hard copies of ppbC and mg/mile reports are submitted to client.

8.2.2 For “FYI” tests:
- 8.2.2.1 The electronic file is not provided to the client.
- 8.2.2.2 Hard copies of the ppbC and mg/mile reports are submitted to the client.

8.2.3 For aborted tests, neither electronic files nor hard copies are submitted to the client.

8.3 METS

8.3.1 After the data status is assigned, the QC, ppbC and mg/mile reports are generated again to include the updated data status. (See section 6.3.)

8.3.2 For “data for record” tests:
- 8.3.2.1 SLB program “METSREPT” automatically sends the DFR Word ppbC and mg/mile reports to the client by copying them to Div on 'Elmclstr_users02_server\Users02\Mld' (X): subdirectory HSL\MLD COMPLETED REPORTS\PROJECT.
  - 8.3.2.1.1 This directory is the “R:” directory for MSCD and MSOD clients.
  - 8.3.2.1.2 If the project does not have a folder, one is created.
- 8.3.2.2 The test results are sent to the public database, Vehicle Emissions Data System (VEDS), using the “Send to VEDS” function in METS.
  - 8.3.2.2.1 For tests that have utilized duplicate codes, only one may be sent to VEDS.
- 8.3.2.3 Clients extract electronic data from VEDS using user-defined custom queries (ACCESS).

8.3.3 For “FYI” tests:
- 8.3.3.1 The electronic file is not provided to the client; VEDS will not accept tests with any status other than DFR.
- 8.3.3.2 “METSREPT” automatically sends the FYI Word ppbC and mg/mile reports to the client by copying them to “Div on 'Elmclstr_users02_server\Users02\Mld' (X):,” subdirectory “HSL\MLD Completed Reports\PROJECT.”
  - 8.3.3.2.1 This directory is the “R:” directory for MSCD and MSOD clients.
  - 8.3.3.2.2 If the project does not have a folder, one is created.

8.3.4 For aborted tests, neither electronic files nor hard copies are submitted to the client.

8.3.4.1 “METSRPT” will not distribute tests designated as aborted to the X: (R:) drive.

8.3.4.2 VEDS will not accept tests with any status other than DFR.

8.4 ET Track is manually updated to reflect that the report has been released.

8.4.1 For “DFR” tests processed by METS only, ET Track is updated to reflect that the data has been sent to VEDS.

8.5 Any deviation from the above data release procedure requires written approval of both the client and the SLB Branch Chief.

8.6 The release of exhaust data by MLD to anyone outside MSCD/MSOD must be approved by MSCD or MSOD management.

9 DATA STORAGE

9.1 Hard Copies

9.1.1 Light-end and Mid-range Data

9.1.1.1 Sample chromatograms and merged reports corresponding to each dyno test are filed in one folder for each dyno test.

9.1.1.2 These folders are filed by date/test number in the laboratory.

9.1.1.3 QC data are filed separately by date in the laboratory.

9.1.2 Carbonyl Data

9.1.2.1 Sample chromatograms and merged reports corresponding to each dyno test are filed in one folder for each dyno test.

9.1.2.2 QC data for each analysis day are filed separately in one folder.

9.1.2.3 The dyno test and QC data folders for each day are filed in one hanging file folder.

9.1.2.4 These folders are filed by date in the laboratory.

9.1.2.5 Reports for each dyno test are filed in binders and stored in the laboratory.

9.1.3 Alcohol Data

9.1.3.1 Chromatograms and reports are filed by date in file folders in the laboratory.

9.1.3.2 Reports for each dyno test are filed in binders and stored in the laboratory.

9.1.4 PDFID Data

9.1.4.1 Chromatograms and corresponding data reports are filed by date in file folders and stored in the laboratory.

9.1.5 GC/MS data

9.1.5.1 Hard copies of raw data, GC/MS Analysis Reports and GC/FID-GC/MS Comparison Reports are filed sequentially by file number and stored in the laboratory.

9.1.6 Dyno Data

9.1.6.1 Dyno data storage is the responsibility of MSOD.

9.1.7 Motor Vehicle Emissions Reports

9.1.7.1 Hard copies are filed in binders by year/project/vehicle/test date.

9.2 Electronic Files

9.2.1 Light-end and Mid-range Data

9.2.1.1 "SAMPLE.RUN"

9.2.1.1.1 Stored on instrument PC (C:\STAR\MODULE16)

9.2.1.1.1.1 Old files periodically deleted (after they are backed up) to increase available disk space

9.2.1.1.2 Periodically backed up onto compact disk (CD)

9.2.1.2 "SAMPLE_A.TXT"/"SAMPLE_B.TXT"

9.2.1.2.1 Stored on instrument PC (C:\STAR\MODULE16)

9.2.1.2.1.1 Old files periodically deleted (after they are backed up) to increase available disk space

9.2.1.2.2 Periodically backed up onto compact disk (CD)

9.2.1.3 "LTEST-#.MDD"/ “MTEST-#.MDD”

9.2.1.3.1 Stored on instrument PC (C:\MIDLIT)

9.2.1.4 "LTEST.MDD" and “MTEST.MDD”

9.2.1.4.1 Stored on instrument PC (C:\MIDLIT)

9.2.1.4.2 Stored on data coordinator’s local drive (C:\LIT, C:\MID)

9.2.1.4.3 Periodically backed up from data coordinator’s local drive to CD

9.2.1.5 "TTEST.MDD"/”KTEST.MDD” and ”DTEST.MDD”/”NTEST.MDD”

9.2.1.5.1 Stored on instrument PC (C:\MIDLIT)

9.2.1.6 “#######.LIT”/”#######.MID”

9.2.1.6.1 Stored on data coordinator’s local drive (C:\METS\#######) and G: drive (“Vol1 on 'Vds01'\VEDS\Production data\METS\YYYY Tests\#######”)

9.2.1.6.2 Periodically backed up onto CD

9.2.2 Carbonyl Data

9.2.2.1 Raw data
- 9.2.2.1.1 Oracle database on instrument PC (C:\MILLENNIUM\PROJECT)
- 9.2.2.1.2 Backed up quarterly onto CD

9.2.2.2 "ALD1####.ARS"/"ALD2####.ARS"
- 9.2.2.2.1 Stored on data processing PC (C:\LC_FILE)
- 9.2.2.2.2 Not backed up, as it is merely an intermediate file

9.2.2.3 "TTEST.MDD"
- 9.2.2.3.1 Stored on data processing PC (C:\FINAL)
- 9.2.2.3.2 Stored on data coordinator's local drive (C:\FINAL)
- 9.2.2.3.3 Periodically backed up from data coordinator's local drive to CD

9.2.2.4 "UTEST.MDD"
- 9.2.2.4.1 Stored on data processing PC (C:\FINAL)
- 9.2.2.4.2 Stored on data coordinator's local drive (C:\FINAL)
- 9.2.2.4.3 Periodically backed up from data coordinator's local drive to CD

9.2.2.5 "CTEST.MDD"
- 9.2.2.5.1 Stored on data processing PC (C:\FINAL\EXC)
- 9.2.2.5.2 Stored on data coordinator's local drive (C:\FINAL)

9.2.2.6 "#######.CAB"
- 9.2.2.6.1 Stored on data coordinator's local drive (C:\METS\#######) and G: drive ("Vol1 on 'Vds01'\VEDS\Production data\METS\YYYY Tests\#######")
- 9.2.2.6.2 Periodically backed up onto CD

9.2.3 Alcohol Data

9.2.3.1 "SAMPLE.RUN"
- 9.2.3.1.1 Stored on instrument PC (C:\STAR\MODULE16)
  - 9.2.3.1.1.1 Old files periodically deleted (after they are backed up) to increase available disk space
- 9.2.3.1.2 Periodically backed up onto CD

9.2.3.2 "SAMPLE.TXT"
- 9.2.3.2.1 Stored on instrument PC (C:\STAR\MODULE16)
- 9.2.3.2.2 Periodically backed up to CD

9.2.3.3 "ATEST.MDD"
9.2.3.3.1 Stored on instrument PC (C:\ALCOHOL\ASC)

9.2.3.4 “DTEST.MDD”
9.2.3.4.1 Stored on instrument PC (C:\ALCOHOL\DLM)
9.2.3.4.2 Stored on data coordinator’s local drive(C:\ALC)
9.2.3.4.3 Periodically backed up from data coordinator’s local drive to CD

9.2.3.5 “ETEST.MDD”
9.2.3.5.1 Stored on instrument PC (C:\ALCOHOL\EXC)

9.2.3.6 “#######.ALC”
9.2.3.6.1 Stored on data coordinator’s local drive (C:\METS\#######) and G: drive (“Vol1 on 'Vds01'\VEDS\Production data\METS\YYYY Tests\#######”)
9.2.3.6.2 Periodically backed up onto CD

9.2.4 <u>PDFID Data</u>

9.2.4.1 "SAMPLE.RUN"
9.2.4.1.1 Stored on instrument PC (C:\STAR\MODULE16)
9.2.4.1.2 Periodically backed up onto CD

9.2.4.2 "SAMPLE_A.TXT"/"SAMPLE_B.TXT"
9.2.4.2.1 Stored on instrument PC (C:\STAR\MODULE16)
9.2.4.2.2 Periodically backed up onto CD

9.2.4.3 "PTEST.MDD”
9.2.4.3.1 Stored on instrument PC (C:\PDFID\DLM)
9.2.4.3.2 Stored on data coordinator’s local drive(C:\PDF)
9.2.4.3.3 Periodically backed up from data coordinator’s local drive to CD

9.2.4.4 ”ATEST.MDD"
9.2.4.4.1 Stored on instrument PC (C:\PDFID\ASC)

9.2.4.5 “FTEST.MDD”
9.2.4.5.1 Stored on instrument PC (C:\PDFID\EXC)

9.2.4.6 “#######.PDF”
9.2.4.6.1 Stored on data coordinator’s local drive (C:\METS\#######) and G: drive (“Vol1 on 'Vds01'\VEDS\Production data\METS\YYYY Tests\#######”)
9.2.4.6.2 Periodically backed up onto CD

9.2.5 GC/MS Data

9.2.5.1 "####.RAW"
- 9.2.5.1.1 Stored on instrument PC (C:\REPORT\GCMS_REPORT)
- 9.2.5.1.2 Periodically backed up onto CD

9.2.5.2 “MS####.TXT”
- 9.2.5.2.1 Stored on chemist’s data processing PC (C:\REPORT\GCMS_REPORT)
- 9.2.5.2.2 Backed up onto diskette

9.2.5.3 “MS####.DOC”
- 9.2.5.3.1 Stored on chemist’s data processing PC (C:\REPORT\GCMS_REPORT)
- 9.2.5.3.2 Backed up onto diskette

9.2.5.4 “FID###.TXT”
- 9.2.5.4.1 Stored on chemist’s data processing PC (C:\REPORT\GCMS_REPORT)
- 9.2.5.4.2 Backed up onto diskette

9.2.5.5 “FID###.DOC”
- 9.2.5.5.1 Stored on chemist’s data processing PC (C:\REPORT\GCMS_REPORT)
- 9.2.5.5.2 Backed up onto diskette

9.2.6 Dynamometer Data

9.2.6.1 Vehicle Testing System (VTS)
- 9.2.6.1.1 Record maintenance is the responsibility of MSOD

9.2.6.2 “XTEST.MDD”/”YTEST.MDD”/”ZTEST.MDD”
- 9.2.6.2.1 Stored on data coordinator’s local drive (C:\DYN)
- 9.2.6.2.2 Also stored on log in PC (C:\DYN)
- 9.2.6.2.3 Periodically backed up onto CD

`

9.2.7 Motor Vehicle Emissions Reports

9.2.7.1 Spreadsheet Method
- 9.2.7.1.1 Stored on data coordinator’s local drive
- 9.2.7.1.2 One copy of "LTEST.MDD" or “ETEST.MDD” is backed up onto CD.
- 9.2.7.1.3 One copy is transferred onto a 3.5-inch floppy disk (one file per disk) for easy retrieval.
- 9.2.7.1.4 Floppies are filed by test date and stored in the laboratory.

9.2.7.2 METS Method

9.2.7.2.1 Database maintenance is the responsibility of MSOD.

9.2.7.2.2 “PROJECT V-TEST TYPE (T)-# MM-DD-YYYY M QC.DOC,”
“PROJECT V-TEST TYPE (T)-# MM-DD-YYYY M PPBC.DOC,”
“PROJECT V-TEST TYPE (T)-# MM-DD-YYYY M MGMI.DOC,”

9.2.7.2.2.1 Stored on “Elmclstr_users02_server\Users02\Mld\Branch\Slab\Draft METS Reports.”

9.2.8 <u>Custom Software</u>

9.2.8.1 <u>Databases</u>

9.2.8.1.1 ET Login

9.2.8.1.1.1 Stored on X:\HSL\ETLOGIN

9.2.8.1.1.2 Backed up to W:\BACKUP\XDRIVE

9.2.8.1.2 ET Track

9.2.8.1.2.1 Stored on X:\HSL\OASLOG

9.2.8.1.2.2 backed up to W:\BACKUP\XDRIVE

9.2.8.1.3 METS

9.2.8.1.3.1 MSOD responsible for maintenance

9.2.8.1.4 VTS

9.2.8.1.4.1 MSOD responsible for maintenance

9.2.8.1.5 VEDS

9.2.8.1.5.1 MOSD responsible for maintenance

9.2.8.2 <u>Programs</u>

9.2.8.2.1 "ALC_2015"

9.2.8.2.1.1 Stored on local drive (C:\ALCOHOL\EXE)

9.2.8.2.1.2 Backed up to W:\BACKUP\FLES\ALCOHOL

9.2.8.2.2 "ALD7"

9.2.8.2.2.1 Stored on local drive (C:\LCEXE)

9.2.8.2.2.2 Backed up to W:\BACKUP\FLES\ALD7

9.2.8.2.3 “ALN”

9.2.8.2.3.1 Stored on local drive (C:\FINAL)

9.2.8.2.3.2 Backed up to W:\BACKUP\QBASIC)

9.2.8.2.4 “COMSHED1”

9.2.8.2.4.1 Stored on GC/MS chemist’s data processing PC (C:\REPORT\GCMS_REPORT_UTILITY)

9.2.8.2.4.2 Backed up on diskette

9.2.8.2.5 "CONVERT4.WK4"
- 9.2.8.2.5.1 Stored on lab data processing PC (C:\123\TSY)
- 9.2.8.2.5.2 Backed up on floppy

9.2.8.2.6 “CONVSHED.WK4”
- 9.2.8.2.6.1 Stored on lab data processing PC (C:\123\TSY)
- 9.2.8.2.6.2 Backed up on floppy

9.2.8.2.7 "ET_LOGIN"
- 9.2.8.2.7.1 Stored on X:\HSL\ETLOGIN
- 9.2.8.2.7.2 Backed up to W:\BACKUP\XDRIVE\ETLOGIN2

9.2.8.2.8 "ET_TRACK"
- 9.2.8.2.8.1 Stored on X:\HSL\OASLOG
- 9.2.8.2.8.2 Backed up to W:\BACKUP\XDRIVE\OASLOG2

9.2.8.2.9 “EVAP25.WK1”
- 9.2.8.2.9.1 Stored on data coordinator’s local drive (C:\SHD)
- 9.2.8.2.9.2 Backed up on CD

9.2.8.2.10 "EXHAUST7"
- 9.2.8.2.10.1 Stored on GC/MS chemist’s data processing PC (C:\REPORT\GCMS_REPORT_UTILITY)
- 9.2.8.2.10.2 Backed up on diskette

9.2.8.2.11 “METSREPT”
- 9.2.8.2.11.1 Stored on S:\HSL\METSBASE\PROGRAMS\METSREPT
- 9.2.8.2.11.2 Backed up to W:\BACKUP\FLES\METSREPT

9.2.8.2.12 “MVTEMP20.WK1”
- 9.2.8.2.12.1 Stored on data coordinator’s local drive (C:\LT)
- 9.2.8.2.12.2 Backed up on CD

9.2.8.2.13 "MIDLIT"
- 9.2.8.2.13.1 Stored on local drives (C:\MIDLIT\STAYPUT)
- 9.2.8.2.13.2 Backed up to W:\BACKUP\FLES\MIDLIT

9.2.8.2.14 "NEW8.WK4"
- 9.2.8.2.14.1 Stored on lab data processing PC (C:\123)
- 9.2.8.2.14.2 Backed up on floppy

9.2.8.2.15 “PDFID”
- 9.2.8.2.15.1 Stored on local drive (C:\PDFID\EXE)
- 9.2.8.2.15.2 Backed up to W:\BACKUP\FLES\PDFID

9.2.8.2.16 “TESTID0”
9.2.8.2.16.1 Stored on E:\SELF\TESTID0
9.2.8.2.16.2 Backed up to W:\BACKUP\FLES\TESTID0

9.2.8.2.17 “VTS2DYN2”
9.2.8.2.17.1 Stored on E:\SELF2\VTS2DYN2
9.2.8.2.17.2 Backed up to W:\BACKUP\FLES\VTS2DYN2

10 List of Software

10.1 Commercial Programs

10.1.1 Lotus, version 2.2 (DOS)
10.1.2 Lotus, version 4.0 (Windows)
10.1.3 Microsoft Access 2.0
10.1.4 Microsoft Access 97
10.1.5 Microsoft Excel 97
10.1.6 Microsoft Word 97
10.1.7 Microsoft WordPad, version 5.0
10.1.8 Millennium HPLC data system, version 4.
10.1.9 QUICK BASIC, version 4.5
10.1.10 ThermoFinnigan Xcalibur GC/MS data system, version 3.1
10.1.11 Windows 98 (Second Edition)
10.1.12 Windows 2000
10.1.13 Windows XP, Professional
10.1.14 Visual Basic, version 5
10.1.15 Varian Star GC data system, version 6.0

10.2 Databases

10.2.1 “Emission Test Login” (ET Login, Access 2.0 with Visual Basic user interface)
10.2.2 “Emission Test Track” (ET Track, Access 2.0 with Visual Basic user interface)
10.2.3 “MLD Emissions Test System” (METS, DB2 with Visual Basic front end)
10.2.4 “Vehicle Emissions Data System” (VEDS, DB2 with Visual Basic front end)
10.2.5 “Vehicle Testing System” (VTS, Oracle with Java front end)

10.3 Custom Programs

10.3.1 "ALC_2015" (Visual Basic)
10.3.2 "ALD7" (Visual Basic)
10.3.3 “ALN” (Quick Basic)
10.3.4 “COMSHED1” (Quick Basic)
10.3.5 "CONVERT4.WK4" (Lotus 4.0)
10.3.6 “CONVSHED.WK4” (Lotus 4.0)
10.3.7 "ET_LOGIN" (Visual Basic)

10.3.8 “EVAP25.WK1” (Lotus 2.2)
10.3.9 “EVPEXHS2” (Quick Basic)
10.3.10 "EXHAUST7 " (Quick Basic)
10.3.11 “GETALC.BAT” (Batch file)
10.3.12 “GETALD.BAT” (Batch file)
10.3.13 “GETALL.BAT” (Batch file)
10.3.14 “GETLM.BAT” (Batch file)
10.3.15 “GETPDF.BAT” (Batch file)
10.3.16 “METSREPT” (Visual Basic)
10.3.17 "MIDLIT" (Visual Basic)
10.3.18 “MVTEMP20.WK1” (Lotus 2.2)
10.3.19 "NEW8.WK4" (Lotus 4.0)
10.3.20 “PDFID” (Visual Basic)
10.3.21 “TESTID0” (Visual Basic)
10.3.22 “VTS2DYN2” (Visual Basic)

11 References

11.1 Code of Federal Regulations, Title 40, Part 86.

11.2 Air Resources Board, "California Non-methane Organic Gas Test Procedures," Part G. (http://www.arb.ca.gov/msprog/levprog/cleandoc/clean_nmogtps_final.pdf)

11.3 MLD Standard Operating Procedures (http://www.arb.ca.gov/testmeth/slb/exhaust.htm)

11.3.1 MLD SOP No. 101

11.3.2 MLD SOP No. 102/103

11.3.3 MLD SOP No. 104

11.3.4 MLD SOP No. 119

11.3.5 MLD SOP No. 120A

APPENDIX

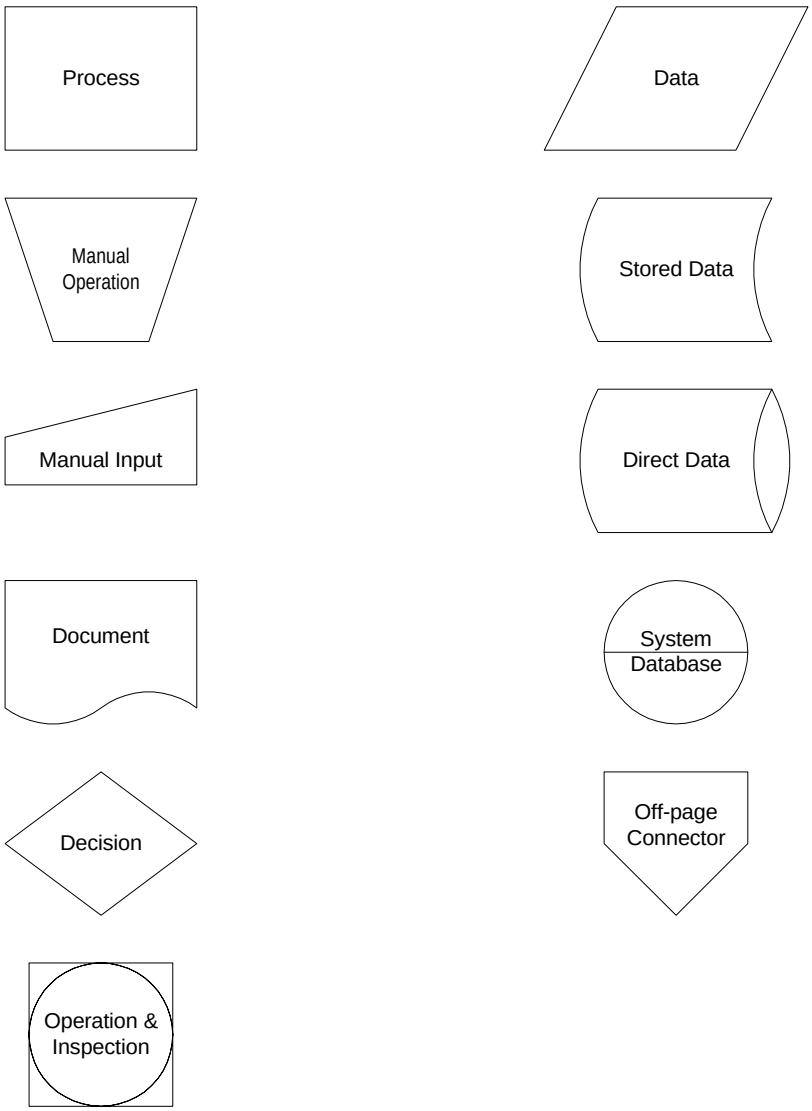


Figure A-1. Key to Flow Chart Shapes

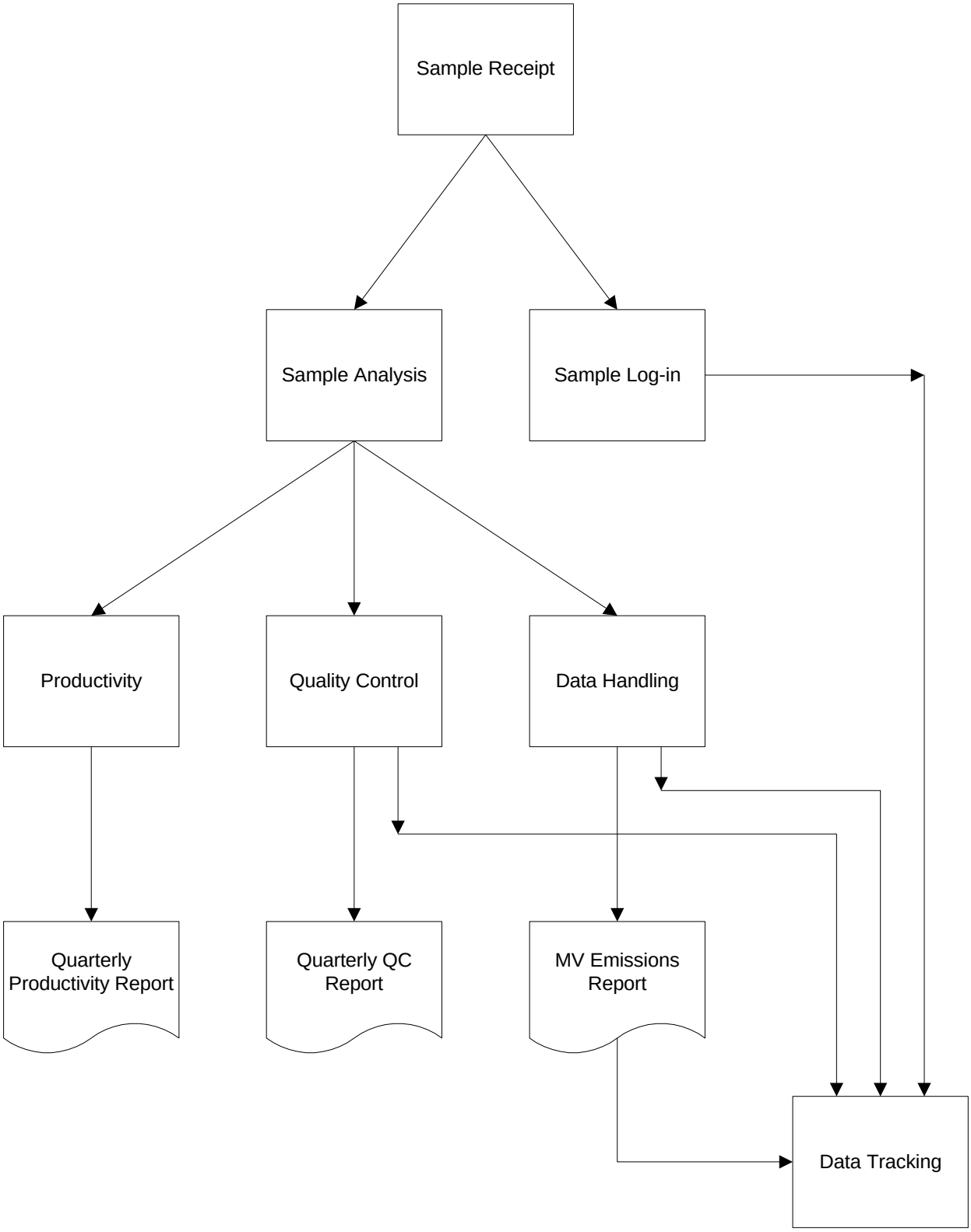


Figure A-2. Overview of OAS Activities

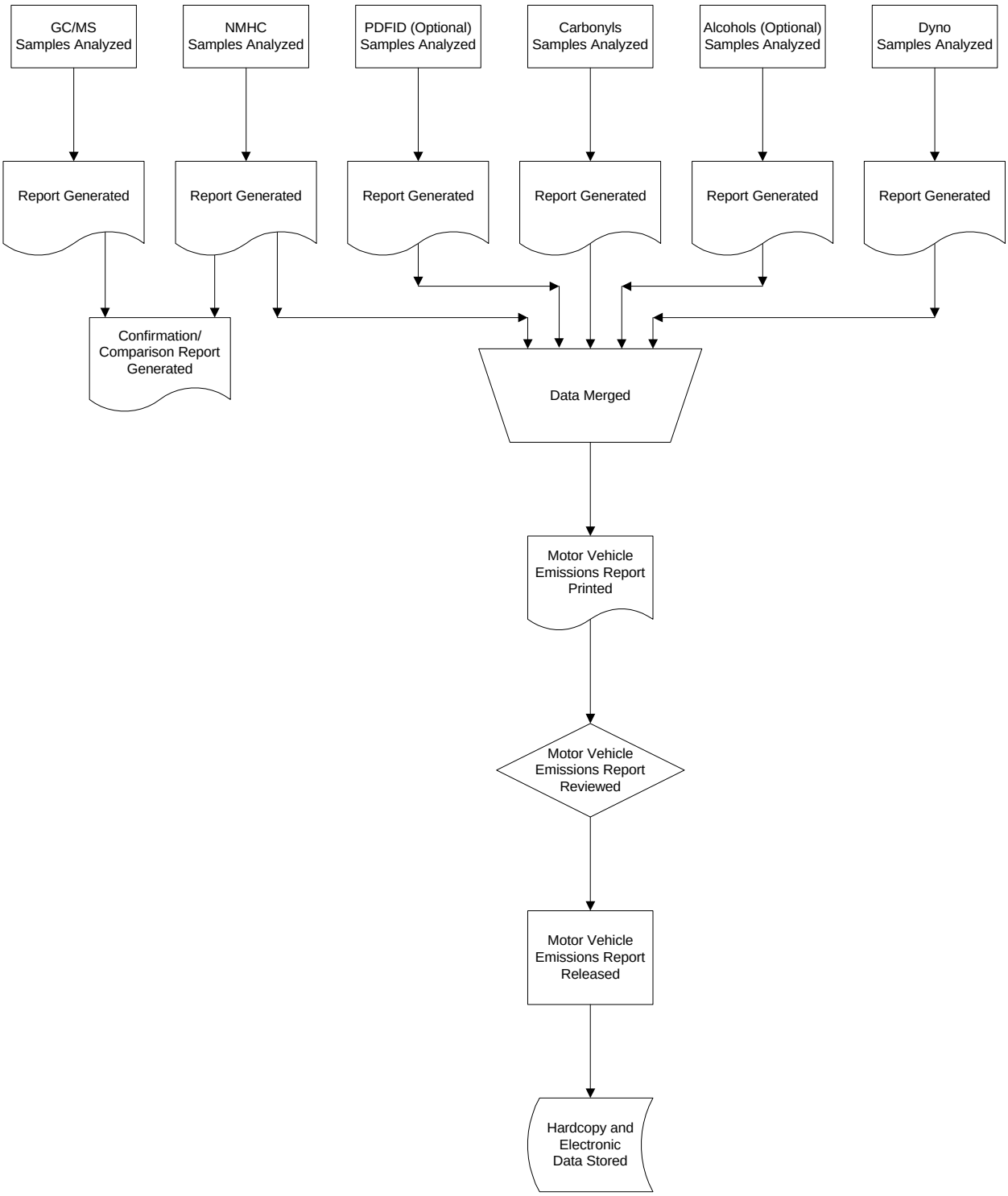


Figure A-3. Data Overview

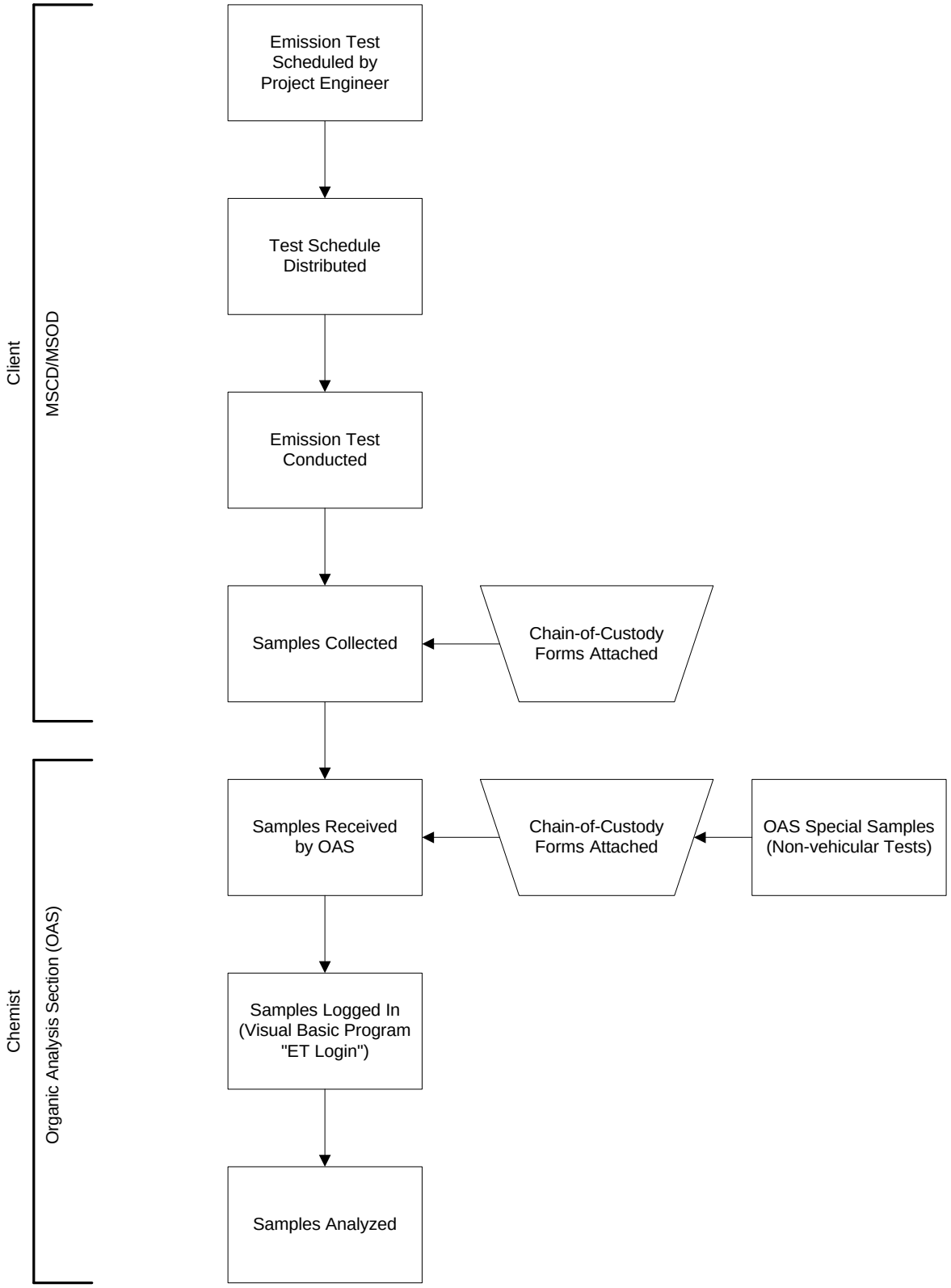


Figure A-4. Sample Handling

STATE OF CALIFORNIA – AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
SOUTHERN LABORATORY BRANCH – ORGANIC ANALYSIS SECTION

CHAIN OF CUSTODY

PROJ: TEST:
VEH: LIC:
FUEL: DATE:
SAMPLE# LOT#
BAGS:BKGD____1____2_____3___DYNO#__

	DATE	TIME	NAME	REASON/ANALYSIS
SAMPLED BY:				
DISCARDED BY:				

Figure A-5. Example of Chain-of-Custody Form

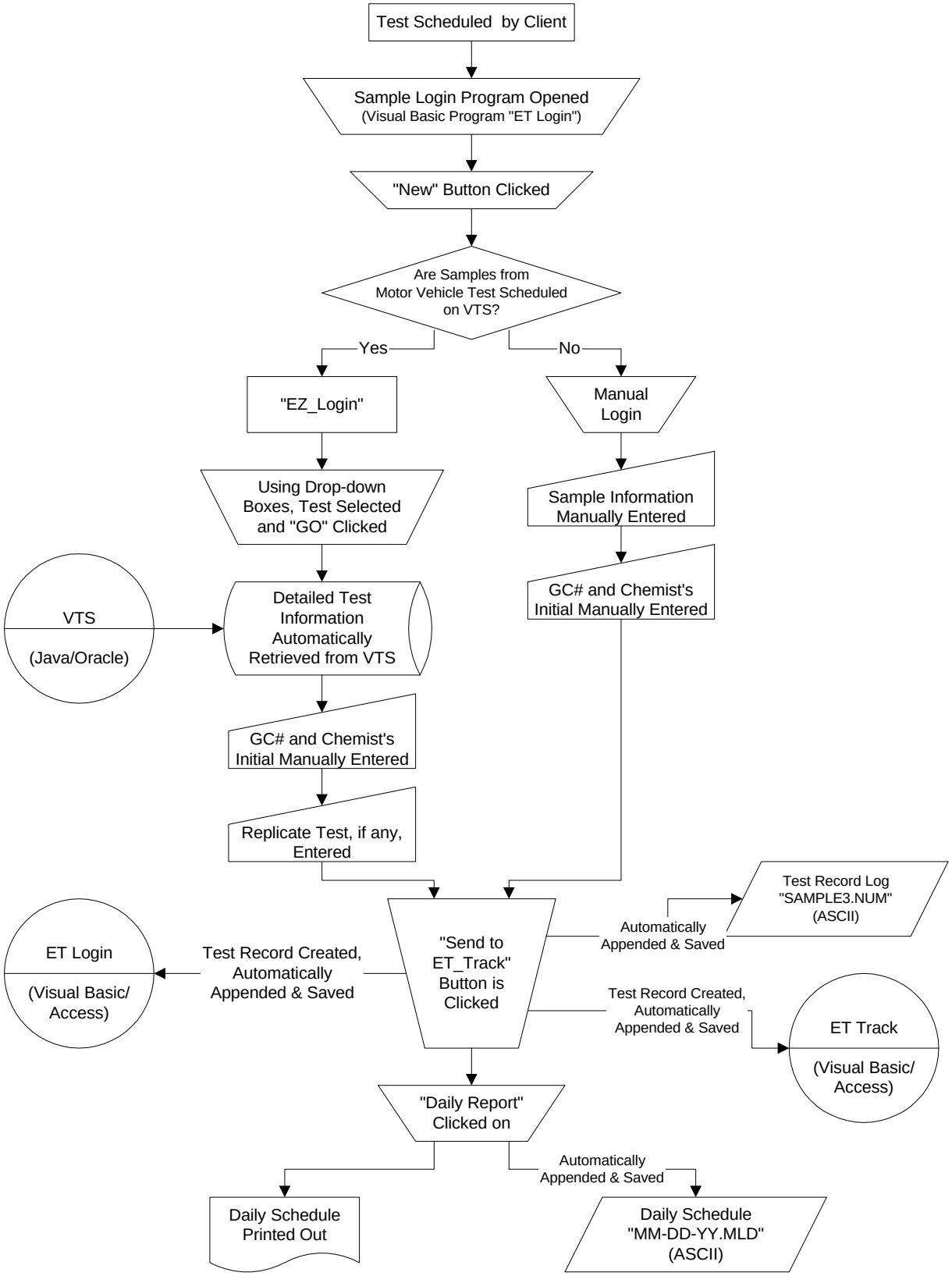


Figure A-6. Sample Login

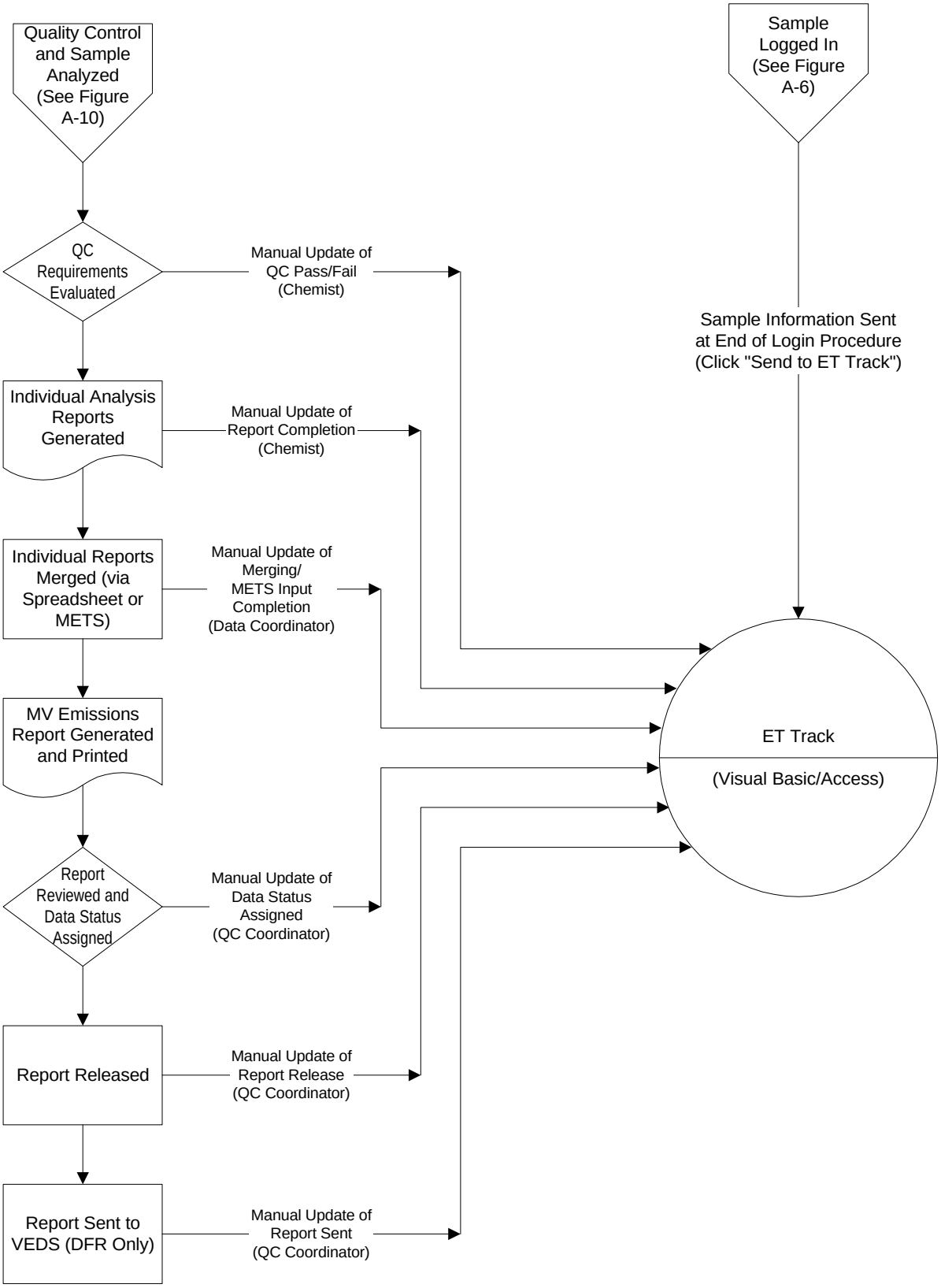


Figure A-7. ET Track

Monitoring and Laboratory Division
Southern Laboratory Branch
Organic Analysis Section

INDIVIDUAL TEST STATUS

Test Date	: 8/8/2002	Report Date:	6/12/2003
Test No.	: 227M1D	Report Time:	02:46 PM
Project	: 2S00C1	Test Type :	M
Fuel	: GN01	GC # :	7
Vehicle	: 1992 VOLV 240 4DR	MLD login #:	10588
Login Comment:	8/7/2002 12:6 2nd DAY TEST background average hc	MSD Test ID:	1007598

(A) QC REVIEW:

Analysis	Status	Date of Completion	Days Taken	Requested
NMHC	Pass	8/9/2002	1	Yes
ALDEHYDE	Pass	8/9/2002	1	Yes
PDFID	Pass	8/8/2002		Yes
ALCOHOL	Pass	8/13/2002	5	Yes

Overall QC (DFR)

QC Comment:

(B) DATA REPORTING:

Report	Completed	Date of Completion	Days Taken	Requested
LIT-END	Yes	8/12/2002	4	Yes
MIDRANGE	Yes	8/12/2002	4	Yes
ALDEHYDE	Yes	8/9/2002	1	Yes
PDFID	Yes	8/8/2002		Yes
ALCOHOL	Yes	8/13/2002	5	Yes
Merged	Yes	8/19/2002	11	Yes
Released to clients (or closed)	Yes	10/23/2002	76	Yes

[End of Roport]

Figure A-8. Example of Individual Test Status Report

Unfinished Reports Summary (ET_Track) 6/12/2003 2:48 PM
From 1/1/2003 To 6/5/2003 By Cmaddox

#	Test Date	Test #	Project: (All)	[1] litend	[2] midrange	[3] carbonyl	[4] alcohol	[5] pdfid
1	5/21/2003	13S21	2R9802	lit_5E	mid_5E	___	___	___
				1	1	0	0	0

Figure A-9. Example of Unfinished Tests Summary

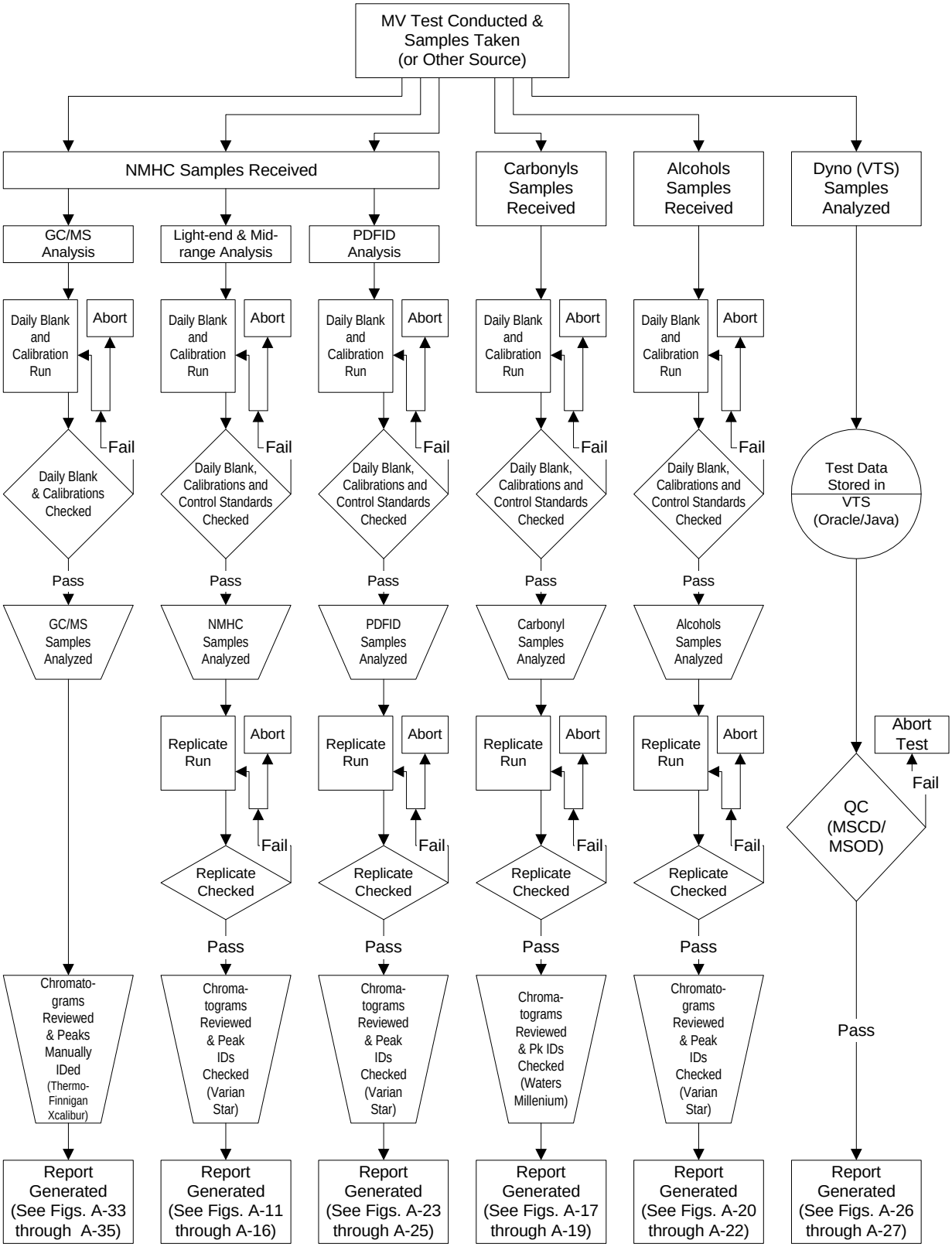


Figure A-10. Sample Analysis

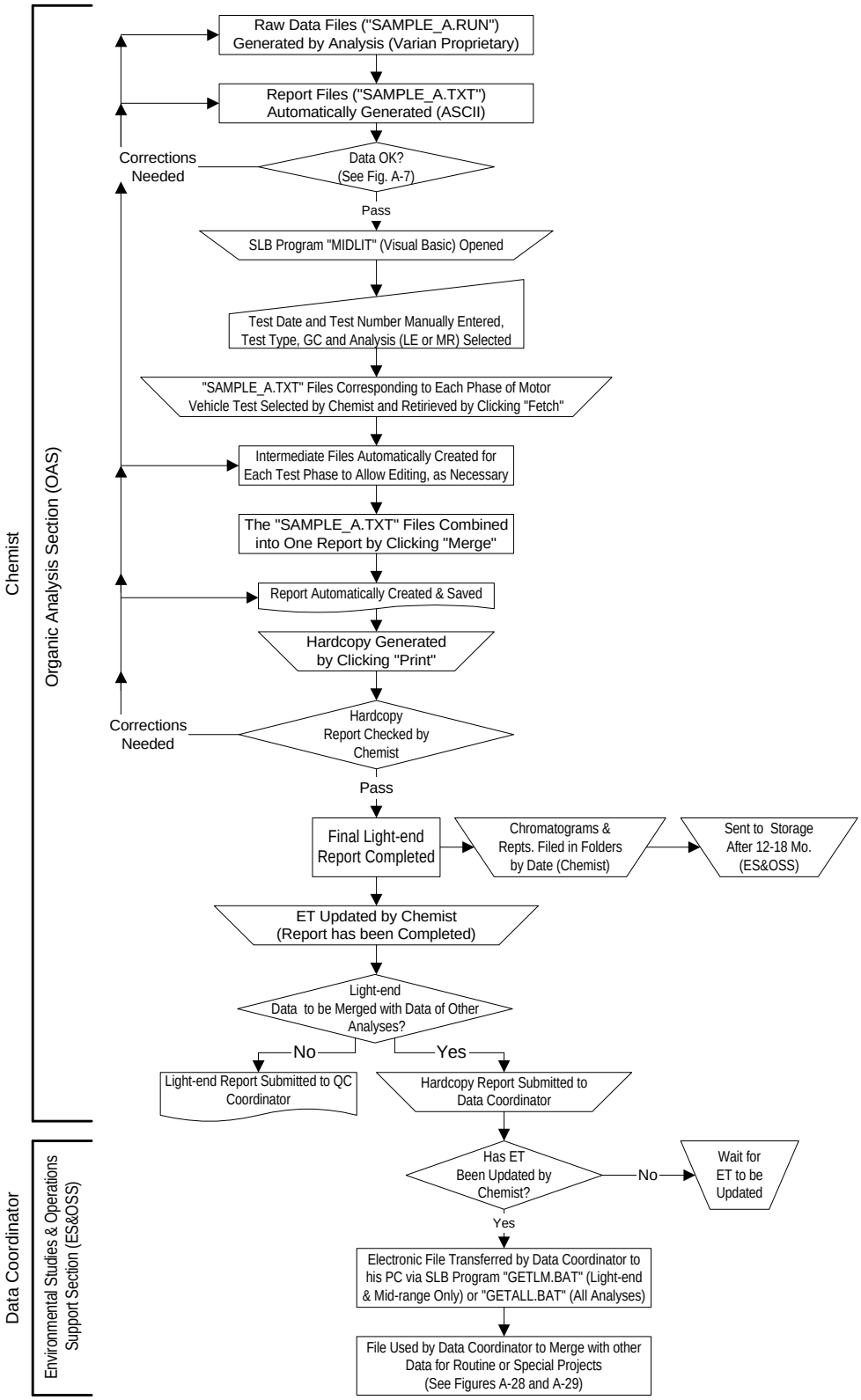


Figure A-11. Light-end Hydrocarbon Reporting

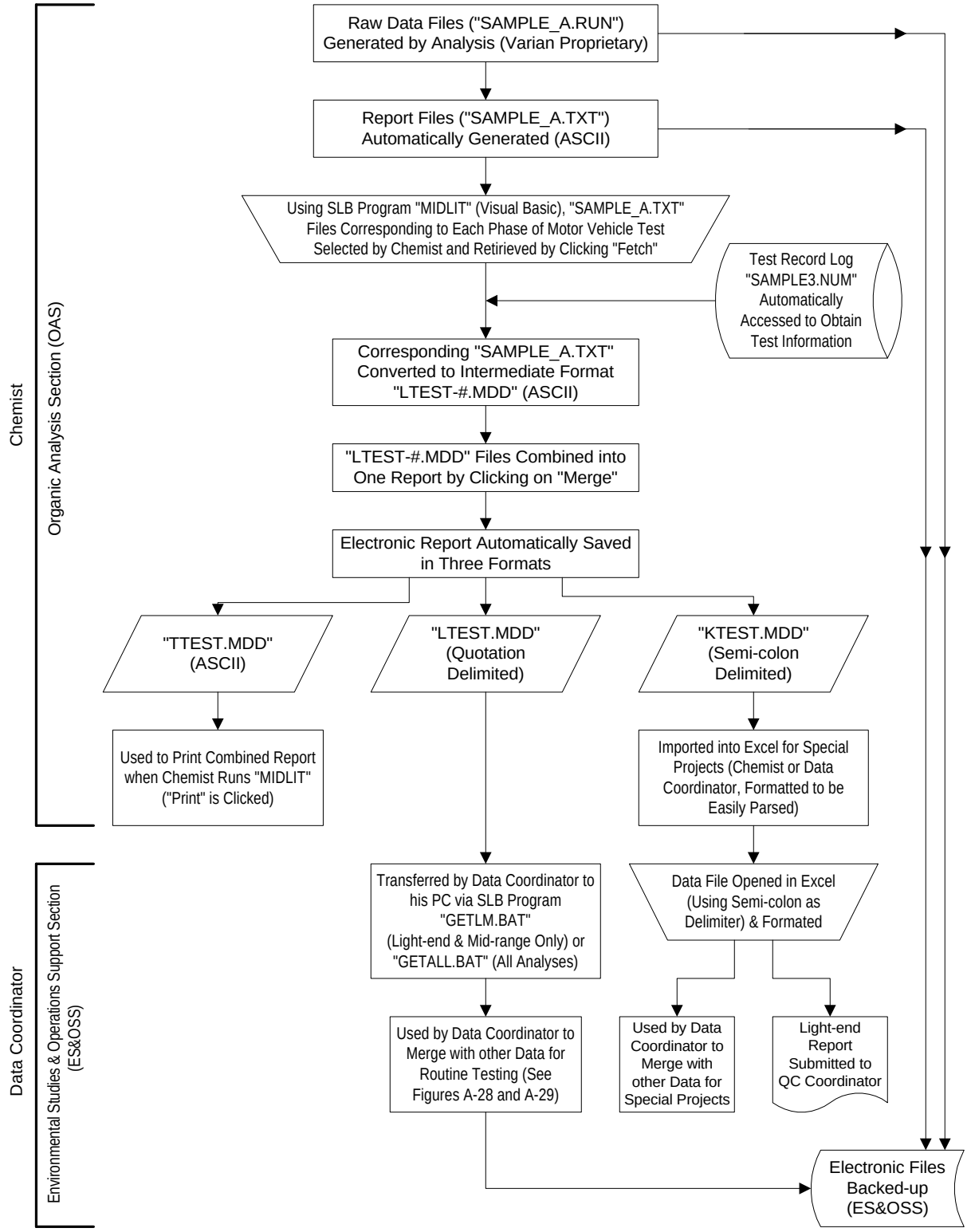


Figure A-12. Light-end Hydrocarbon Data Files

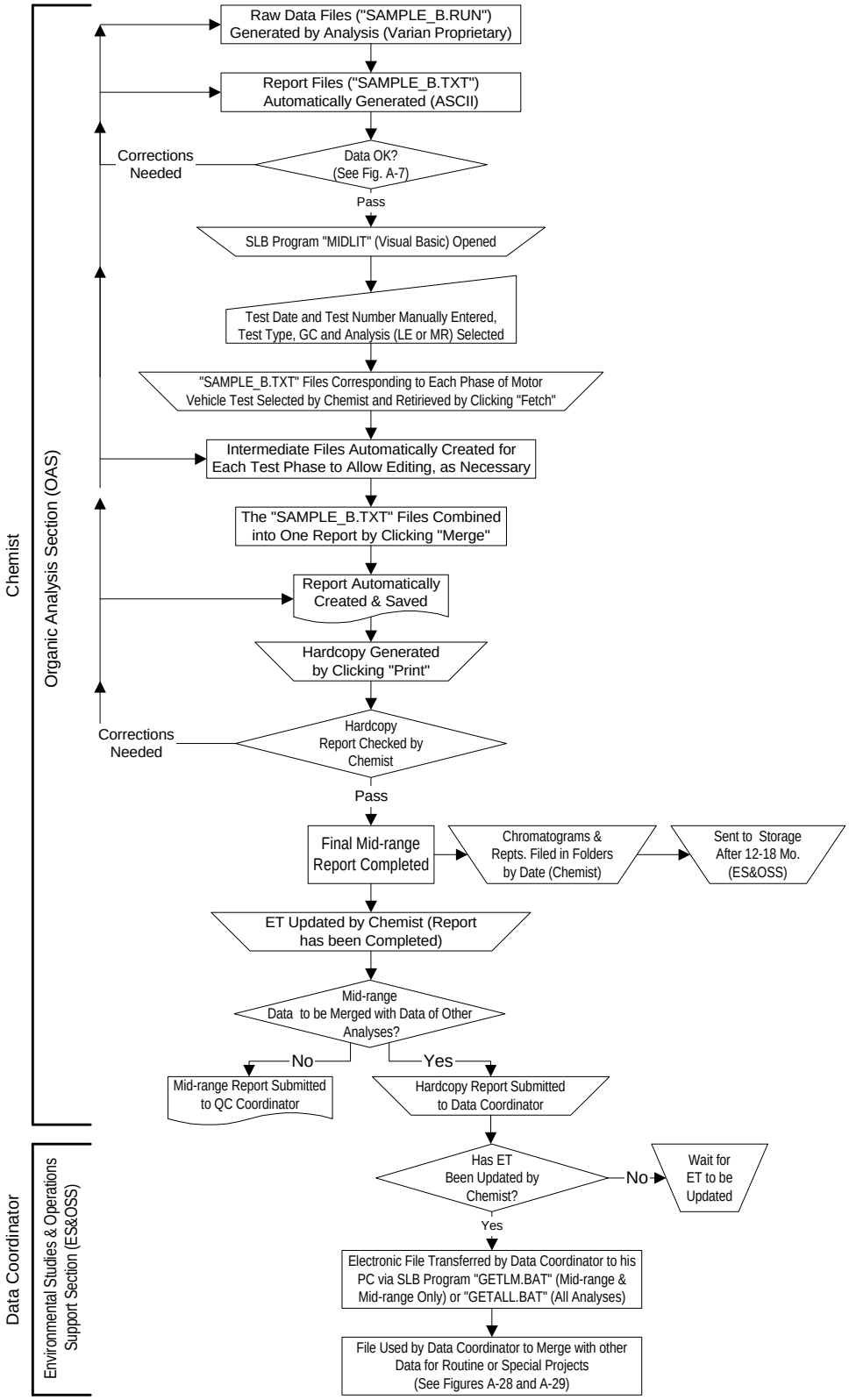


Figure A-13. Mid-range Hydrocarbon Reporting

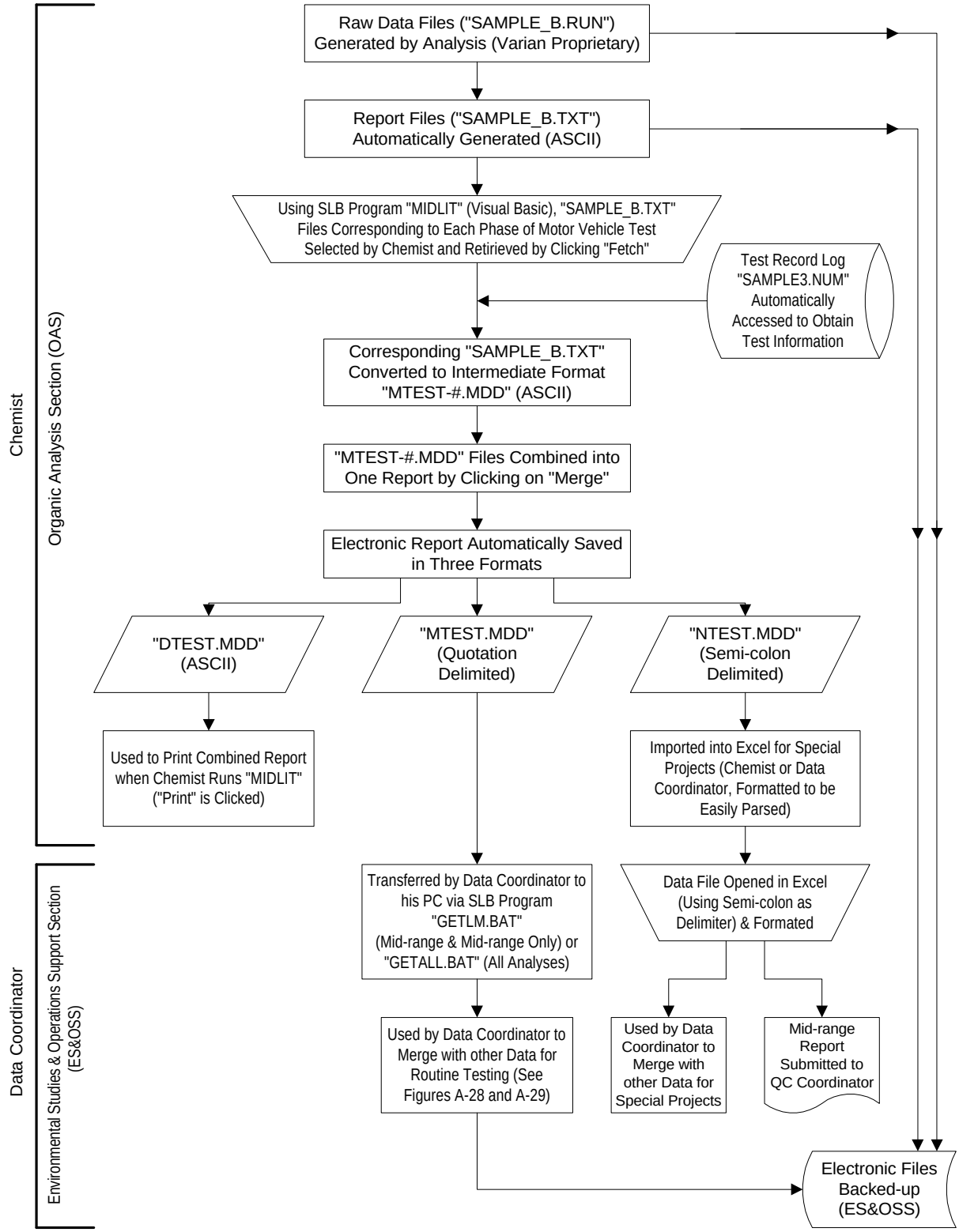


Figure A-14. Mid-range Hydrocarbon Data Files

MLD ORGANIC ANALYSIS SECTION

LIGHT-END HYDROCARBONS (MLD #1002) Report Date: 08/01/2002
VTS number: 1007442 Analysis Date: 07/30/2002
Test Name : 223-EC-1 Cell #: 2 Logged-in Date: 07/30/2002
Comment: 7/25/2002 10:3 1st DAY TEST CO mi Test:223C1 Project: 2S00C1
Vehicle ID: 1993 GM LUMINA 4 DR SEDAN Fuel:GN01
Analyst: JGS Instrument: GC#5L_8021 - PC(DATA)#311 - PC(REPORT)#309

No.	COMPOUND (UNIT: ppbC)	Bkgrnd	Bag#2	Bag#3	Bag#1	FLAG	CAS #
	Analysis Date	07/30	07/30	07/30	07/30		
	Time	20:52	19:19	16:12	12:14		
	Year	2002	2002	2002	2002		
001	ethane	15	886	1350	1700	0	00074-84-0
002	ethene - - - - -	15	3010	6900	10700	0	00074-85-1
003	propane	22	67	104	122	0	00074-98-6
004	propene - - - -	8	1320	3340	5880	0	00115-07-1
005	Mpropane	7	45	88	114	0	00075-28-5
006	ethyne - - - - -	11	72	1190	5840	0	00074-86-2
007	n-butane	15	241	492	635	0	00106-97-8
008	1,2-propadiene - -	0	0	115	428	0	00463-49-0
009	t-2-butene . . .	0	116	262	419	0	00624-64-6
010	1-butene - - - -	0	128	542	932	0	00106-98-9
011	2-Mpropene . . .	0	1890	4740	6540	0	00115-11-7
012	c-2-butene - - -	0	88	218	343	0	00590-18-1
013	2,2-diMpropane . .	0	0	7	9	0	00463-82-1
014	CYpentane - - - -	0	123	256	362	0	00287-92-3
015	2-Mbutane	49	2500	5320	7480	0	00078-78-4
016	1-propyne - - - -	0	0	0	0	0	00074-99-7
017	n-pentane	19	968	2010	2760	0	00109-66-0
018	1,2-butadiene - -	0	0	0	0	0	00590-19-2
019	1,3-butadiene . .	0	64	379	1070	0	00106-99-0
020	3-M-1-butene - - -	0	0	0	0	0	00563-45-1
021	CYpentene	0	44	177	326	0	00142-29-0
022	t-2-pentene - - -	0	65	182	302	0	00646-04-8
023	2-M-2-butene . . .	0	62	245	421	0	00513-35-9
024	1-pentene - - - -	0	24	102	194	0	00109-67-1
025	2-M-1-butene . . .	0	62	164	325	0	00563-46-2
026	c-2-pentene - - -	0	34	100	168	0	00627-20-3
027	1-buten-3-yne . .	0	0	33	165	0	00689-97-4
028	2-butyne - - - -	0	0	0	0	0	00503-17-3
029	2,2-diMbutane . .	0	0	0	33	0	00075-83-2
030	MCYpentane - - -	18	1060	2210	3200	0	00096-37-7
031	1-butyne	0	0	0	0	0	00107-00-6
032	2,3-diMbutane - -	0	0	0	0	0	00079-29-8
033	2-Mpentane . . .	40	1610	3330	4680	0	00107-83-5
034	3-Mpentane - - -	19	876	1780	2510	0	00096-14-0
035	n-hexane	19	658	1370	1880	0	00110-54-3
036	2-M-1,3-butadiene -	0	0	0	0	0	00078-79-5
037	1,3-CYpentadiene .	0	0	0	0	0	00542-92-7
	T_O_T_A_L	257	16013	37006	59538		

Figure A-15. Example of Light-end Hydrocarbon Report

MLD ORGANIC ANALYSIS SECTION

MID-RANGE HYDROCARBONS (MLD #1003) Report Date: 08/01/2002
VTS number: 1007442 Analysis Date: 07/30/2002
Test Name : 223-EC-1 Cell #: 2 Logged-in Date: 07/30/2002
Comment: 7/25/2002 10:3 1st DAY TEST CO mi Test:223C1 Project: 2S00C1
Vehicle ID: 1993 GM LUMINA 4 DR SEDAN Fuel:GN01
Analyst: JGS Instrument: GC#5M_7991 - PC(DATA)#311 - PC(REPORT)#309

No.	COMPOUND (UNIT: ppbC)	Bkgrnd	Bag#2	Bag#3	Bag#1	FLAG	CAS #
	Analysis Date	07/30	07/30	07/30	07/30		
	Time	20:52	19:19	16:12	12:14		
	Year	2002	2002	2002	2002		
001	n-butane	15	234	526	667	0	00106-97-8
002	1,3-butadiyne - -	0	0	0	36	0	00460-12-8
003	3-M-1-butene . . .	0	19	78	141	0	00563-45-1
004	2-Mbutane - - - -	46	2530	5260	7020	0	00078-78-4
005	n-pentane	18	973	2020	2780	0	00109-66-0
006	2-M-1,3-butadiene -	0	9	23	77	0	00078-79-5
007	3,3-diM-1-butene .	0	0	8	16	0	00558-37-2
008	t-1,3-pentadiene -	0	44	11	26	2	02004-70-8
009	2,2-diMbutane . .	0	204	410	564	0	00075-83-2
010	CYpentene - - - -	0	24	96	179	0	00142-29-0
011	4-M-1-pentene . .	0	0	0	0	0	00691-37-2
012	3-M-1-pentene - -	0	11	49	76	0	00760-20-3
013	CYpentane	0	130	272	387	0	00287-92-3
014	2,3-diMbutane - -	9	331	677	938	0	00079-29-8
015	2,3-diM-1-butene .	0	0	0	0	0	00563-78-0
016	M-tert-butyl-ether -	0	0	10	1760	0	01634-04-4
017	4-M-c-2-pentene . .	0	0	0	0	0	00691-38-3
018	2-Mpentane - - -	31	1360	2740	3870	0	00107-83-5
019	4-M-t-2-pentene . .	41	17	53	76	1	00674-76-0
020	3-Mpentane - - -	19	819	1690	2360	0	00096-14-0
021	1-hexene	0	9	48	109	0	00592-41-6
022	2-M-1-pentene - -	0	13	9	13	1	00763-29-1
023	n-hexane	20	640	1290	1860	0	00110-54-3
024	t-3-hexene - - -	0	17	42	73	0	13269-52-8
025	c-3-hexene . . .	0	0	0	0	0	07642-09-3
026	t-2-hexene - - -	0	24	66	114	0	04050-45-7
027	2-M-2-pentene . .	0	18	39	80	0	00625-27-4
028	3-M-t-2-pentene - -	0	0	0	0	0	00616-12-6
029	3-MCYpentene . . .	0	33	59	110	0	01120-62-3
030	c-2-hexene - - -	0	0	0	0	0	07688-21-3
031	3-M-c-2-pentene . .	0	0	0	0	0	00922-62-3
032	1-E-tert-butyl-ether	0	0	0	0	0	00637-92-3
033	2,2-diMpentane . .	0	0	0	0	0	00590-35-2
034	MCYpentane - - -	14	901	1870	2740	0	00096-37-7
035	2,4-diMpentane . .	15	258	519	748	0	00108-08-7
036	2,2,3-triMbutane -	0	10	22	31	0	00464-06-2
037	3,4-diM-1-pentene .	0	0	0	0	0	07385-78-6
038	2,4-diM-1-pentene -	0	0	7	12	0	02213-32-3
039	1-MCYpentene . . .	0	0	0	0	0	00693-89-0
040	benzene - - - -	15	1840	2700	4020	0	00071-43-2
041	3-M-1-hexene . . .	0	0	0	0	0	03404-61-3
042	3,3-diMpentane - -	0	29	58	83	0	00562-49-2
043	2,4-diM-2-pentene .	0	0	0	0	0	00625-65-0
044	CYhexane - - - -	0	289	607	907	0	00110-82-7
045	2-M-t-3-hexene . .	0	0	20	33	0	00692-24-0
046	4-M-t-2-hexene - -	0	0	17	27	0	03683-22-5
047	2-Mhexane	18	582	1190	1760	0	00591-76-4
048	2,3-diMpentane - -	22	385	767	1100	0	00565-59-3

Figure A-16. Example of Mid-range Hydrocarbon Report, Page 1 of 3

049	CYhexene	0	15	53	103	0	00110-83-8
050	3-Mhexane - - - -	18	575	1170	1720	0	00589-34-4
051	t-1,3-diMCYpentane .	7	241	491	739	0	01759-58-6
052	c-1,3-diMCYpentane -	0	223	453	678	0	02532-58-3
053	3-Epentane . . .	0	23	103	187	0	00617-78-7
054	t-1,2-diMCYpentane -	7	223	390	549	0	00822-50-4
055	2,2,4-triMpentane .	23	560	1130	1640	0	00540-84-1
056	1-heptene - - - -	0	0	0	0	0	00592-76-7
057	3-M-t-3-hexene . .	0	0	0	0	0	03899-36-3
058	t-3-heptene - - -	0	15	27	46	0	14686-14-7
059	n-heptane	8	291	589	889	0	00142-82-5
060	2,4,4-triM-1-pentene	0	0	0	0	0	00107-39-1
061	2-M-2-hexene . . .	0	11	0	0	2	02738-19-4
062	t-2-heptene - - -	0	0	0	0	0	14686-13-6
063	3-E-2-pentene . .	10	27	47	55	0	00816-79-5
064	3-M-c-2-hexene - -	0	0	0	0	0	10574-36-4
065	2,3-diM-2-pentene .	0	0	0	0	0	10574-37-5
066	c-2-heptene - - -	0	0	22	41	0	06443-92-1
067	MCYhexane	17	529	1080	1660	0	00108-87-2
068	2,2-diMhexane - -	0	64	134	206	0	00590-73-8
069	2,4,4-triM-2-pentene	0	0	0	10	0	00107-40-4
070	ECYpentane - - -	0	103	209	322	0	01640-89-7
071	2,5-diMhexane . .	0	115	236	355	0	00592-13-2
072	2,4-diMhexane - -	0	157	337	515	0	00589-43-5
073	1,2,4-triMCYpentane	0	87	180	274	0	02815-58-9
074	3,3-diMhexane - -	0	10	12	26	0	00563-16-6
075	1a,2a,3b-triMCYpentane	0	43	100	157	0	15890-40-1
076	2,3,4-triMpentane -	7	190	415	628	0	00565-75-3
077	toluene	68	2500	4910	8550	0	00108-88-3
078	2,3,3-triMpentane -	0	0	0	0	0	00560-21-4
079	2,3-diMhexane . .	0	92	195	292	0	00584-94-1
080	2-Mheptane - - -	0	186	383	592	0	00592-27-8
081	4-Mheptane . . .	0	71	148	227	0	00589-53-7
082	3,4-diMhexane - -	0	27	61	93	0	00583-48-2
083	3-Mheptane . . .	0	211	436	708	0	00589-81-1
084	c-1,3-diMCYhexane -	0	107	221	348	0	00638-04-0
085	t-1,4-diMCYhexane .	0	42	87	137	0	02207-04-7
086	2,2,5-triMhexane -	0	122	247	373	0	03522-94-9
087	t-1-M-3-ECYpentane .	0	48	97	208	0	02613-65-2
088	c-1-M-3-ECYpentane -	0	51	136	173	0	16747-50-5
089	1-octene	0	34	65	104	0	00111-66-0
090	2,2,4-triMhexane -	0	0	15	35	0	16747-26-5
091	t-4-octene . . .	0	0	0	0	0	14850-23-8
092	n-octane - - - -	0	125	246	390	0	00111-65-9
093	t-2-octene . . .	0	13	25	41	0	13389-42-9
094	t-1,3-diMCYhexane -	0	56	116	187	0	02207-03-6
095	2,4,4-triMhexane .	0	14	30	78	0	16747-30-1
096	c-2-octene - - -	0	25	53	81	0	07642-04-8
097	2,3,5-triMhexane .	0	20	39	65	0	01069-53-0
098	2,4-diMheptane - -	0	31	57	84	0	02213-23-2
099	c-1,2-diMCYhexane .	0	19	37	60	0	02207-01-4
100	2,6-diMheptane - -	0	47	98	155	0	01072-05-5
101	ECYhexane	0	26	53	86	0	01678-91-7
102	3,5-diMheptane - -	0	79	162	254	0	00926-82-9
103	Ebenzene	0	401	947	1800	0	00100-41-4
104	1,3,5-triMCYhexane -	0	22	44	79	0	01839-63-0
105	2,3-diMheptane . .	0	0	0	0	0	03074-71-3
106	m- & p-xylene - -	14	1430	3460	6730	0	00108-38-3
107	4-M-octane . . .	0	139	279	446	0	02216-34-4
108	2-M-octane - - -	0	0	0	0	0	03221-61-2

Figure A-16. Example of Mid-range Hydrocarbon Report, Page 2 of 3

109	3-M-octane . . .	0	96	198	317	0	02216-33-3
110	styrene - - - -	0	62	100	271	0	00100-42-5
111	o-xylene	0	534	1250	2410	0	00095-47-6
112	2,2,4-triMheptane -	0	11	21	36	0	14720-74-2
113	1-M-4-ECYhexane . .	0	14	28	49	0	06236-88-0
114	2,2,5-triMheptane -	0	41	83	138	0	02091-95-6
115	1-nonene	0	7	15	25	0	00124-11-8
116	n-nonane - - - -	11	84	162	259	0	00111-84-2
117	3,3-diM-octane . .	0	13	29	50	0	04110-44-5
118	(1-ME)benzene - -	0	25	62	109	0	00098-82-8
119	2,3-diM-octane . .	0	10	22	35	0	07146-60-3
120	2,2-diM-octane - -	0	26	55	89	0	15869-87-1
121	2,5-diM-octane . .	0	28	59	97	0	15869-89-3
122	2,4-diM-octane - -	0	28	75	144	0	04032-94-4
123	2,6-diM-octane . .	0	31	60	96	0	02051-30-1
124	n-propylbenzene - -	0	85	211	402	0	00103-65-1
125	1-M-3-Ebenzene . .	0	364	957	1910	0	00620-14-4
126	1-M-4-Ebenzene - -	0	123	390	789	0	00622-96-8
127	1,3,5-triMbenzene .	0	143	435	878	0	00108-67-8
128	2-Mnonane - - - -	0	70	136	217	0	00871-83-0
129	1-M-2-Ebenzene . .	0	120	313	615	0	00611-14-3
130	1,2,4-triMbenzene -	7	296	1190	2590	0	00095-63-6
131	(2-Mpropyl)benzene .	0	0	16	24	0	00538-93-2
132	(1-Mpropyl)benzene -	0	0	0	0	0	00135-98-8
133	n-decane	0	46	89	148	0	00124-18-5
134	1-M-3-(1-ME)benzene	0	10	26	48	0	00535-77-3
135	1,2,3-triMbenzene .	0	83	273	550	0	00526-73-8
136	1-M-4-(1-ME)benzene	0	12	30	50	0	00099-87-6
137	indan	0	43	146	307	0	00496-11-7
138	1-M-2-(1-ME)benzene	0	13	28	45	0	00527-84-4
139	1,3-diEbenzene . .	0	30	86	168	0	00141-93-5
140	1-M-3-n-propylbenzene	0	88	212	386	0	01074-43-7
141	1,4-diEbenzene . .	0	28	99	197	0	00105-05-5
142	1-M-4-n-propylbenzene	0	0	0	0	0	01074-55-1
143	1,3-diM-5-Ebenzene .	0	82	241	473	0	00934-74-7
144	1,2-diEbenzene - -	0	0	16	42	0	00135-01-3
145	1-M-2-n-propylbenzene	0	28	67	120	0	01074-17-5
146	1,4-diM-2-Ebenzene -	0	31	116	239	0	01758-88-9
147	1,3-diM-4-Ebenzene .	0	23	98	212	0	00874-41-9
148	1,2-diM-4-Ebenzene -	0	44	189	405	0	00934-80-5
149	1,3-diM-2-Ebenzene .	0	11	33	62	0	02870-04-4
150	n-undecane - - -	0	11	23	38	0	01120-21-4
151	1,2-diM-3-Ebenzene .	0	12	41	81	0	00933-98-2
152	1,2,4,5-tetraMbenzene	0	14	56	133	0	00095-93-2
153	1,2,3,5-tetraMbenzene	0	16	75	169	0	00527-53-7
154	1-(diME)-2-Mbenzene	0	0	13	19	0	01074-92-6
155	5-M-indan	0	10	25	48	0	00874-35-1
156	4-M-indan - - - -	0	10	40	96	0	00824-22-6
157	1-E-2-n-propylbenzene	0	0	22	42	0	16021-20-8
158	2-M-indan - - - -	0	14	50	110	0	00824-63-5
159	1,2,3,4-tetraMbenzene	0	8	18	33	0	00488-23-3
160	n-pentylbenzene - -	0	0	21	50	0	00538-68-1
161	1-M-2-n-butylbenzene	0	11	19	36	0	01595-11-5
162	naphthalene - - -	0	38	47	76	0	00091-20-3
163	1-(diME)-3,5-diMbenzene	0	0	9	15	0	00098-19-1
164	1,3-di-n-propylbenzene	0	0	8	14	0	17171-72-1
165	n-dodecane . . .	0	0	15	35	0	00112-40-3
	T_O_T_A_L	480	24120	51176	83966	6	

Figure A-16. Example of Mid-range Hydrocarbon Report, Page 3 of 3

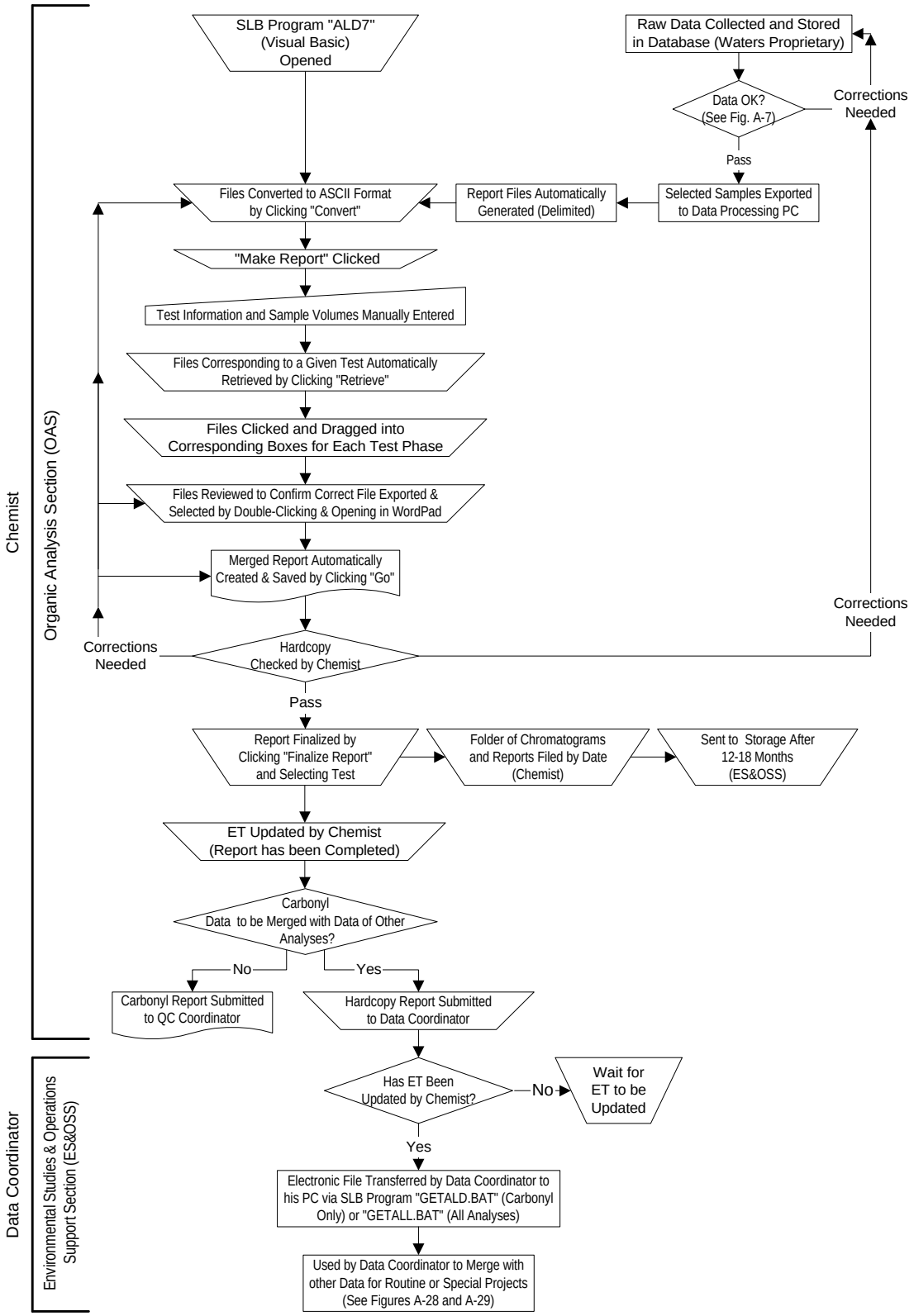


Figure A-17. Carbonyl Reporting

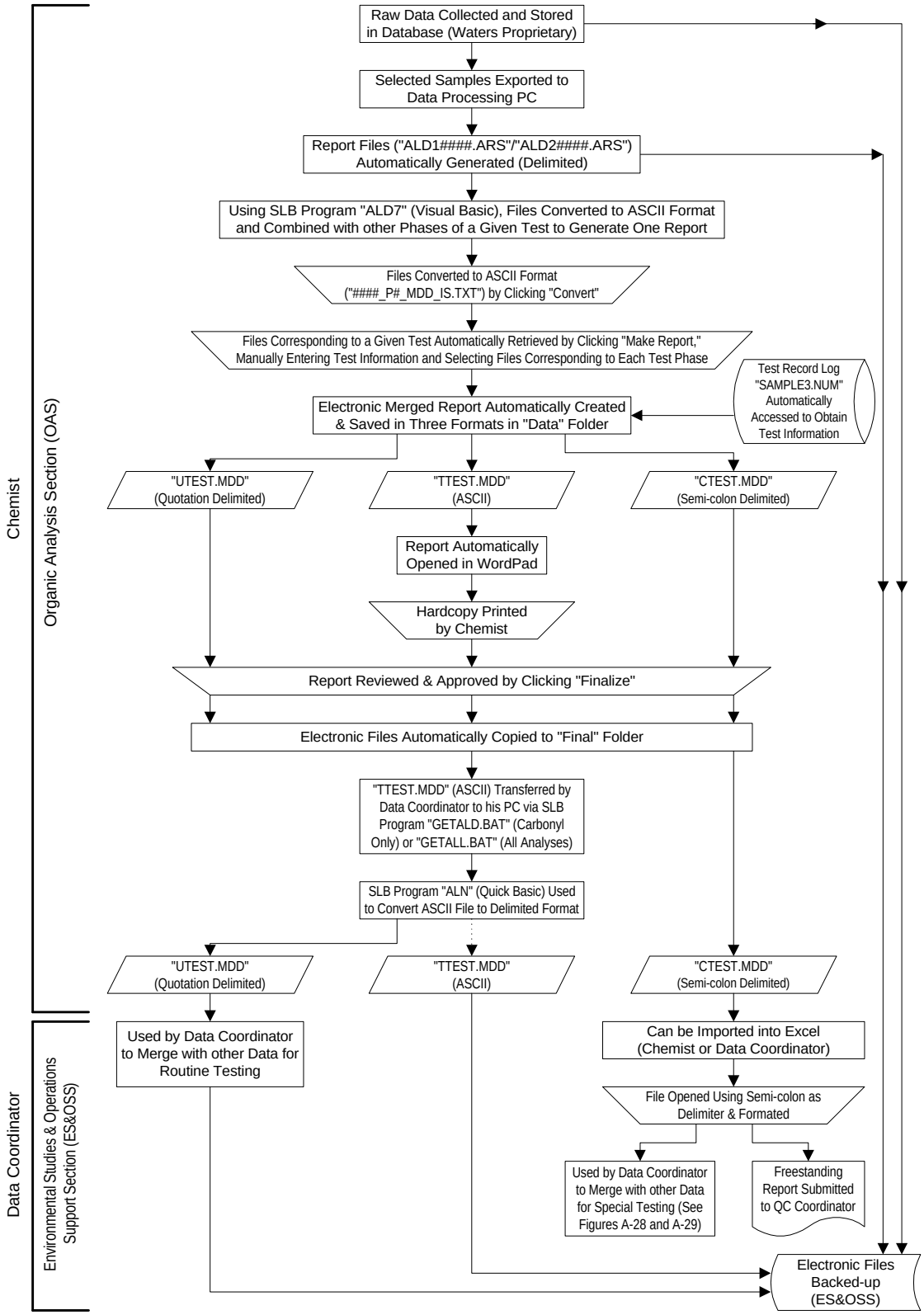


Figure A-18. Carbonyl Data Files

Monitoring and Laboratory Division
Southern Laboratory Branch
Organic Analysis Section

CARBONYLS Analysis Report - Cartridge Sampling

Test: 223C1 Project: 2S00C1 Report Date: 08/01/02
Car : 1993 GM LUMINA 4 DR SED Test Date: 07/30/02
Fuel: GN01 CARB LC No.: #8009
Unit: ug/ml File: T223C1.730 Analysts : LOS
Test Name: 223-EC-1 Cell: 2 Test ID : 1007442
Comments: 7/25/2002 10:3 1st DAY TEST CO might not have sta

	Phase 1		Phase 2		Phase 3		Compos.
	Bkg	Sample	Bkg	Sample	Bkg	Sample	Bkg
Sample ID	223C1_B	223C1_S	223C1_B	223C1_S	223C1_B	223C1_S	NA
Analysis Date	07/30	07/30	07/31	07/31	07/31	07/31	NA
Analysis Time	22:23	23:40	00:18	00:56	01:34	02:12	NA
Sample Volume (L)	8.68	8.62	14.50	14.67	8.62	8.64	NA
Elution Volume (ml)	4.4	4.4	4.4	4.4	4.4	4.4	NA
Analysis Year	2002	2002	2002	2002	2002	2002	NA

	Phase 1		Phase 2		Phase 3		Compos.
Unit (ug/ml)	Bkg	Sample	Bkg	Sample	Bkg	Sample	Bkg
Formaldehyde	0.032	3.100	0.029	0.756	0.022	1.721	0
Acetaldehyde	0	0.791	0.007	0.123	0.013	0.551	0
Acrolein	0	0.285	0	0.007	0	0.084	0
Acetone	0.062	0.549	0.083	0.105	0.052	0.393	0
Propionaldehyde	0	0.143	0	0.008	0	0.070	0
Butyraldehyde	0	0.057	0	0.001	0.002	0.018	0
Methyl Ethyl Ketone	0.012	0.054	0.013	0.010	0.011	0.033	0
Methacrolein	0	0.195	0	0.023	0	0.108	0
Benzaldehyde	0	0.429	0	0.101	0	0.238	0
Crotonaldehyde	0	0.050	0	0	0	0.016	0
Valeraldehyde	0.014	0.025	0.008	0	0.013	0.010	0
m - Tolualdehyde	0.009	0.532	0.011	0.203	0.008	0.277	0
Hexanal	0	0.039	0.007	0.014	0	0.044	0

Figure A-19. Example of Carbonyl Report

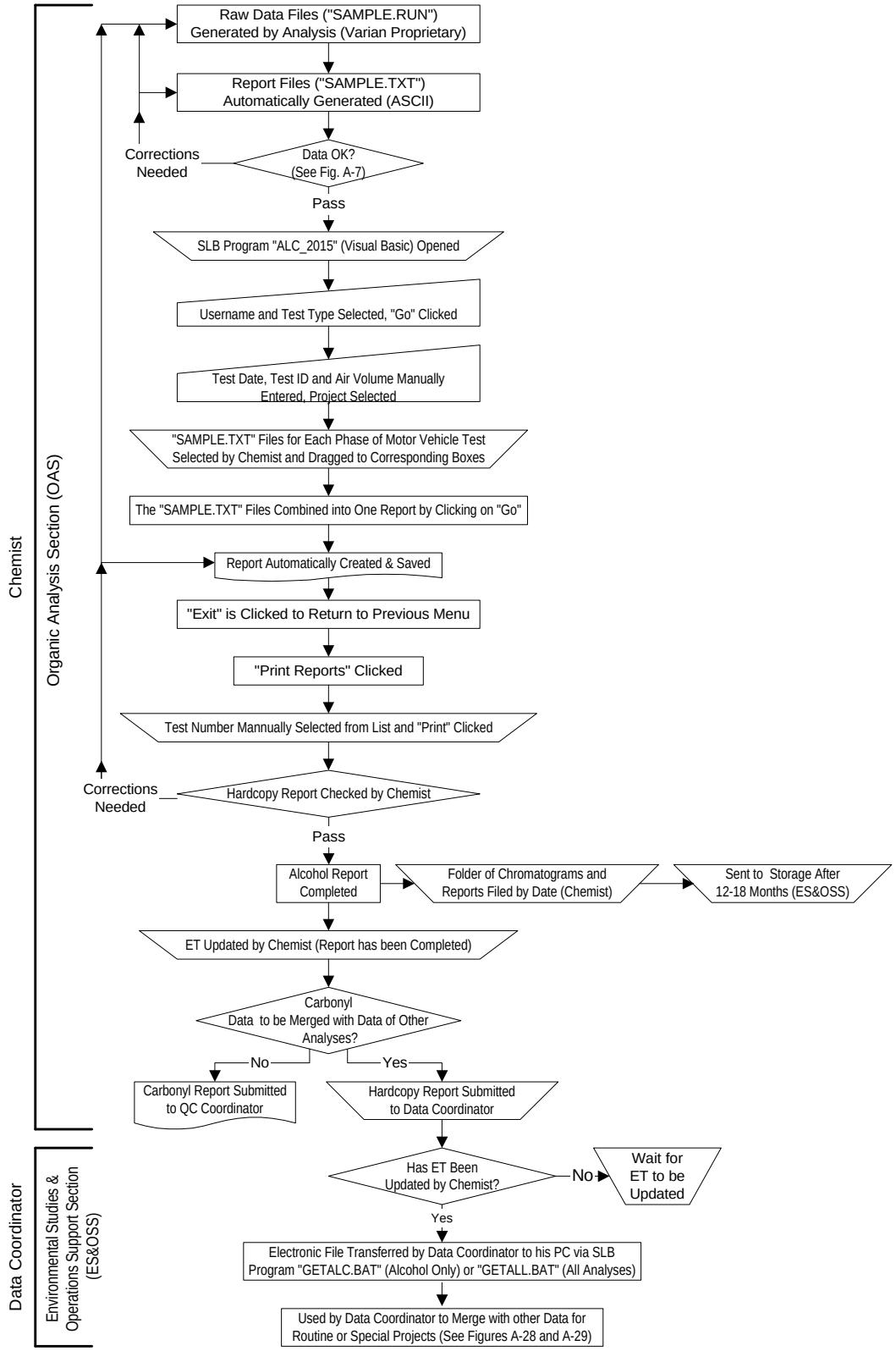


Figure A-20. Alcohol Reporting

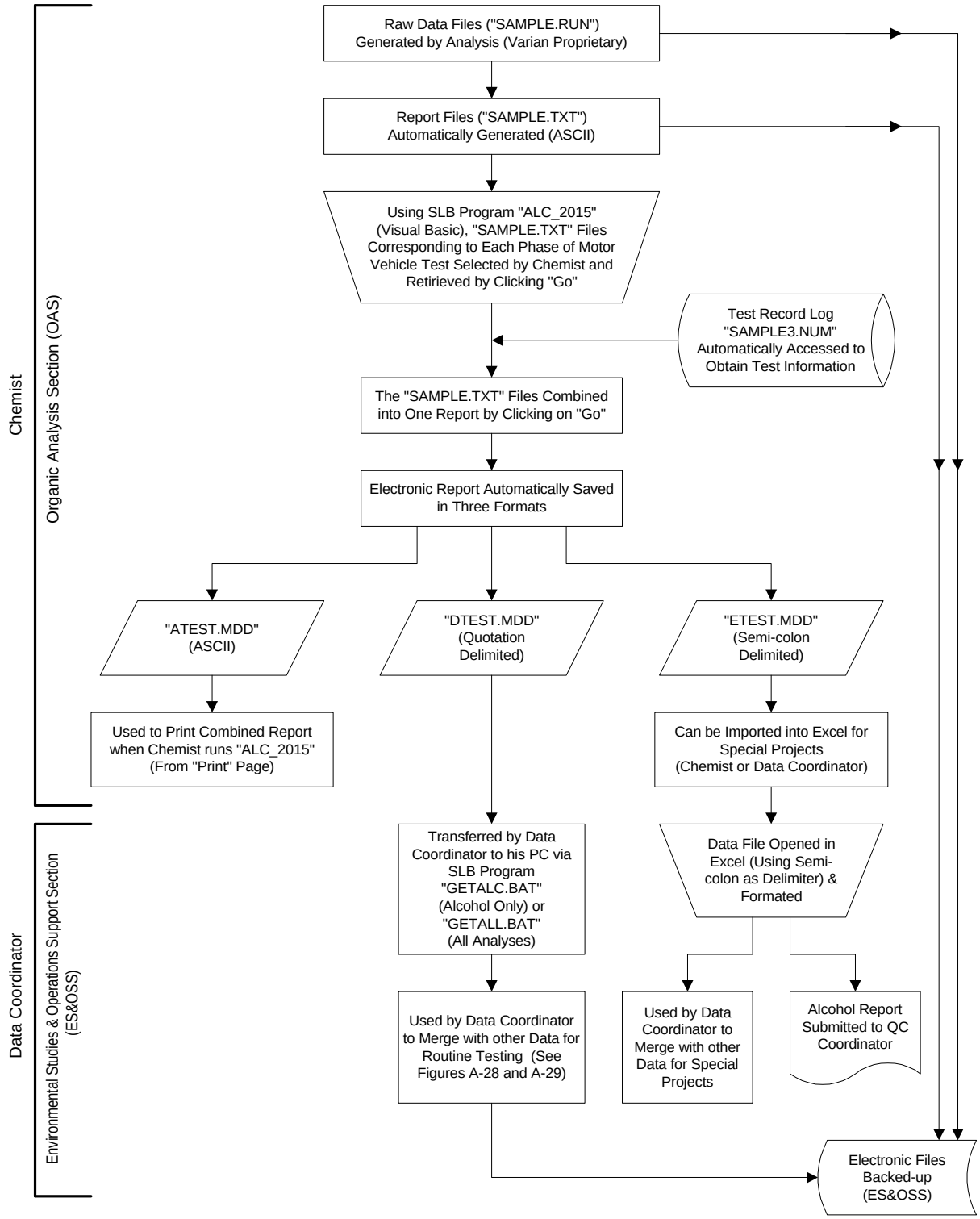


Figure A-21. Alcohol Data Files

Monitoring & Laboratory Division
Southern Laboratory Branch
Organic Analysis Section
ALCOHOL ANALYSIS

Test Date : 07/30/2002	Test No. : 223C1	Project: 2S00C1
Report Date: 08/05/2002	Analyst : RPP	Unit : ug/ml
Directory : \STAR\data	MLD Method: MLD No. 1001	OAS Method: alc#1.mth

Air Volume (Liters)		LOD		Workstation
Background :	31.70	Methanol	: 0.1	
Mode 1 :	8.70	Ethanol	: 0.1	PC#123
Mode 2 :	14.36			GC#FAM_GC
Mode 3 :	8.54			

Data File	Anal.Date	Time	Sample Name	Methanol	Ethanol
02\223 mec	07/31/2002	12:04	Blank	0.000	0.000
02\223 mec	07/31/2002	12:18	Background (A)	0.000	0.000
02\223 mec	07/31/2002	12:32	Background (B)	0.000	0.000
02\223 mec	07/31/2002	12:45	Mode 1 (A)	0.853	0.000
02\223 mec	07/31/2002	13:13	Mode 1 (B)	0.000	0.000
02\223 mec	07/31/2002	13:26	Mode 2 (A)	0.300	0.000
02\223 mec	07/31/2002	13:40	Mode 2 (B)	0.000	0.000
02\223 mec	07/31/2002	13:54	Mode 3 (A)	0.694	0.000
02\223 mec	07/31/2002	14:08	Mode 3 (B)	0.000	0.000

This report was checked and approved by ROSE Date: 08/05/2002

and by _____ Date: _____

Figure A-22. Example of Alcohol Report

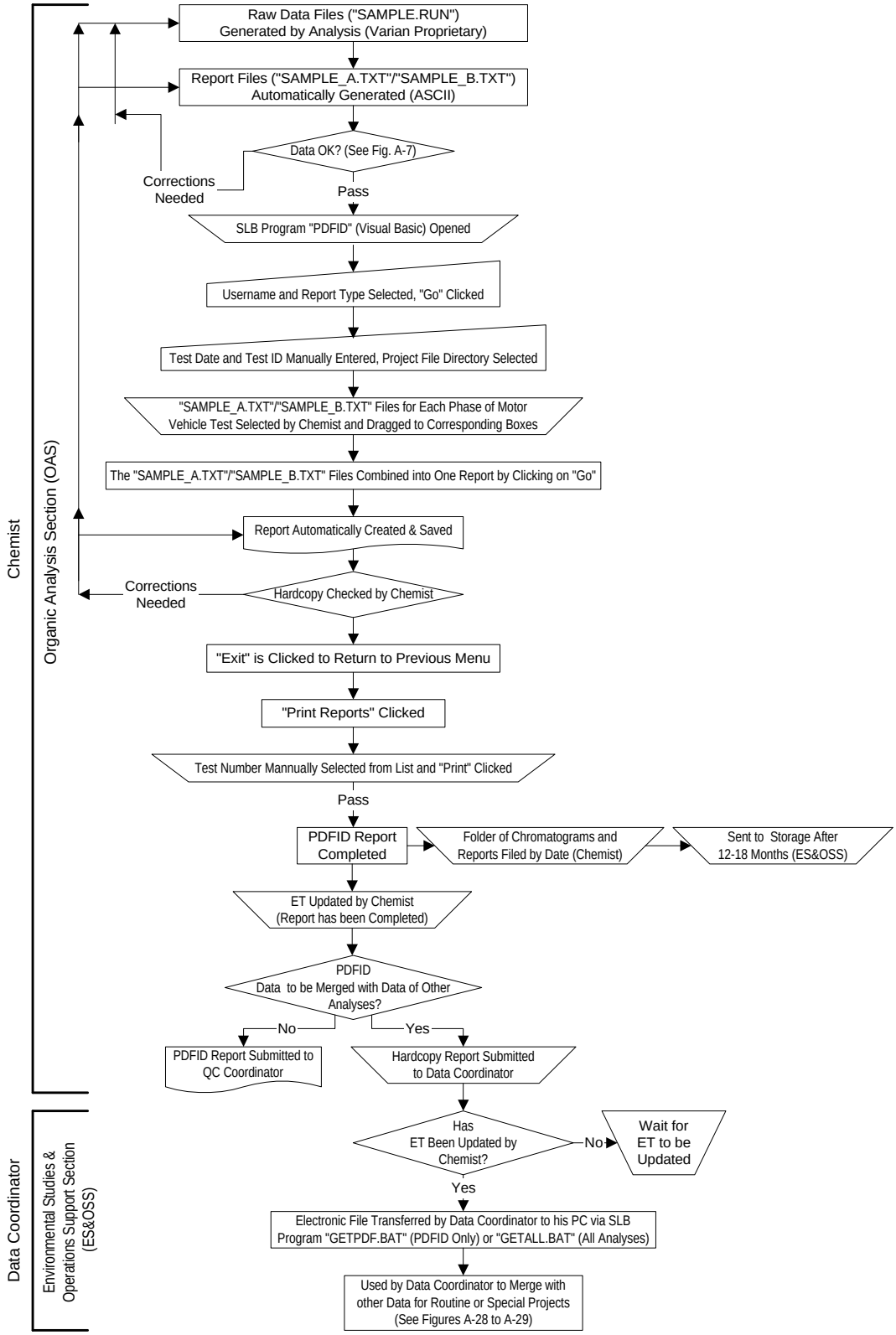


Figure A-23. PDFID Reporting

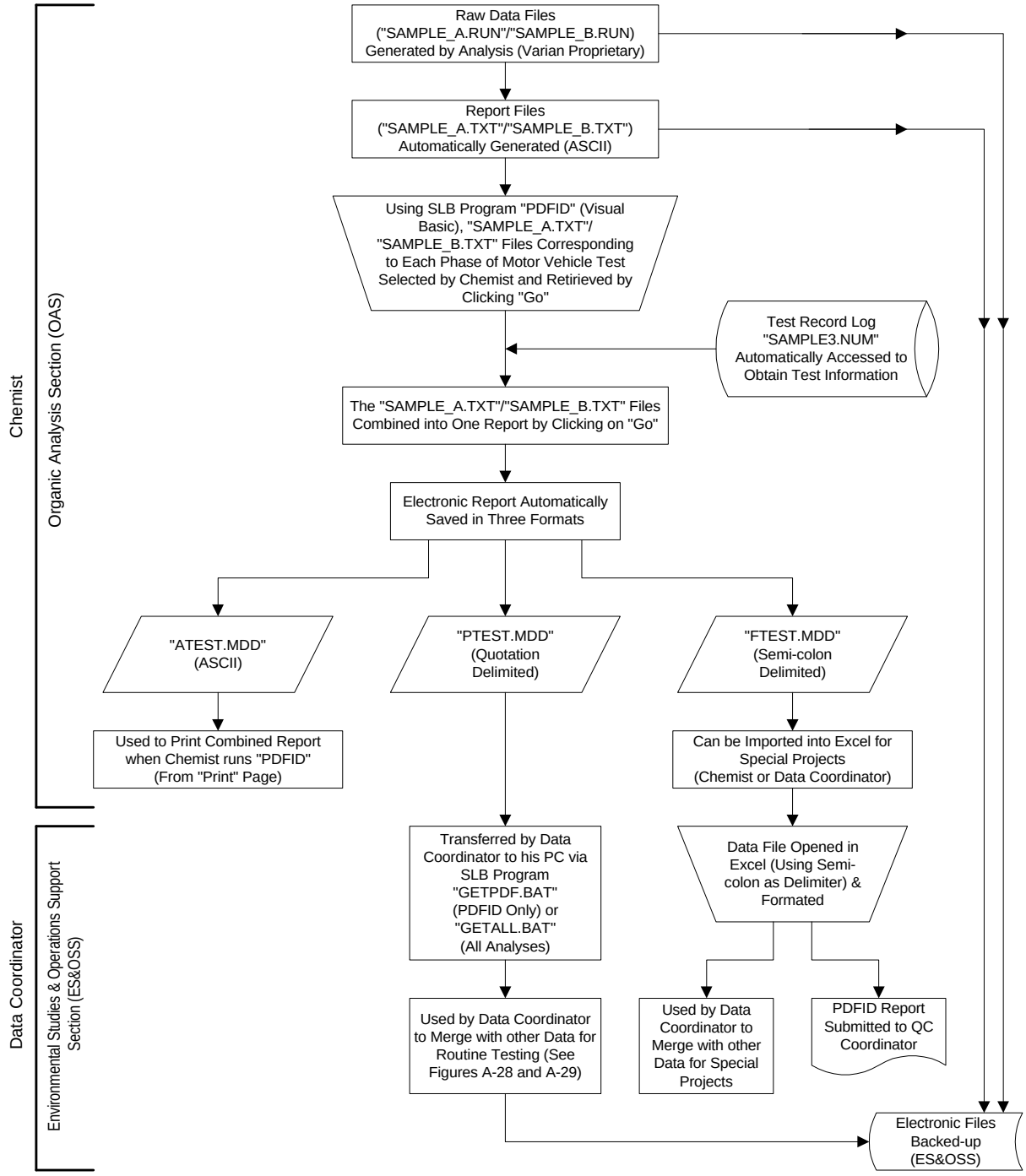


Figure A-24. PDFID Data Files

Monitoring & Laboratory Division
Southern Laboratory Branch
Organic Analysis Section

PDFID ANALYSIS

Test Date : 07/30/2002 Test No. : 223C1 Project: 2S00C1

Report Date: 07/30/2002 Analyst : LD Unit : ppmC

Directory : \STAR\MODULE16 MLD Method: pdfid.mth

LOD		Workstation
Methane	: .04	
NMHC	: .06	PC#316
		GC#1P_2742

Data File	Anal.Date	Time	Sample	NMHC	Methane (Column)	Methane (Cryo)	Methane (RPD %)
2s00c1 223 c1	07/30/2002	15:03	Mode 0	0.653	2.066	2.011	1.0
2s00c1 223 c1	07/30/2002	14:32	Mode 1	123.839	10.744	10.211	2.0
2s00c1 223 c1	07/30/2002	14:51	Mode 2	32.838	6.558	6.351	1.0
2s00c1 223 c1	07/30/2002	15:13	Mode 3	72.556	7.956	7.829	0.0

This report was checked and approved by LD Date: 07/30/2002

and by _____ Date: _____

Figure A-25. Example of PDFID Report

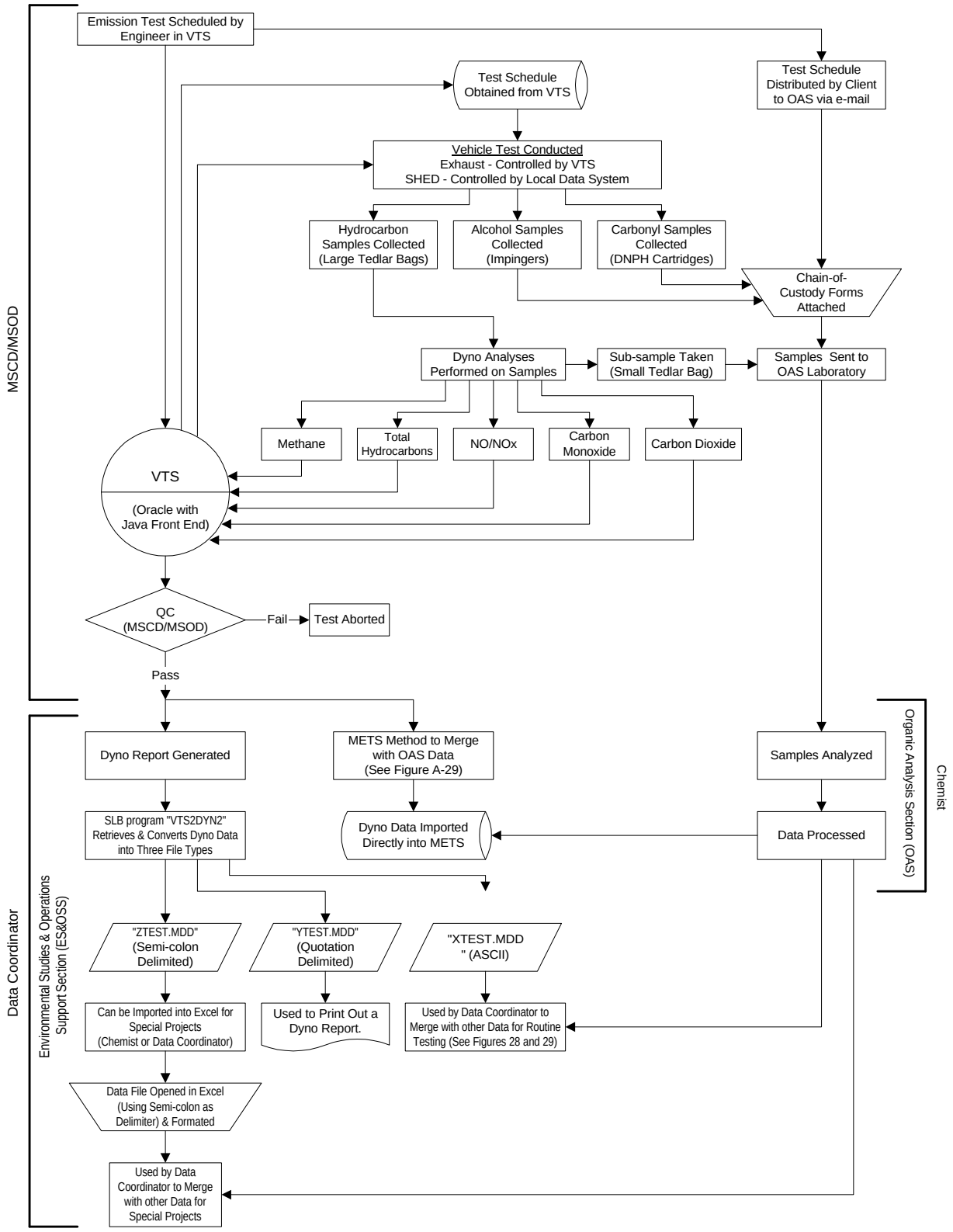


Figure A-26. Dynamometer Data Reporting

```
           CALIFORNIA AIR RESOURCES BOARD, HAAGEN-SMIT LABORATORY
                    (Test Data may NOT have been verified)

TEST TIME: 07/30/02  08:44    LAST EDIT: vtsowner TIME: 07/30/02  08:44
PROJECT  VEH#  VEH ID  TEST ID  TEST  TYPE  TEST TYPE DESCRIPTION
2S00C1   223  1002082  1007442   1    EC    Enhanced Cold CVS II Test

 D   C   T  OP1  OP2  DRV
 2   2   2   49   49   21

YR MFG  DIV     MODEL          VIN                    #C   DISP  ENGINE FAMILY
93 GM   CHEV    LUMINA 4 DR  2G1WL54T8P9138803      6   3.13   P1G3.4W8XGZX

FC LIC-STATE   VTYP  FUEL  TR   INRWT  A-HP  10%  I-HP  ODOM    SHIFTPOINT
 C 3CHU425 CA  PC    61    A3   3625   6      S   6     248051  NONE

ROAD LOAD COEFFICIENTS
A: 0             B:  0             C: 1.7999960109  D: 0             n: 0

DR SEQ    REASON
   1       B

COMMENTS:

BAG    BARO       DP       DB     VMIX     DIST    TIME
 1    29.65    60.04    72.30     2828    3.587519338060800     0.00
 2    29.65    60.29    74.99     4860    3.849241418572800     0.00
 3    29.65    60.16    73.01     2829    3.584073121228800   578.75

BAG     HUCF       R HUM   AB HUM   1-1\DF  COUNT
 1     1.0144      65.35    78.02   0.9156  1884214
 2     1.0177      60.22    78.70   0.9456  2021674
 3     1.0159      64.06    78.34   0.9286  1882404

              HC        CO       CO2     METH      NOX       NO     NOXC
RNG           1         1       1        1         1
B1 CONC     3.297000000000000    2.028800000000000    0.044439500000000    1.719000000000000
0.133000000000000   -0.010000000000000    0.134913888092511
   D.V.M.   0.000     0.000     0.000    0.000    0.000    0.000

S1 CONC   131.400000000000000  773.424000000000000    1.023870000000000    9.885000000000000
25.131000000000000   23.399000000000000   25.492638508668500
   D.V.M.   0.000     0.000     0.000    0.000    0.000    0.000
   GRAMS    5.986    71.940  1440.545    0.444    3.831    2.337   3.886
   GPM      1.669    20.053   401.544    0.124    1.068    0.651   1.083
   MPG     19.610        PARTICULATES:   0.000

RNG           1         1       1        1         1
B2 CONC     3.381000000000000    1.221400000000000    0.044246200000000    1.705000000000000
0.100000000000000    0.013000000000000    0.101771532932545
   D.V.M.   0.000     0.000     0.000    0.000    0.000    0.000

S2 CONC    41.012000000000000  273.421000000000000    0.686701000000000    6.272000000000000
4.777000000000000    4.457000000000000    4.861626128187690
   D.V.M.   0.000     0.000     0.000    0.000    0.000    0.000
   GRAMS    3.030    43.626  1623.741    0.428    1.233    0.763   1.254
   GPM      0.787    11.334   421.834    0.111    0.320    0.198   0.326
   MPG     19.439        PARTICULATES:   0.000

RNG           1         1       1        1         1
B3 CONC     3.315000000000000    1.356300000000000    0.044767600000000    1.720000000000000
0.090000000000000   -0.020000000000000    0.091433834597045
   D.V.M.   0.000     0.000     0.000    0.000    0.000    0.000

S3 CONC    84.424000000000000  408.365000000000000    0.893731000000000    7.773000000000000
19.769000000000000   18.677000000000000   20.083949734988800
   D.V.M.   0.000     0.000     0.000    0.000    0.000    0.000
   GRAMS    3.794    37.972  1249.017    0.330    3.016    1.866   3.064
   GPM      1.059    10.595   348.491    0.092    0.842    0.521   0.855
   MPG     23.326        PARTICULATES:   0.000

WT GPM      1.045    12.939   397.468    0.109    0.619    0.381   0.628
                                 WT MPG    20.410      PARTICULATES:  0.000
```

Figure A-27. Example of Dyno Report

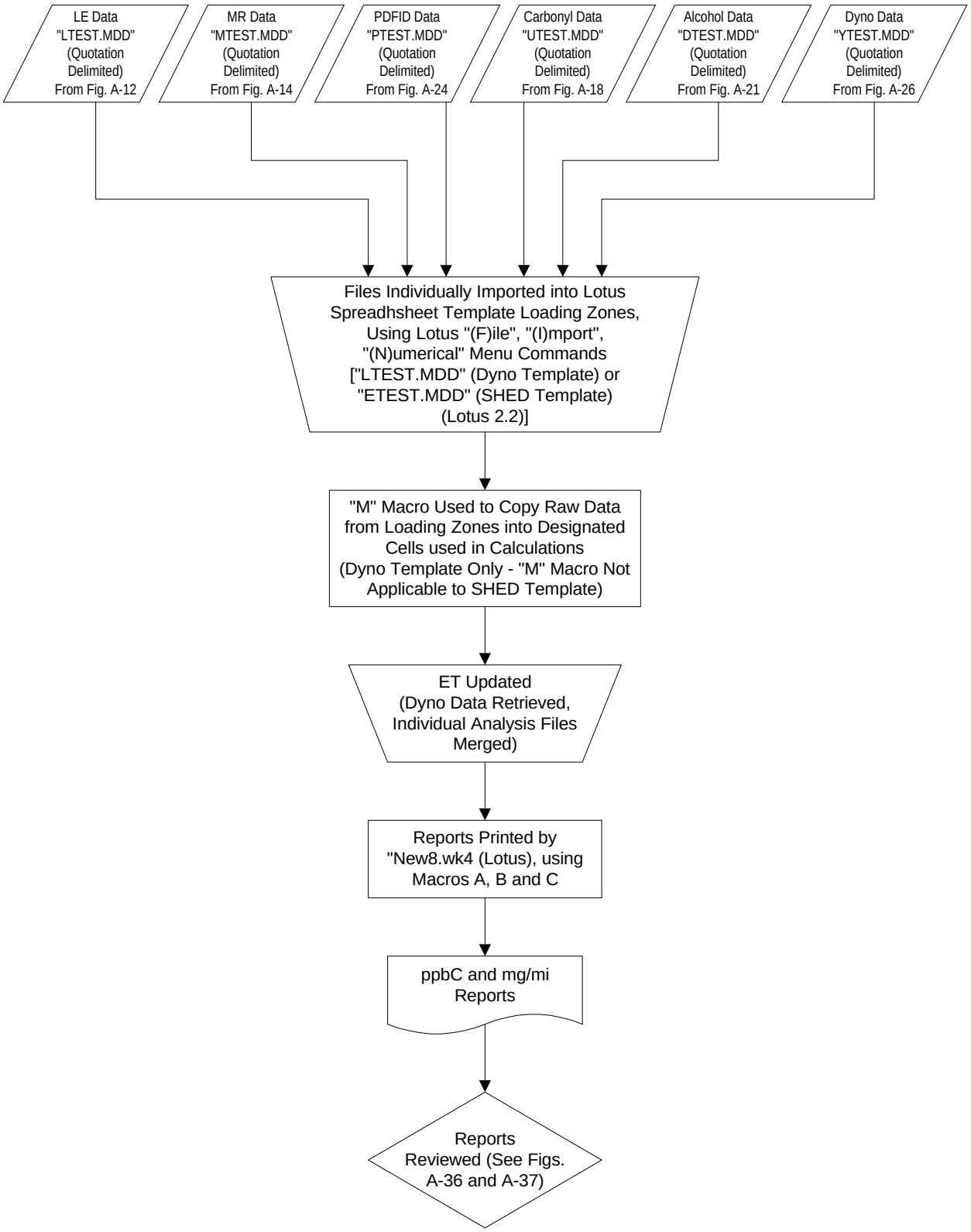


Figure A-28. Data Merging and Report Generation by Spreadsheet

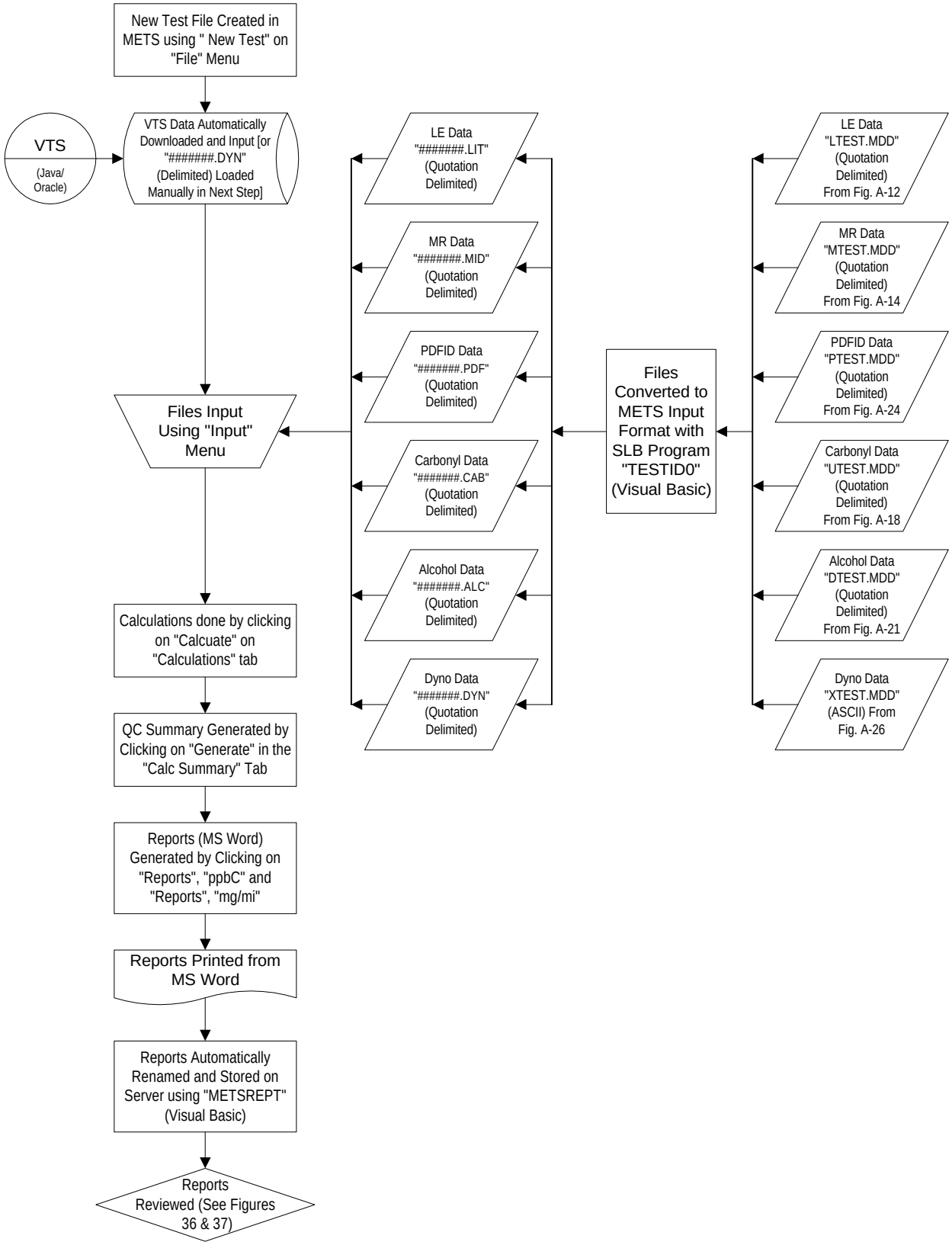


Figure A-29. Data Merging and Report Generation by METS

```
12/2/2002 2:36:47 PM

MLD TEST ID: 200C1
TEST ID:     1006698
TEST DATE:   6/6/2002
PROJECT ID:  2S00C1
VEHICLE ID:  1001866
MLD SEQ NUM: 677

Hydrocarbon/LightEnd/FTP Test:

MTBE Test:
No MTBE detected. MTBE value is atypical for this type of fuel since fuel contains MTBE.
Fuel Type=GN01-COMMERCIAL PHASE 2 GASOLINE, Test Phase=0, MTBE ppbC=, MTBE Bkg ppbC=0

Hydrocarbon/Midrange/FTP Test:

Alcohols/FTP Test:

Alcohols/Methanol/FTP Test:

Alcohols/Ethanol/FTP Test:
-- Relative bag concentration order is unusual for this type of test.

Alcohols/Subtotals/FTP Test:

Carbonyls/FTP Test:

NMHC GC/Min Concentration Test:

NMHC GC/FTP Test:

NMHC DYNO/FTP Test:

NMHC PDFID/FTP Test:

METHANE/DYNO Test:

Methane PDFID/FTP Test:

Dyno Bkg Total Hydrocarbon Test:

Carbonyls/Background Test:

Crossover Test:
-- Does not meet criteria for Crossover Test. 00075-83-2 (2,2-diMbutane) Phase 1
-- Does not meet criteria for Crossover Test. 00075-83-2 (2,2-diMbutane) Phase 2
-- Does not meet criteria for Crossover Test. 00075-83-2 (2,2-diMbutane) Phase 3
-- Does not meet criteria for Crossover Test. 00096-37-7 (MCYpentane) Phase 1
-- Does not meet criteria for Crossover Test. 00096-37-7 (MCYpentane) Phase 2
-- Does not meet criteria for Crossover Test. 00096-37-7 (MCYpentane) Phase 3
-- Does not meet criteria for Crossover Test. 00106-97-8 (n-butane) Phase 1
-- Does not meet criteria for Crossover Test. 00106-97-8 (n-butane) Phase 2
-- Does not meet criteria for Crossover Test. 00106-97-8 (n-butane) Phase 3
-- Does not meet criteria for Crossover Test. 00142-29-0 (CYpentene) Phase 1
-- Does not meet criteria for Crossover Test. 00142-29-0 (CYpentene) Phase 2
-- Does not meet criteria for Crossover Test. 00142-29-0 (CYpentene) Phase 3
-- Does not meet criteria for Crossover Test. 00563-45-1 (3-M-1-butene) Phase 1
-- Does not meet criteria for Crossover Test. 00563-45-1 (3-M-1-butene) Phase 2
-- Does not meet criteria for Crossover Test. 00563-45-1 (3-M-1-butene) Phase 3

GC/FID Checks

Time Checks

Based on GC/FID and Elapsed Time Checks: Recommend 'DATA FOR RECORD' test status.
```

Figure A-30. Example of QC Summary (ppbC)

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 1 Test ID: 1006698 Rev. Date: 11/19/2002

MONITORING AND LABORATORY DIVISION, ORGANIC ANALYSIS LABORATORY REPORT, ppbC

Data Final if Signed. Sr. Chemist Review by _____ Date _____

VEHICLE EMISSIONS ANALYSIS Test Report Status: Data For Record [DFR]

Veh. Year: 1990 Model: GM SEDAN DEVILLE Dyno #: 2
Veh. ID: 1001866 License: 8379PH CA Odometer: 113311
Fuel: GN01/3/1 - COMMERCIAL PHASE 2 GASOLINE

LIGHT-END HYDROCARBONS (MLD Method # 1002) Analysis Date: 06/06/2002
Units: ppbC GC: 7L_8500-LOS

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
00074-84-0	ethane	27	2670	1860	2620
00074-85-1	ethene	41	15800	9830	14500
00074-98-6	propane	45	107	105	127
00115-07-1	propene	23	8190	5530	7690
00075-28-5	methylpropane	9	<L	<L	<L
00074-86-2	ethyne	42	11400	6100	8830
00106-97-8	n-butane	23	1580	1080	1530
00463-49-0	1,2-propadiene	<L	<L	<L	<L
00624-64-6	trans-2-butene	<L	800	487	699
00106-98-9	1-butene	<L	1210	738	1090
00115-11-7	2-methylpropene	29	6890	4750	6770
00590-18-1	cis-2-butene	<L	591	350	517
00463-82-1	2,2-dimethylpropane	<L	28	19	25
00287-92-3	cyclopentane ***	<L	221	132	189
00078-78-4	2-methylbutane	92	9860	6340	8840
00074-99-7	1-propyne	<L	1110	734	1080
00109-66-0	n-pentane ***	39	2220	1400	1960
00590-19-2	1,2-butadiene	<L	57	40	58
00106-99-0	1,3-butadiene	<L	1130	690	995
00563-45-1	3-methyl-1-butene ***	<L	<L	<L	<L
00142-29-0	cyclopentene ***	<L	468	291	403
00646-04-8	trans-2-pentene	<L	262	157	225
00513-35-9	2-methyl-2-butene	<L	468	376	446
00109-67-1	1-pentene	<L	195	119	166
00563-46-2	2-methyl-1-butene	<L	667	433	586
00627-20-3	cis-2-pentene	<L	151	89	130
00689-97-4	1-buten-3-yne	<L	409	267	416
00503-17-3	2-butyne	<L	43	22	37
00075-83-2	2,2-dimethylbutane ***	<L	<L	<L	<L
00096-37-7	methylcyclopentane ***	39	2270	1400	1930
00107-00-6	1-butyne	<L	152	93	149
00079-29-8	2,3-dimethylbutane ***	19	1540	951	1330
00107-83-5	2-methylpentane ***	71	3440	2120	2960
00096-14-0	3-methylpentane ***	42	2190	1340	1880
00110-54-3	n-hexane ***	38	1180	685	952

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 1 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 2 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
	Light-End HC Subtotal	331	63770	40209	57526

*** Measured and reported for record as part of mid-range analysis.
Not counted in light-end subtotal.

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 2 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 3 Test ID: 1006698 Rev. Date: 11/19/2002

MID-RANGE HYDROCARBONS (MLD Method # 1003) Analysis Date: 06/06/2002
Units: ppbC GC: 7M_8498-LOS

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
00106-97-8	n-butane ***	19	825	587	779
00460-12-8	1,3-butadiyne	<L	68	43	53
00563-45-1	3-methyl-1-butene	<L	344	209	286
00078-78-4	2-methylbutane ***	78	9900	6320	8800
00109-66-0	n-pentane	36	2210	1380	1930
00078-79-5	2-methyl-1,3-butadiene	<L	137	86	20
00558-37-2	3,3-dimethyl-1-butene	<L	117	80	104
02004-70-8	trans-1,3-pentadiene	<L	15	<L	<L
00075-83-2	2,2-dimethylbutane	8	1120	698	952
00142-29-0	cyclopentene	<L	118	64	91
00691-37-2	4-methyl-1-pentene	<L	<L	<L	<L
00760-20-3	3-methyl-1-pentene	<L	121	76	105
00287-92-3	cyclopentane	<L	240	157	210
00079-29-8	2,3-dimethylbutane	21	1780	1090	1530
00563-78-0	2,3-dimethyl-1-butene	<L	<L	<L	<L
01634-04-4	methyl-tert-butyl-ether	<L	7220	3980	5000
00691-38-3	4-methyl-cis-2-pentene	<L	<L	<L	<L
00107-83-5	2-methylpentane	148	3620	2280	3130
00674-76-0	4-methyl-trans-2-pentene	<L	149	120	146
00096-14-0	3-methylpentane	34	2010	1260	1720
00592-41-6	1-hexene	<L	69	52	70
00763-29-1	2-methyl-1-pentene	<L	105	63	94
00110-54-3	n-hexane	37	1080	655	905
13269-52-8	trans-3-hexene	<L	61	40	54
07642-09-3	cis-3-hexene	<L	CA	CA	CA
04050-45-7	trans-2-hexene	<L	97	62	85
00625-27-4	2-methyl-2-pentene	<L	<L	<L	<L
00616-12-6	3-methyl-trans-2-pentene	<L	CB	CB	CB
01120-62-3	3-methylcyclopentene	<L	66	41	52
07688-21-3	cis-2-hexene	<L	59	38	47
00922-62-3	3-methyl-cis-2-pentene	<L	17	8	7
00637-92-3	1-ethyl-tert-butyl-ether	<L	<L	<L	<L
00590-35-2	2,2-dimethylpentane	CB	CB	CB	CB
00096-37-7	methylcyclopentane	28	1360	816	1150
00108-08-7	2,4-dimethylpentane	17	2330	1400	1960
00464-06-2	2,2,3-trimethylbutane	<L	89	64	83
07385-78-6	3,4-dimethyl-1-pentene	<L	<L	<L	8
02213-32-3	2,4-dimethyl-1-pentene	<L	19	13	17
00693-89-0	1-methylcyclopentene	CB	CB	CB	CB
00071-43-2	benzene	27	4490	2830	3980
03404-61-3	3-methyl-1-hexene	<L	<L	<L	<L
00562-49-2	3,3-dimethylpentane	<L	171	111	152
00625-65-0	2,4-dimethyl-2-pentene	<L	34	29	35
00110-82-7	cyclohexane	11	631	394	529

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 3 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 4 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
00692-24-0	2-methyl-trans-3-hexene	<L	26	22	24
03683-22-5	4-methyl-trans-2-hexene	<L	32	20	26
00591-76-4	2-methylhexane	13	1540	865	1280
00565-59-3	2,3-dimethylpentane	21	3280	2010	2750
00110-83-8	cyclohexene	<L	63	48	60
00589-34-4	3-methylhexane	15	1780	1060	1490
01759-58-6	t-1,3-diMCYpentane	8	187	117	158
02532-58-3	cis-1,3-dimethylcyclopentane	<L	165	108	143
00617-78-7	3-ethylpentane	<L	162	108	133
00822-50-4	t-1,2-diMCYpentane	8	129	75	111
00540-84-1	2,2,4-trimethylpentane	17	5000	3060	4200
00592-76-7	1-heptene	CA	CA	CA	CA
03899-36-3	3-methyl-trans-3-hexene	<L	<L	16	8
14686-14-7	trans-3-heptene	<L	34	27	26
00142-82-5	n-heptane	<L	1090	637	889
00107-39-1	2,4,4-trimethyl-1-pentene	<L	<L	<L	<L
02738-19-4	2-methyl-2-hexene	<L	<L	33	<L
14686-13-6	trans-2-heptene	16	47	34	46
00816-79-5	3-ethyl-2-pentene	<L	<L	<L	<L
10574-36-4	3-methyl-cis-2-hexene	<L	7	7	<L
10574-37-5	2,3-dimethyl-2-pentene	<L	9	<L	<L
06443-92-1	cis-2-heptene	<L	41	41	55
00108-87-2	methylcyclohexane	18	430	259	351
00590-73-8	2,2-dimethylhexane	<L	131	80	104
00107-40-4	2,4,4-trimethyl-2-pentene	<L	18	15	14
01640-89-7	ethylcyclopentane	<L	79	53	67
00592-13-2	2,5-dimethylhexane	<L	924	554	765
00589-43-5	2,4-dimethylhexane	<L	995	607	836
02815-58-9	1,2,4-trimethylcyclopentane	<L	62	40	48
00563-16-6	3,3-dimethylhexane	<L	67	40	53
15890-40-1	1a,2a,3b-triMCYpentane	<L	31	17	18
00565-75-3	2,3,4-trimethylpentane	<L	1970	1190	1630
00108-88-3	toluene	81	16400	9550	13700
00560-21-4	2,3,3-trimethylpentane	CA	CA	CA	CA
00584-94-1	2,3-dimethylhexane	<L	649	401	549
00592-27-8	2-methylheptane	<L	515	318	434
00589-53-7	4-methylheptane	<L	220	136	187
00583-48-2	3,4-dimethylhexane	<L	178	114	153
00589-81-1	3-methylheptane	<L	609	373	513
00638-04-0	cis-1,3-dimethylcyclohexane	<L	86	54	76
02207-04-7	t-1,4-diMCYhexane	<L	39	34	42
03522-94-9	2,2,5-trimethylhexane	<L	3110	1900	2610
02613-65-2	t-1-M-3-ECYpentane	<L	72	38	55
16747-50-5	c-1-M-3-ECYpentane	<L	<L	42	50
00111-66-0	1-octene	<L	74	44	57
16747-26-5	2,2,4-trimethylhexane	<L	38	12	20

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 4 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 5 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
14850-23-8	trans-4-octene	<L	21	<L	9
00111-65-9	n-octane	<L	392	240	332
13389-42-9	trans-2-octene	<L	13	13	12
02207-03-6	t-1,3-diMCYhexane	<L	62	41	52
16747-30-1	2,4,4-trimethylhexane	<L	69	46	56
07642-04-8	cis-2-octene	<L	60	103	36
01069-53-0	2,3,5-trimethylhexane	11	499	331	420
02213-23-2	2,4-dimethylheptane	<L	84	53	69
02207-01-4	cis-1,2-dimethylcyclohexane	<L	26	16	20
01072-05-5	2,6-dimethylheptane	<L	127	77	103
01678-91-7	ethylcyclohexane	<L	27	16	23
00926-82-9	3,5-dimethylheptane	<L	233	144	199
00100-41-4	ethylbenzene	10	2950	1790	2570
01839-63-0	1,3,5-trimethylcyclohexane	<L	57	42	54
03074-71-3	2,3-dimethylheptane	<L	<L	<L	7
00108-38-3	m-xylene	24	6333	3820	5427
00106-42-3	p-xylene	12	3167	1910	2713
02216-34-4	4-methyloctane	<L	273	203	267
03221-61-2	2-methyloctane	<L	CA	CA	11
02216-33-3	3-methyloctane	<L	161	130	156
00100-42-5	styrene	<L	265	148	153
00095-47-6	o-xylene	17	4000	2460	3460
14720-74-2	2,2,4-trimethylheptane	<L	<L	<L	<L
06236-88-0	1-methyl-4-ethylcyclohexane	<L	21	17	22
02091-95-6	2,2,5-trimethylheptane	<L	321	216	290
00124-11-8	1-nonene	<L	7	12	14
00111-84-2	n-nonane	9	325	225	299
04110-44-5	3,3-dimethyloctane	<L	<L	27	<L
00098-82-8	(1-methylethyl)benzene	<L	16	<L	30
07146-60-3	2,3-dimethyloctane	<L	187	119	163
15869-87-1	2,2-dimethyloctane	<L	189	124	168
15869-89-3	2,5-dimethyloctane	<L	41	27	36
04032-94-4	2,4-dimethyloctane	<L	42	28	36
02051-30-1	2,6-dimethyloctane	<L	34	28	35
00103-65-1	n-propylbenzene	<L	499	312	444
00620-14-4	1-methyl-3-ethylbenzene	9	2090	1340	1880
00622-96-8	1-methyl-4-ethylbenzene	<L	911	585	820
00108-67-8	1,3,5-trimethylbenzene	<L	857	543	756
00871-83-0	2-methylnonane	<L	508	332	444
00611-14-3	1-methyl-2-ethylbenzene	<L	870	561	785
00095-63-6	1,2,4-trimethylbenzene	23	3120	2000	2800
00538-93-2	(2-methylpropyl)benzene	<L	24	14	21
00135-98-8	(1-methylpropyl)benzene	<L	CB	CB	CB
00124-18-5	n-decane	<L	102	67	93
00535-77-3	1-M-3-(1-ME)benzene	<L	36	25	33
00526-73-8	1,2,3-trimethylbenzene	<L	740	494	686
00099-87-6	1-M-4-(1-ME)benzene	<L	43	31	41

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 5 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 6 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
00496-11-7	2,3-dihydroindene (indan)	<L	186	118	188
00527-84-4	1-M-2-(1-ME)benzene	<L	36	29	35
00141-93-5	1,3-diethylbenzene	<L	136	98	133
01074-43-7	1-methyl-3-n-propylbenzene	31	423	334	433
00105-05-5	1,4-diethylbenzene	<L	171	119	163
01074-55-1	1-methyl-4-n-propylbenzene	<L	CA	CA	CA
00934-74-7	1,3-dimethyl-5-ethylbenzene	<L	339	224	324
00135-01-3	1,2-diethylbenzene	<L	22	16	20
01074-17-5	1-methyl-2-n-propylbenzene	<L	121	83	113
01758-88-9	1,4-dimethyl-2-ethylbenzene	<L	270	189	262
00874-41-9	1,3-dimethyl-4-ethylbenzene	<L	202	141	200
00934-80-5	1,2-dimethyl-4-ethylbenzene	<L	345	238	335
02870-04-4	1,3-dimethyl-2-ethylbenzene	<L	115	74	101
01120-21-4	n-undecane (hendecane)	<L	33	15	31
00933-98-2	1,2-dimethyl-3-ethylbenzene	<L	116	55	102
00095-93-2	1,2,4,5-tetramethylbenzene	<L	149	113	158
00527-53-7	1,2,3,5-tetramethylbenzene	<L	196	146	202
01074-92-6	1-(diME)-2-Mbenzene	<L	18	18	23
00874-35-1	5-methylindan	<L	53	40	77
00824-22-6	4-methylindan	<L	36	28	39
16021-20-8	1-ethyl-2-n-propylbenzene	<L	23	20	26
00824-63-5	2-methylindan	<L	59	46	61
00488-23-3	1,2,3,4-tetramethylbenzene	<L	77	61	83
00538-68-1	n-pentylbenzene	<L	16	18	20
01595-11-5	1-methyl-2-n-butylbenzene	<L	26	25	13
00091-20-3	naphthalene	<L	70	55	21
00098-19-1	1-(diME)-3,5-diMbenzene	<L	37	39	116
17171-72-1	1,3-di-n-propylbenzene	<L	28	27	33
00112-40-3	n-dodecane	<L	27	20	28
	Mid-Range HC Subtotal	710	96148	59417	82621
	Ethers Subtotal	<L	7220	3980	5000

*** Measured and reported for record as part of light-end analysis.
Not counted in mid-range subtotal.

CA - Coelutes with compound above.
CB - Coelutes with compound below.
<L - Less than limit of detection.

m- and p-xylene coelute. 0.6666 of the combined peak is assigned to m-xylene.

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 6 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 7 Test ID: 1006698 Rev. Date: 11/19/2002

ALCOHOLS (MLD Method # 1001) Analysis Date: 06/07/2002
Units: ppbC GC#: GC#6128-MLE

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
00067-56-1	methanol	65	772	433	714
00064-17-5	ethanol	57	<L	<L	<L
	Alcohols Subtotal	122	772	433	714

CARBONYLS BACKGROUND(MLD Method # 1004) Analysis Date: 06/07/2002
Units: ppbC HPLC#: #8009-NTC

CAS #	Compound	Bkg 1 ppbC	Bkg 2 ppbC	Bkg 3 ppbC
00050-00-0	formaldehyde	16	21	27
00075-07-0	acetaldehyde	13	17	18
00107-02-8	acrolein (propenal)	<L	<L	<L
00067-64-1	acetone (2-propanone)	57	54	69
00123-38-6	propionaldehyde (propanal)	6	5	8
00123-72-8	butyraldehyde (butanal)	<L	2	<L
00078-93-3	methylethylketone	11	8	10
00078-85-3	methacrolein	<L	<L	<L
00100-52-7	benzaldehyde	<L	<L	<L
04170-30-3	crotonaldehdye	<L	<L	<L
00110-62-3	valeraldehyde	<L	<L	<L
00620-23-5	m-tolualdehyde	<L	9	<L
00066-25-1	hexanal	<L	<L	<L
	Carbonyls Background Subtotal	104	115	132

CAS #	Compound	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
00050-00-0	formaldehyde	3094	2163	2951
00075-07-0	acetaldehyde	919	584	808
00107-02-8	acrolein (propenal)	388	216	349
00067-64-1	acetone (2-propanone)	806	479	702
00123-38-6	propionaldehyde (propanal)	164	95	141
00123-72-8	butyraldehyde (butanal)	120	69	109
00078-93-3	methylethylketone	65	39	56
00078-85-3	methacrolein	387	239	343
00100-52-7	benzaldehyde	861	595	824
04170-30-3	crotonaldehdye	201	117	180
00110-62-3	valeraldehyde	133	49	68
00620-23-5	m-tolualdehyde	1118	755	1021
00066-25-1	hexanal	219	157	176
	Carbonyls Sample Subtotal	8474	5558	7729

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 7 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 8 Test ID: 1006698 Rev. Date: 11/19/2002

GC/DYNO/PDFID COMPARISONS

Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC
Total HC, Test Cell*	3405	181740	112041	157354
NMHC, GC	1041	159918	99626	140147
NMHC, Test Cell*	1246	170950	104942	148776
NMHC, PDFID	1228	164504	99657	143766
Methane, Test Cell*	2159	10790	7099	8578
Methane, PDFID	2238	10579	7044	8551
CO, Test Cell*	2981	935250	300267	424313
NOx, ppb, Test Cell*	90	41481	22027	35000
Dyno THC Bkg.		3219	3441	3555
Dyno CH4 Bkg.		2145	2183	2148
Dyno CO Bkg.		2504	3382	3057
Dyno NOx Bkg.		77	96	95
NMHC, Test Cell, Bkg.		1074	1258	1407

* Background values are the average of individual phase background measurements.

Response Factors	Methane	Methanol	Ethanol	MTBE
Dyno THC	1.165	0.884	0.734	0.760
PDFID		0.714	0.685	0.840
GC				0.831

		Comp. Bkg	Phase 1	Phase 2	Phase 3
GC/FID	NMHC Percent Difference	-16 P	-6 P	-5 P	-6 P
GC/PDFID	NMHC Percent Difference	-15 P	-3 P	0 P	-3 P

P=Passed Criteria; F=Failed Criteria

Pass Criteria: +/- 20% OR 4000 ppbC

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 8 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 9 Test ID: 1006698 Rev. Date: 11/19/2002

IMPINGER AND CARTRIDGE DATA

CARBONYLS (MLD Method # 1004) using Cartridges Analysis Date: 06/07/2002
Units: ug/mL HPLC#: #8009-NTC

CAS #	Compound	Phase 1 ug/mL	Phase 2 ug/mL	Phase 3 ug/mL
00050-00-0	formaldehyde, background	0.040	0.087	0.067
00050-00-0	formaldehyde	7.503	8.991	7.157
00075-07-0	acetaldehyde, background	0.024	0.052	0.033
00075-07-0	acetaldehyde	1.634	1.780	1.437
00107-02-8	acrolein (propenal), background	<L	<L	<L
00107-02-8	acrolein (propenal)	0.585	0.560	0.526
00067-64-1	acetone (2-propanone), background	0.090	0.147	0.109
00067-64-1	acetone (2-propanone)	1.261	1.283	1.098
00123-38-6	propionaldehyde (propanal), backgroun	0.010	0.014	0.012
00123-38-6	propionaldehyde (propanal)	0.257	0.255	0.221
00123-72-8	butyraldehyde (butanal), background	<L	0.004	<L
00123-72-8	butyraldehyde (butanal)	0.175	0.173	0.159
00078-93-3	methylethylketone, background	0.016	0.020	0.015
00078-93-3	methylethylketone	0.094	0.098	0.082
00078-85-3	methacrolein, background	<L	<L	<L
00078-85-3	methacrolein	0.548	0.579	0.485
00100-52-7	benzaldehyde, background	<L	<L	<L
00100-52-7	benzaldehyde	1.054	1.250	1.009
04170-30-3	crotonaldehdye, background	<L	<L	<L
04170-30-3	crotonaldehdye	0.284	0.284	0.255
00110-62-3	valeraldehyde, background	<L	<L	<L
00110-62-3	valeraldehyde	0.185	0.118	0.095
00620-23-5	m-tolualdehyde, background	<L	0.018	<L
00620-23-5	m-tolualdehyde	1.356	1.571	1.239
00066-25-1	hexanal, background	<L	<L	<L
00066-25-1	hexanal	0.295	0.363	0.237

ALCOHOLS (MLD Method # 1001) Analysis Date: 06/07/2002
Units: ug/mL GC#: GC#6128-MLE

CAS #	Compound	Comp. Bkg ug/mL	Phase 1 ug/mL	Phase 2 ug/mL	Phase 3 ug/mL
00067-56-1	methanol, A	0.184	0.581	0.563	0.540
00067-56-1	methanol, B	N/A	<L	<L	<L
00064-17-5	ethanol, A	0.116	<L	<L	<L
00064-17-5	ethanol, B	N/A	<L	<L	<L

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 9 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 10 Test ID: 1006698 Rev. Date: 11/19/2002

ELAPSED TIME BETWEEN SAMPLING AND ANALYSIS

Phase	Light-end HC Hrs.	Mid-range HC Hrs.	Carbonyls Hrs.	Alcohols Hrs.
Indiv. Bkg, Phase 1	N/A	N/A	25.0 P	N/A
Indiv. Bkg, Phase 2	N/A	N/A	26.7 P	N/A
Indiv. Bkg, Phase 3	N/A	N/A	27.6 P	N/A
Composite Bkg.	10.0 P	10.0 P	N/A	13.1 P
Sample, Phase 1	2.7 P	2.7 P	26.3 P	14.1 P
Sample, Phase 2	8.7 P	8.7 P	27.3 P	14.6 P
Sample, Phase 3	5.3 P	5.3 P	28.3 P	14.8 P

P=Passed Criteria; F=Failed Criteria

Pass Criteria: Elapsed time must not exceed the following limits:
(Phase 1 limit for Light-end HC = 8.5 hours for cold start tests only; otherwise 24.5 hours.)

Bkg	24.5	24.5	720.0	144.0
Phase 1	8.5	24.5	720.0	144.0
Phase 2	24.5	24.5	720.0	144.0
Phase 3+	24.5	24.5	720.0	144.0

CARBONYLS AND ALCOHOLS SAMPLE VOLUMES - DEVIATION FROM EXPECTED VALUES

Phase	Carbonyls	Alcohols
Phase 1	1.9% P	1.1% P
Phase 2	1.6% P	1.4% P
Phase 3	1.9% P	1.6% P

P=Passed Criteria; F=Failed Criteria (Possible Sampling Problem)

Pass Criteria: Carbonyl % deviation within +/- 20%
Alcohol % deviation within +/- 20%

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 10 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 11 Test ID: 1006698 Rev. Date: 11/19/2002

COMPLETE CROSSOVER SUMMARY

CAS #	Compound	Comp. Bkg ppbC	Phase 1 ppbC	Phase 2 ppbC	Phase 3 ppbC	
00106-97-8	n-butane	23	1580	1080	1530	
00106-97-8	n-butane ***	19 P	825 F	587 F	779 F	
00287-92-3	cyclopentane ***	<L	221	132	189	
00287-92-3	cyclopentane	<L P	240 P	157 P	210 P	
00078-78-4	2-methylbutane	92	9860	6340	8840	
00078-78-4	2-methylbutane ***	78 P	9900 P	6320 P	8800 P	
00109-66-0	n-pentane ***	39	2220	1400	1960	
00109-66-0	n-pentane	36 P	2210 P	1380 P	1930 P	
00563-45-1	3-methyl-1-butene ***	<L	<L	<L	<L	
00563-45-1	3-methyl-1-butene	<L P	344 F	209 F	286 F	
00142-29-0	cyclopentene ***	<L	468	291	403	
00142-29-0	cyclopentene	<L P	118 F	64 F	91 F	
00075-83-2	2,2-dimethylbutane ***	<L	<L	<L	<L	*
00075-83-2	2,2-dimethylbutane	8 P	1120 F	698 F	952 F	
00096-37-7	methylcyclopentane ***	39	2270	1400	1930	*
00096-37-7	methylcyclopentane	28 P	1360 F	816 F	1150 F	
00079-29-8	2,3-dimethylbutane ***	19	1540	951	1330	**
00079-29-8	2,3-dimethylbutane	21 P	1780 P	1090 P	1530 P	
00107-83-5	2-methylpentane ***	71	3440	2120	2960	**
00107-83-5	2-methylpentane	148 P	3620 P	2280 P	3130 P	
00096-14-0	3-methylpentane ***	42	2190	1340	1880	
00096-14-0	3-methylpentane	34 P	2010 P	1260 P	1720 P	
00110-54-3	n-hexane ***	38	1180	685	952	
00110-54-3	n-hexane	37 P	1080 P	655 P	905 P	

Allowable MR Tolerance: 15%, 25%, 50%, 150 ppbC for LE in range >5000, 1000 to 5000, 100 to 1000 and < 100 ppbC, respectively.

* 2,2-dimethylbutane and methylcyclopentane in the light-end analysis sometimes coelute.

** 2,3-dimethylbutane and 2-methylpentane in the light-end analysis sometimes coelute.

*** Not reported as official data.

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 11 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 12 Test ID: 1006698 Rev. Date: 11/19/2002

SUMMARY OF QC PASS/FAIL CRITERIA

NMHC COMPARISONS:	GC/Dyno FID	GC/PDFID
PHASES PASS:	4	4
PHASES FAIL:	0	0
PHASES N/A:	0	0

CROSSOVER COMPARISONS (not used to determine overall rating):

Crossovers PASS:	33
Crossovers FAIL:	15
Crossovers N/A:	0

ELAPSED TIME CHECKS:	Lightend	Midrange	Carbonyls	Alcohols
Elapsed times PASS:	4	4	6	4
Elapsed times FAIL:	0	0	0	0
Elapsed times N/A:	3	3	1	3

Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 12 of 13

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Project No: 2S00C1          Test No: 200-EC-1            Test Date: 06/06/2002
Page: 13                    Test ID: 1006698             Rev. Date: 11/19/2002

Start of Warning Messages [Test MLD_SEQ_NUM = 677]

Input Files:
Lightend:            Processed Successfully
  11/19/2002 1:01:54 PM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.LIT

Lightend Indiv. Bkg: Not Processed


Midrange:            Processed Successfully
  11/19/2002 1:01:54 PM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.MID

Midrange Indiv. Bkg: Not Processed


Alcohol:             Processed Successfully
  8/1/2002 8:28:04 AM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.ALC

Carbonyl:            Processed Successfully
  11/19/2002 1:01:54 PM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.CAB

PDFID:               Processed Successfully
  8/1/2002 8:31:40 AM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.PDF

MVDAS:               Processed Successfully
  8/1/2002 8:32:06 AM  VTS


End of Warning Messages
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Figure A-31. Example of Motor Vehicle Emissions Report (ppbC), Page 13 of 13

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 1 Test ID: 1006698 Rev. Date: 11/19/2002

MONITORING AND LABORATORY DIVISION, ORGANIC ANALYSIS LABORATORY REPORT, mg/mi

VEHICLE EMISSIONS ANALYSIS Test Report Status: Data For Record [DFR]

Veh. Year: 1990 Model: GM SEDAN DEVILLE Dyno #: 2
Veh. ID: 1001866 License: 8379PH CA Odometer: 113311
Fuel: GN01/3/1 - COMMERCIAL PHASE 2 GASOLINE

LIGHT-END HYDROCARBONS (MLD Method # 1002) Analysis Date: 06/06/2002
Units: mg/mile GC: 7L_8500-LOS

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
00074-84-0	ethane	38.20	36.44	40.22	35.72
00074-85-1	ethene	196.75	202.55	200.27	185.70
00074-98-6	propane	1.20	0.90	1.35	1.15
00115-07-1	propene	107.18	104.97	112.67	98.47
00075-28-5	methylpropane	<L	<L	<L	<L
00074-86-2	ethyne	116.47	135.51	115.06	104.78
00106-97-8	n-butane	21.44	20.76	22.43	20.07
00463-49-0	1,2-propadiene	<L	<L	<L	<L
00624-64-6	trans-2-butene	9.76	10.28	9.96	8.98
00106-98-9	1-butene	14.89	15.55	15.09	14.00
00115-11-7	2-methylpropene	92.11	88.20	96.60	86.59
00590-18-1	cis-2-butene	7.11	7.59	7.16	6.64
00463-82-1	2,2-dimethylpropane	0.37	0.37	0.40	0.33
00078-78-4	2-methylbutane	126.74	129.25	131.59	115.66
00074-99-7	1-propyne	13.85	13.58	14.29	13.20
00590-19-2	1,2-butadiene	0.75	0.71	0.79	0.72
00106-99-0	1,3-butadiene	13.33	14.00	13.61	12.32
00646-04-8	trans-2-pentene	3.15	3.37	3.21	2.89
00513-35-9	2-methyl-2-butene	6.80	6.01	7.69	5.73
00109-67-1	1-pentene	2.37	2.51	2.43	2.13
00563-46-2	2-methyl-1-butene	8.43	8.57	8.86	7.52
00627-20-3	cis-2-pentene	1.80	1.94	1.82	1.67
00689-97-4	1-buten-3-yne	5.00	4.88	5.07	4.96
00503-17-3	2-butyne	0.46	0.53	0.43	0.46
00107-00-6	1-butyne	1.85	1.88	1.83	1.84
	Light-End HC Subtotal	790.01	810.33	812.84	731.53

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 1 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 2 Test ID: 1006698 Rev. Date: 11/19/2002

MID-RANGE HYDROCARBONS (MLD Method # 1003) Analysis Date: 06/06/2002
Units: mg/mile GC: 7M_8498-LOS

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
00460-12-8	1,3-butadiyne	0.73	0.78	0.78	0.61
00563-45-1	3-methyl-1-butene	4.14	4.42	4.27	3.67
00109-66-0	n-pentane	27.53	28.79	28.33	25.06
00078-79-5	2-methyl-1,3-butadiene	1.31	1.71	1.71	0.25
00558-37-2	3,3-dimethyl-1-butene	1.53	1.50	1.64	1.34
02004-70-8	trans-1,3-pentadiene	0.04	0.19	<L	<L
00075-83-2	2,2-dimethylbutane	13.94	14.64	14.46	12.42
00142-29-0	cyclopentene	1.28	1.47	1.27	1.13
00691-37-2	4-methyl-1-pentene	<L	<L	<L	<L
00760-20-3	3-methyl-1-pentene	1.50	1.55	1.55	1.35
00287-92-3	cyclopentane	3.04	3.08	3.21	2.70
00079-29-8	2,3-dimethylbutane	21.87	23.17	22.42	19.86
00563-78-0	2,3-dimethyl-1-butene	<L	<L	<L	<L
01634-04-4	methyl-tert-butyl-ether	99.34	116.60	102.32	80.69
00691-38-3	4-methyl-cis-2-pentene	<L	<L	<L	<L
00107-83-5	2-methylpentane	43.56	45.88	44.85	39.37
00674-76-0	4-methyl-trans-2-pentene	2.18	1.91	2.45	1.87
00096-14-0	3-methylpentane	24.82	26.04	25.72	22.21
00592-41-6	1-hexene	0.98	0.89	1.06	0.90
00763-29-1	2-methyl-1-pentene	1.28	1.35	1.29	1.21
00110-54-3	n-hexane	12.73	13.77	12.99	11.45
13269-52-8	trans-3-hexene	0.78	0.78	0.82	0.69
07642-09-3	cis-3-hexene	CA	CA	CA	CA
04050-45-7	trans-2-hexene	1.22	1.25	1.27	1.09
00625-27-4	2-methyl-2-pentene	<L	<L	<L	<L
00616-12-6	3-methyl-trans-2-pentene	CB	CB	CB	CB
01120-62-3	3-methylcyclopentene	0.77	0.83	0.82	0.65
07688-21-3	cis-2-hexene	0.73	0.76	0.78	0.60
00922-62-3	3-methyl-cis-2-pentene	0.15	0.22	0.16	0.09
00637-92-3	1-ethyl-tert-butyl-ether	<L	<L	<L	<L
00590-35-2	2,2-dimethylpentane	CB	CB	CB	CB
00096-37-7	methylcyclopentane	15.89	17.15	16.15	14.44
00108-08-7	2,4-dimethylpentane	28.26	30.35	28.89	25.48
00464-06-2	2,2,3-trimethylbutane	1.23	1.17	1.34	1.09
07385-78-6	3,4-dimethyl-1-pentene	0.03	<L	<L	0.10
02213-32-3	2,4-dimethyl-1-pentene	0.25	0.24	0.27	0.22
00693-89-0	1-methylcyclopentene	CB	CB	CB	CB
00071-43-2	benzene	51.57	53.26	53.24	47.14
03404-61-3	3-methyl-1-hexene	<L	<L	<L	<L
00562-49-2	3,3-dimethylpentane	2.21	2.24	2.32	1.99
00625-65-0	2,4-dimethyl-2-pentene	0.52	0.44	0.59	0.45
00110-82-7	cyclohexane	7.55	7.98	7.85	6.66

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 2 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 3 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
00692-24-0	2-methyl-trans-3-hexene	0.39	0.33	0.45	0.31
03683-22-5	4-methyl-trans-2-hexene	0.39	0.41	0.41	0.33
00591-76-4	2-methylhexane	17.94	20.04	17.80	16.62
00565-59-3	2,3-dimethylpentane	40.22	42.76	41.55	35.78
00110-83-8	cyclohexene	0.87	0.79	0.96	0.75
00589-34-4	3-methylhexane	21.43	23.17	21.83	19.35
01759-58-6	t-1,3-diMCYpentane	2.17	2.31	2.24	1.93
02532-58-3	cis-1,3-dimethylcyclopentane	2.09	2.12	2.21	1.84
00617-78-7	3-ethylpentane	2.09	2.12	2.25	1.74
00822-50-4	t-1,2-diMCYpentane	1.41	1.57	1.38	1.33
00540-84-1	2,2,4-trimethylpentane	61.37	65.20	63.38	54.70
00592-76-7	1-heptene	CA	CA	CA	CA
03899-36-3	3-methyl-trans-3-hexene	0.20	<L	0.33	0.10
14686-14-7	trans-3-heptene	0.47	0.44	0.55	0.33
00142-82-5	n-heptane	13.05	14.29	13.30	11.65
00107-39-1	2,4,4-trimethyl-1-pentene	<L	<L	<L	<L
02738-19-4	2-methyl-2-hexene	0.35	<L	0.67	<L
14686-13-6	trans-2-heptene	0.40	0.42	0.39	0.40
00816-79-5	3-ethyl-2-pentene	<L	<L	<L	<L
10574-36-4	3-methyl-cis-2-hexene	0.09	0.09	0.14	<L
10574-37-5	2,3-dimethyl-2-pentene	0.02	0.12	<L	<L
06443-92-1	cis-2-heptene	0.74	0.53	0.84	0.71
00108-87-2	methylcyclohexane	4.85	5.32	4.95	4.30
00590-73-8	2,2-dimethylhexane	1.59	1.71	1.67	1.36
00107-40-4	2,4,4-trimethyl-2-pentene	0.26	0.23	0.31	0.18
01640-89-7	ethylcyclopentane	1.01	1.02	1.08	0.86
00592-13-2	2,5-dimethylhexane	11.23	12.09	11.53	10.00
00589-43-5	2,4-dimethylhexane	12.25	13.01	12.64	10.93
02815-58-9	1,2,4-trimethylcyclopentane	0.76	0.80	0.82	0.62
00563-16-6	3,3-dimethylhexane	0.80	0.88	0.83	0.69
15890-40-1	1a,2a,3b-triMCYpentane	0.33	0.40	0.35	0.23
00565-75-3	2,3,4-trimethylpentane	24.03	25.77	24.78	21.31
00108-88-3	toluene	180.11	196.88	181.85	164.19
00560-21-4	2,3,3-trimethylpentane	CA	CA	CA	CA
00584-94-1	2,3-dimethylhexane	8.06	8.49	8.35	7.18
00592-27-8	2-methylheptane	6.38	6.74	6.62	5.67
00589-53-7	4-methylheptane	2.73	2.88	2.83	2.44
00583-48-2	3,4-dimethylhexane	2.26	2.33	2.37	2.00
00589-81-1	3-methylheptane	7.52	7.97	7.77	6.71
00638-04-0	cis-1,3-dimethylcyclohexane	1.07	1.11	1.10	0.98
02207-04-7	t-1,4-diMCYhexane	0.61	0.50	0.70	0.54
03522-94-9	2,2,5-trimethylhexane	38.22	40.60	39.48	34.05
02613-65-2	t-1-M-3-ECYpentane	0.79	0.93	0.78	0.71
16747-50-5	c-1-M-3-ECYpentane	0.62	<L	0.86	0.64
00111-66-0	1-octene	0.86	0.95	0.90	0.73

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 3 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 4 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
16747-26-5	2,2,4-trimethylhexane	0.30	0.50	0.25	0.26
14850-23-8	trans-4-octene	0.09	0.27	<L	0.12
00111-65-9	n-octane	4.84	5.13	5.00	4.34
13389-42-9	trans-2-octene	0.21	0.17	0.27	0.15
02207-03-6	t-1,3-diMCYhexane	0.78	0.80	0.84	0.67
16747-30-1	2,4,4-trimethylhexane	0.88	0.90	0.96	0.73
07642-04-8	cis-2-octene	1.38	0.77	2.11	0.46
01069-53-0	2,3,5-trimethylhexane	6.25	6.39	6.66	5.35
02213-23-2	2,4-dimethylheptane	1.05	1.10	1.10	0.90
02207-01-4	cis-1,2-dimethylcyclohexane	0.31	0.33	0.33	0.26
01072-05-5	2,6-dimethylheptane	1.54	1.66	1.60	1.34
01678-91-7	ethylcyclohexane	0.32	0.35	0.33	0.30
00926-82-9	3,5-dimethylheptane	2.89	3.04	2.99	2.60
00100-41-4	ethylbenzene	33.81	35.75	34.46	31.11
01839-63-0	1,3,5-trimethylcyclohexane	0.79	0.73	0.86	0.69
03074-71-3	2,3-dimethylheptane	0.03	<L	<L	0.09
00108-38-3	m-xylene	72.01	76.73	73.49	65.66
00106-42-3	p-xylene	36.01	38.37	36.74	32.83
02216-34-4	4-methyloctane	3.88	3.56	4.22	3.48
03221-61-2	2-methyloctane	0.04	CA	CA	0.14
02216-33-3	3-methyloctane	2.39	2.10	2.70	2.04
00100-42-5	styrene	2.61	3.16	2.81	1.82
00095-47-6	o-xylene	46.04	48.44	47.30	41.84
14720-74-2	2,2,4-trimethylheptane	<L	<L	<L	<L
06236-88-0	1-methyl-4-ethylcyclohexane	0.31	0.27	0.35	0.28
02091-95-6	2,2,5-trimethylheptane	4.23	4.18	4.48	3.78
00124-11-8	1-nonene	0.20	0.09	0.25	0.18
00111-84-2	n-nonane	4.23	4.14	4.50	3.79
04110-44-5	3,3-dimethyloctane	0.29	<L	0.56	<L
00098-82-8	(1-methylethyl)benzene	0.14	0.20	<L	0.37
07146-60-3	2,3-dimethyloctane	2.37	2.44	2.47	2.12
15869-87-1	2,2-dimethyloctane	2.44	2.46	2.57	2.19
15869-89-3	2,5-dimethyloctane	0.53	0.53	0.56	0.47
04032-94-4	2,4-dimethyloctane	0.54	0.55	0.58	0.47
02051-30-1	2,6-dimethyloctane	0.52	0.44	0.58	0.46
00103-65-1	n-propylbenzene	5.90	6.10	6.08	5.43
00620-14-4	1-methyl-3-ethylbenzene	25.00	25.47	25.93	22.88
00622-96-8	1-methyl-4-ethylbenzene	10.97	11.15	11.39	10.02
00108-67-8	1,3,5-trimethylbenzene	10.19	10.48	10.57	9.24
00871-83-0	2-methylnonane	6.53	6.62	6.89	5.78
00611-14-3	1-methyl-2-ethylbenzene	10.50	10.64	10.92	9.60
00095-63-6	1,2,4-trimethylbenzene	37.15	37.92	38.53	33.97
00538-93-2	(2-methylpropyl)benzene	0.27	0.30	0.27	0.26
00135-98-8	(1-methylpropyl)benzene	CB	CB	CB	CB
00124-18-5	n-decane	1.33	1.33	1.39	1.21

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 4 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 5 Test ID: 1006698 Rev. Date: 11/19/2002

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
00535-77-3	1-M-3-(1-ME)benzene	0.46	0.44	0.49	0.41
00526-73-8	1,2,3-trimethylbenzene	9.16	9.05	9.62	8.39
00099-87-6	1-M-4-(1-ME)benzene	0.56	0.53	0.61	0.50
00496-11-7	2,3-dihydroindene (indan)	2.25	2.24	2.26	2.26
00527-84-4	1-M-2-(1-ME)benzene	0.50	0.44	0.57	0.43
00141-93-5	1,3-diethylbenzene	1.79	1.67	1.92	1.63
01074-43-7	1-methyl-3-n-propylbenzene	5.47	4.86	5.97	4.97
00105-05-5	1,4-diethylbenzene	2.19	2.10	2.33	2.00
01074-55-1	1-methyl-4-n-propylbenzene	CA	CA	CA	CA
00934-74-7	1,3-dimethyl-5-ethylbenzene	4.23	4.17	4.38	3.98
00135-01-3	1,2-diethylbenzene	0.29	0.27	0.31	0.25
01074-17-5	1-methyl-2-n-propylbenzene	1.53	1.49	1.62	1.39
01758-88-9	1,4-dimethyl-2-ethylbenzene	3.49	3.32	3.70	3.22
00874-41-9	1,3-dimethyl-4-ethylbenzene	2.62	2.48	2.76	2.46
00934-80-5	1,2-dimethyl-4-ethylbenzene	4.42	4.24	4.66	4.12
02870-04-4	1,3-dimethyl-2-ethylbenzene	1.38	1.41	1.45	1.24
01120-21-4	n-undecane (hendecane)	0.36	0.43	0.31	0.40
00933-98-2	1,2-dimethyl-3-ethylbenzene	1.20	1.43	1.08	1.25
00095-93-2	1,2,4,5-tetramethylbenzene	2.06	1.83	2.21	1.94
00527-53-7	1,2,3,5-tetramethylbenzene	2.66	2.41	2.86	2.48
01074-92-6	1-(diME)-2-Mbenzene	0.31	0.22	0.35	0.28
00874-35-1	5-methylindan	0.79	0.64	0.77	0.93
00824-22-6	4-methylindan	0.50	0.44	0.54	0.47
16021-20-8	1-ethyl-2-n-propylbenzene	0.35	0.28	0.39	0.32
00824-63-5	2-methylindan	0.81	0.71	0.89	0.74
00488-23-3	1,2,3,4-tetramethylbenzene	1.09	0.95	1.19	1.02
00538-68-1	n-pentylbenzene	0.29	0.20	0.35	0.25
01595-11-5	1-methyl-2-n-butylbenzene	0.37	0.32	0.49	0.16
00091-20-3	naphthalene	0.77	0.82	1.03	0.25
00098-19-1	1-(diME)-3,5-diMbenzene	0.89	0.46	0.77	1.44
17171-72-1	1,3-di-n-propylbenzene	0.46	0.35	0.53	0.41
00112-40-3	n-dodecane	0.39	0.35	0.41	0.36
	Mid-Range HC Subtotal	1141.39	1201.24	1176.48	1029.91
	Ethers Subtotal	99.34	116.60	102.32	80.69

CA - Coelutes with compound above.
CB - Coelutes with compound below.
<L - Less than limit of detection.

m- and p-xylene coelute. 0.6666 of the combined peak is assigned to m-xylene.

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 5 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 6 Test ID: 1006698 Rev. Date: 11/19/2002

ALCOHOLS (MLD Method # 1001) Analysis Date: 06/07/2002
Units: mg/mi GC: GC#6128-MLE

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
00067-56-1	methanol	18.64	20.95	17.42	19.20
00064-17-5	ethanol	<L	<L	<L	<L
	Alcohols Subtotal	18.64	20.95	17.42	19.20

CARBONYLS (MLD Method # 1004) Analysis Date: 06/07/2002
Units: mg/mi HPLC: #8009-NTC

CAS #	Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
00050-00-0	formaldehyde	88.27	84.70	93.84	80.44
00075-07-0	acetaldehyde	17.62	18.29	18.24	15.95
00107-02-8	acrolein (propenal)	6.07	6.64	5.90	5.96
00067-64-1	acetone (2-propanone)	12.15	13.40	12.08	11.33
00123-38-6	propionaldehyde (propanal)	2.56	2.81	2.55	2.38
00123-72-8	butyraldehyde (butanal)	1.83	1.98	1.78	1.80
00078-93-3	methylethylketone	0.83	0.91	0.84	0.78
00078-85-3	methacrolein	5.96	6.22	6.10	5.50
00100-52-7	benzaldehyde	12.44	11.96	13.16	11.44
04170-30-3	crotonaldehdye	3.01	3.22	2.99	2.89
00110-62-3	valeraldehyde	1.37	2.10	1.24	1.08
00620-23-5	m-tolualdehyde	15.53	15.38	16.37	14.04
00066-25-1	hexanal	3.41	3.35	3.82	2.69
	Carbonyls Subtotal	171.05	170.95	178.91	156.27

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 6 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 7 Test ID: 1006698 Rev. Date: 11/19/2002

GC/DYNO/PDFID COMPARISONS

Compound	Weighted mg/mi	Phase 1 mg/mi	Phase 2 mg/mi	Phase 3 mg/mi
NMOG, GC	2220.43	2320.07	2287.97	2017.60
NMOG, Test Cell	2358.33	2489.41	2417.79	2147.09
NMOG, PDFID	2268.13	2404.93	2310.44	2084.96
Total Reactivity(O3 mg/mi)	8621.82	8817.80	8917.47	7915.14
Specific Reactivity(O3/NMOG)	3.883	3.801	3.898	3.923
Total HC, Test Cell	2169.67	2294.66	2222.40	1975.70
Methane, Test Cell	114.96	130.30	118.29	97.11
Methane, PDFID	112.34	125.97	115.80	95.50
Ethers, GC	99.34	116.60	102.32	80.69
Alcohols, GC	18.64	20.95	17.42	19.20
Carbonyls, HPLC	171.05	170.95	178.91	156.27
NMHC, GC	1931.40	2011.57	1989.32	1761.43
NMHC, Test Cell	2069.30	2180.91	2119.13	1890.92
NMHC, PDFID	1979.10	2096.44	2011.79	1828.80
CO, Test Cell	14213.84	23939.86	12134.78	10808.01
CO2, Test Cell	466878	485342	489572	410051
NOX, Test Cell	1527.86	1745.23	1471.57	1470.32
MPG Actual	17.33	16.21	16.67	19.84
MPG Gasoline Equivalent	17.30	16.18	16.64	19.81

Response Factors	Methane	Methanol	Ethanol	MTBE
Dyno THC	1.165	0.884	0.734	0.760
PDFID		0.714	0.685	0.840
GC				0.831

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 7 of 9

Project No: 2S00C1 Test No: 200-EC-1 Test Date: 06/06/2002
Page: 8 Test ID: 1006698 Rev. Date: 11/19/2002

ELAPSED TIME BETWEEN SAMPLING AND ANALYSIS

Phase	Light-end HC Hrs.	Mid-range HC Hrs.	Carbonyls Hrs.	Alcohols Hrs.
Indiv. Bkg, Phase 1	N/A	N/A	25.0 P	N/A
Indiv. Bkg, Phase 2	N/A	N/A	26.7 P	N/A
Indiv. Bkg, Phase 3	N/A	N/A	27.6 P	N/A
Composite Bkg.	10.0 P	10.0 P	N/A	13.1 P
Sample, Phase 1	2.7 P	2.7 P	26.3 P	14.1 P
Sample, Phase 2	8.7 P	8.7 P	27.3 P	14.6 P
Sample, Phase 3	5.3 P	5.3 P	28.3 P	14.8 P

P=Passed Criteria; F=Failed Criteria

Pass Criteria: Elapsed time must not exceed the following limits:
(Phase 1 limit for Light-end HC = 8.5 hours for cold start tests only; otherwise 24.5 hours.)

Bkg	24.5	24.5	720.0	144.0
Phase 1	8.5	24.5	720.0	144.0
Phase 2	24.5	24.5	720.0	144.0
Phase 3+	24.5	24.5	720.0	144.0

Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 8 of 9

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Project No: 2S00C1          Test No: 200-EC-1            Test Date: 06/06/2002
Page: 9                     Test ID: 1006698             Rev. Date: 11/19/2002

Start of Warning Messages [Test MLD_SEQ_NUM = 677]

Input Files:
Lightend:            Processed Successfully
  11/19/2002 1:01:54 PM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.LIT

Lightend Indiv. Bkg: Not Processed


Midrange:            Processed Successfully
  11/19/2002 1:01:54 PM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.MID

Midrange Indiv. Bkg: Not Processed


Alcohol:             Processed Successfully
  8/1/2002 8:28:04 AM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.ALC

Carbonyl:            Processed Successfully
  11/19/2002 1:01:54 PM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.CAB

PDFID:               Processed Successfully
  8/1/2002 8:31:40 AM  G:\VEDS\PRODUCTION DATA\METS\2002 TESTS\1006698\1006698.PDF

MVDAS:               Processed Successfully
  8/1/2002 8:32:06 AM  VTS


End of Warning Messages
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Figure A-32. Example of Motor Vehicle Emissions Report (mg/mile), Page 9 of 9

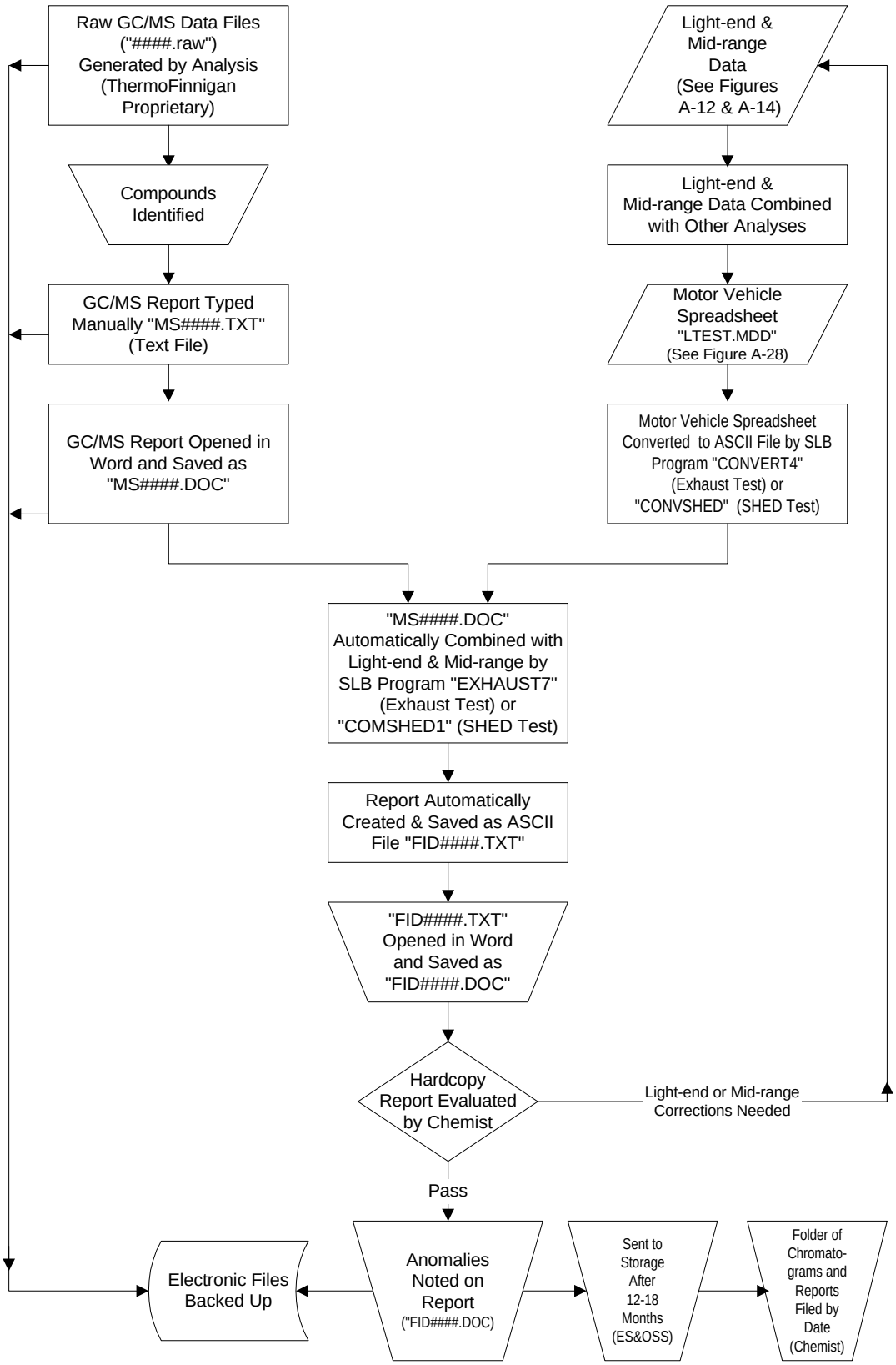

Figure A-33. GC/MS Reporting and Automated Comparison Report

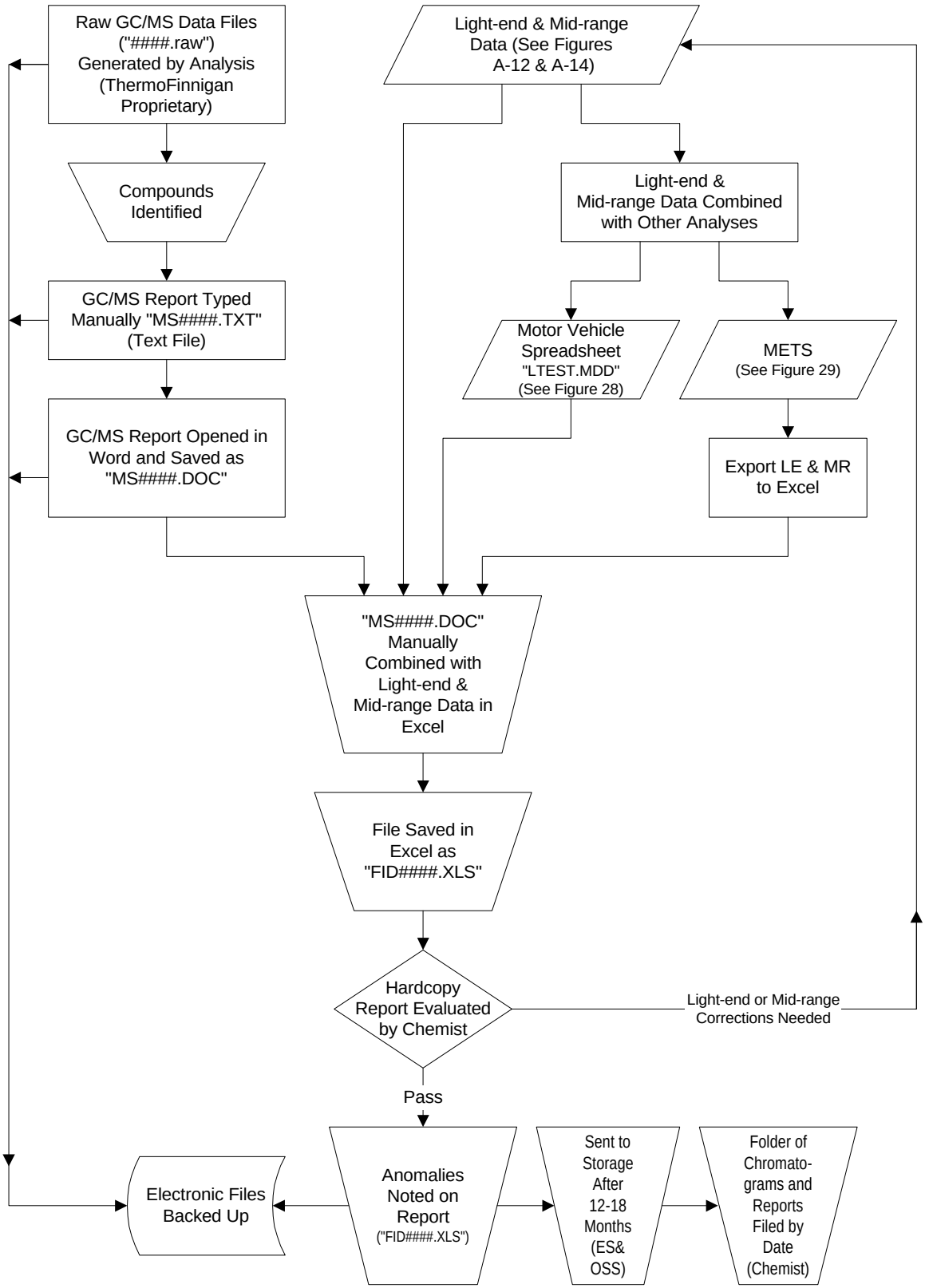

Figure A-34. GC/MS Reporting and Manual Comparison Report

GC/FID AND GC/MS DATA COMPARSION

Project:	NA	Sample:	Cylinder ALM041223
Test Number:	Audit	Vehicle:	NA
Test Date:	8/14/02	Fuel:	NA
Reference File:	GC/MS # 3294		

The following compounds were identified and are listed in order of their retention times:

Molecular Formula	CAS Number	Compound	GC/FID (ppbC)	GCMS Peak Size (3=high)	Remarks
C3H6	00115-07-1	1-propene	608	2	
C3H8	00074-98-6	propane	1862	3	
C4H8	00106-98-9	1-butene	323	2	
C4H10	00106-97-8	n-butane	1311	3	
C5H12	00078-78-4	2-methylbutane	1490	3	
C5H12	00109-66-0	n-pentane	739	3	
C6H14	00079-29-8	2,3-dimethylbutane	547	3	
C6H14	00107-83-5	2-methylpentane	967	3	
C6H14	00110-54-3	n-hexane	533	3	
C6H12	00096-37-7	methylcyclopentane	403	2	
C6H6	00071-43-2	benzene	966	3	
C7H16	00589-34-4	3-methylhexane	315	2	
C8H18	00540-84-1	2,2,4-trimethylpentane	795	3	
C7H14	00108-87-2	methylcyclohexane	298	2	
C8H18	00590-73-8	2,2-dimethylhexane	311	2	
C7H8	00108-88-3	methylbenzene (toluene)	1542	3	
C8H18	00111-65-9	n-octane	310	2	
C8H10	00100-41-4	ethylbenzene	567	3	
C8H10	00108-38-3	m/p-xylene	1328	3	
C8H10	00095-47-6	o-xylene	529	3	
C9H12	00095-63-6	1,2,4-trimethylbenzene	339	2	
C10H22	00124-18-5	n-decane	452	3	

Figure A-35. Example of GC/MS – GC/FID Comparison Report

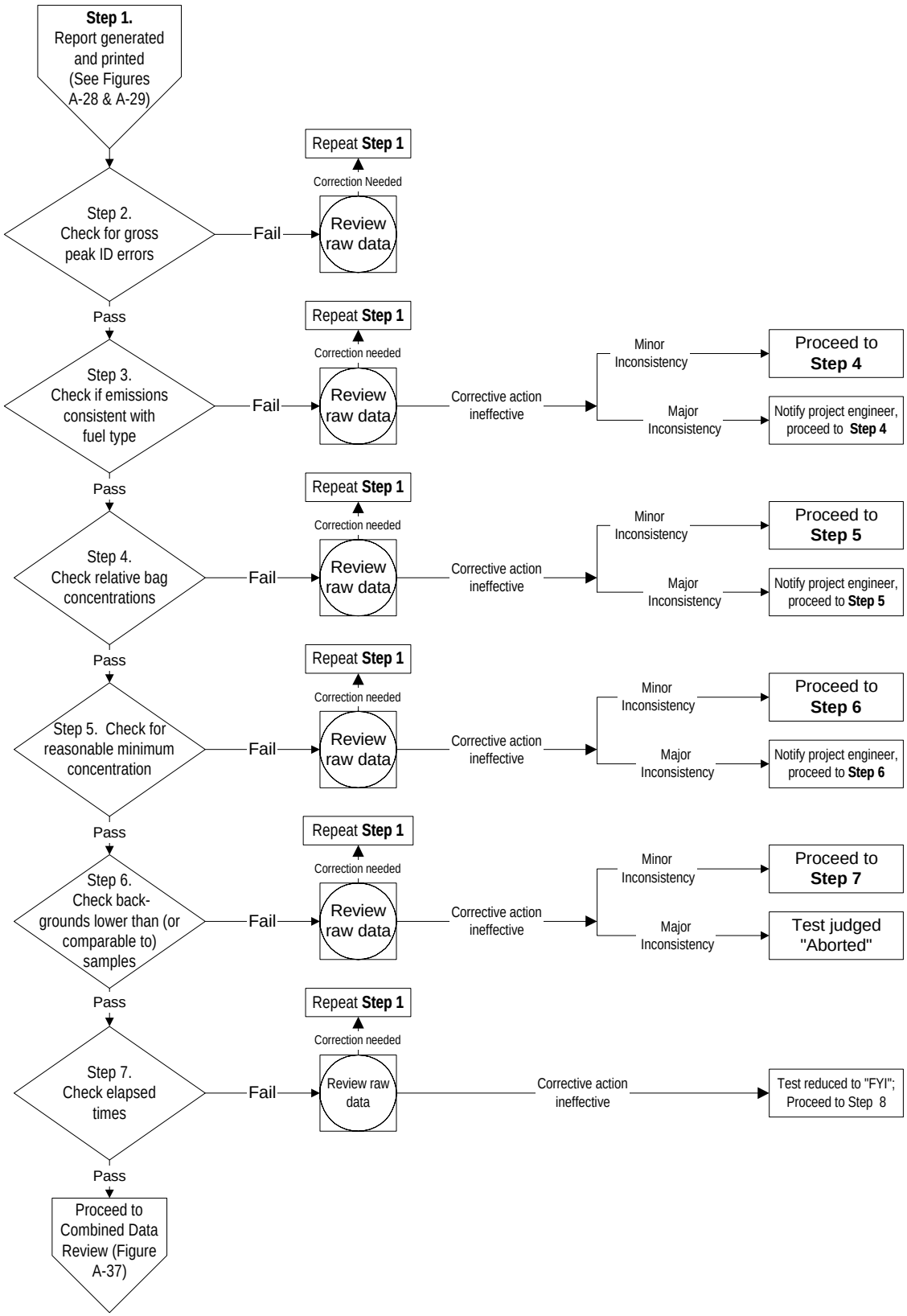

Figure A-36. Data Review – OAS Portion

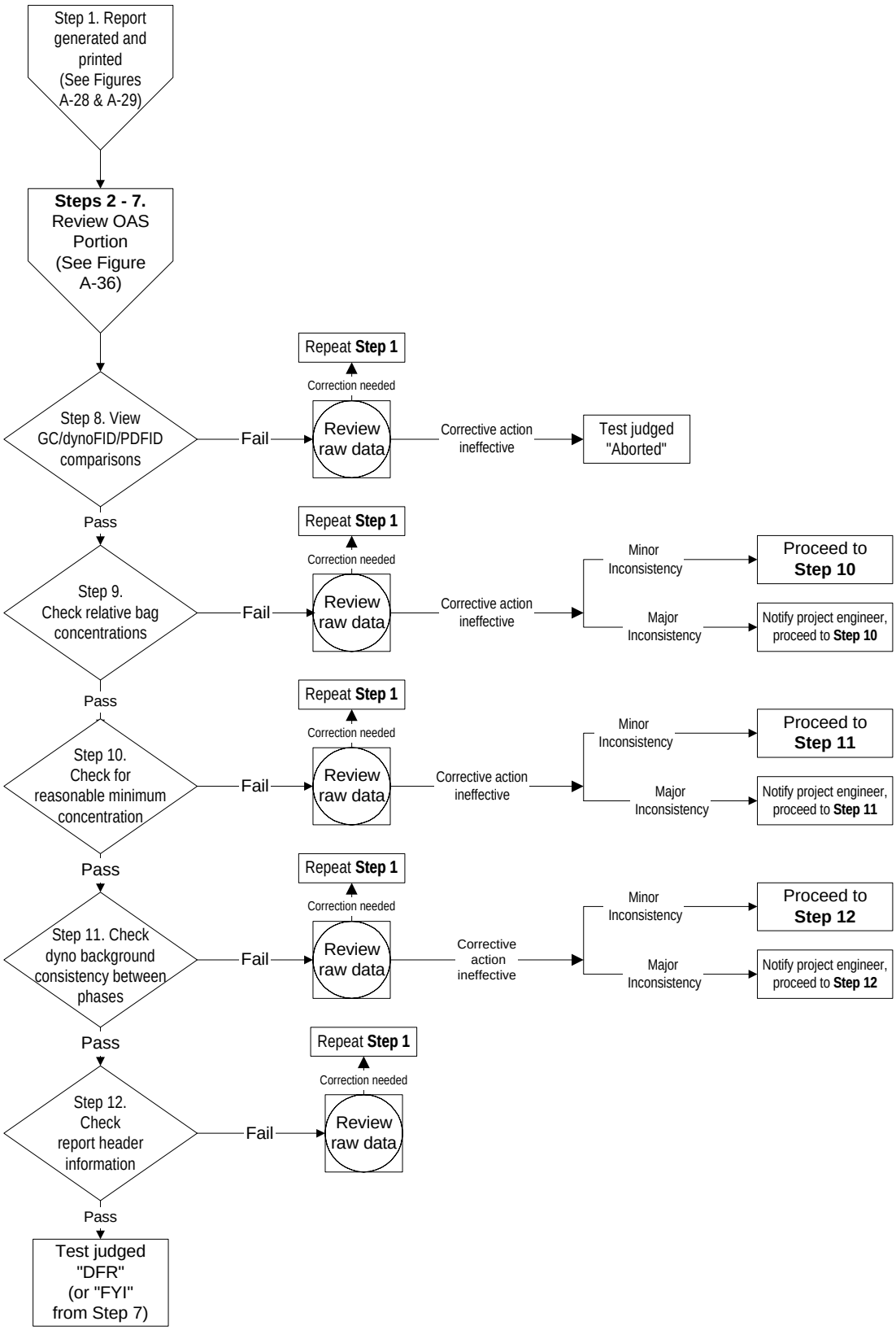

Figure A-37. Data Review – Combined Data

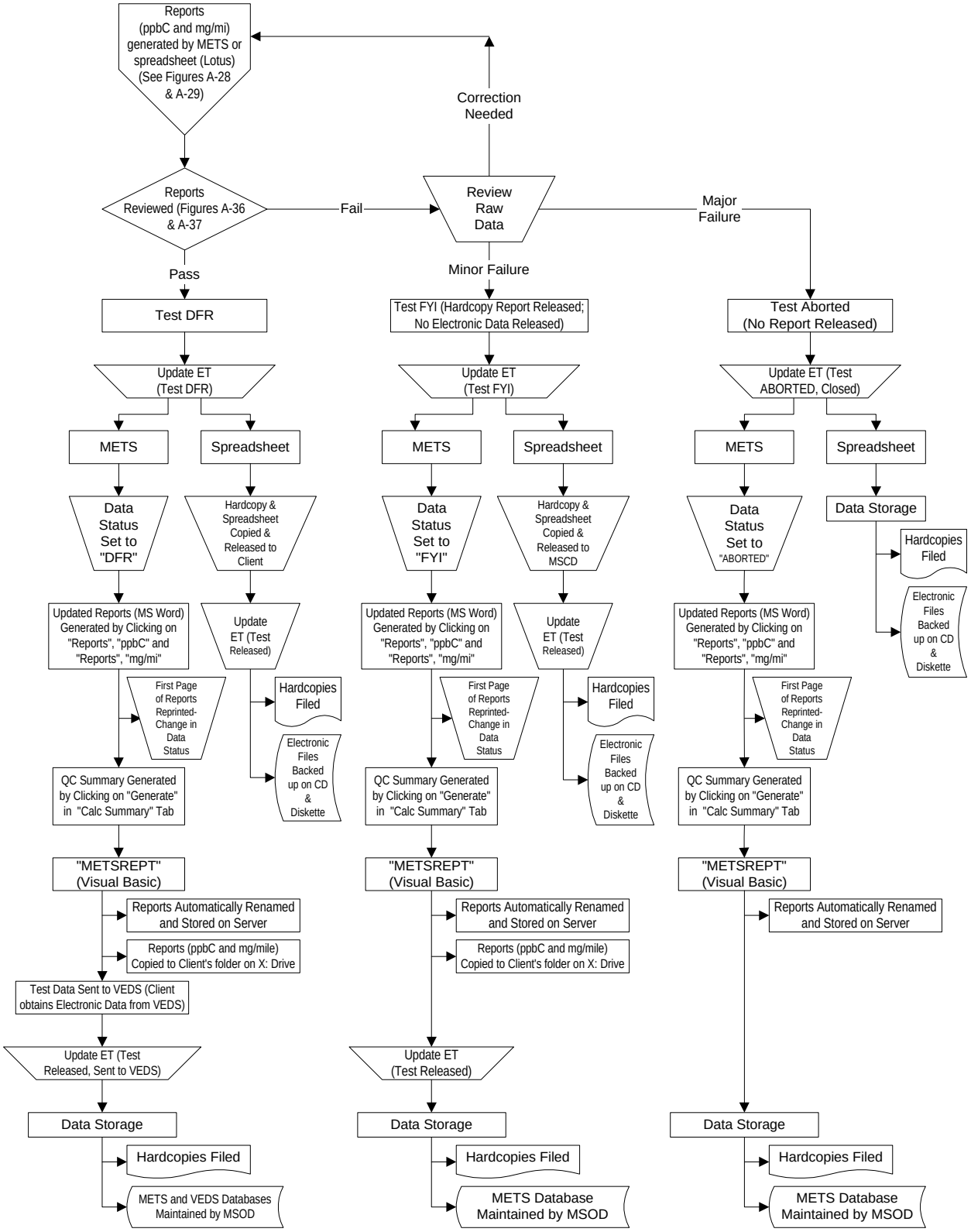

Figure A-38. Data Release