SAMS Data Staging Overview and Administrator's Guide

Version 1.0

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1. Introduction

1.1. Document Organization

This document is separate into 11 sections:

1. Introduction
2. Automated Nightly Data Staging
3. Manual Data Loading from a Nightly File
4. SAMS Nightly Staging Configuration
5. SAMS QA Data (Weekly) Processing
6. SAMS QA Configuration
7. FARS Data Loader
8. FARS Data Loader Configuration
9. Appendix A: Troubleshooting the Automated Data Staging Process
10. Appendix B: SAMS_STAGE_LOAD Package Overview
11. Appendix C: Sams_Warehouse_Load Package Overview

Document Purpose

The SAMS application at MDOT utilizes a wide variety of data to support decision making in the MDOT enterprise. In order to maintain the effectiveness of the SAMS system, some of the more time-sensitive data must be refreshed at varying frequencies. The primary purpose of this document is to serve as an administrator's guide to loading the data on which SAMS relies. While a complete understanding of the SAMS Data Loading processes is not necessary to support them, it is important to have a basic knowledge of the system components in order to be able to support these from an administrative standpoint.

SAMS supports two different methods to load data:

- **Automated Data Staging** – Automatic processes load data at regularly scheduled intervals. One example of this type processing is Nightly Crash Data Staging.
- **Manual Data Loading** –Manual data loading deals primarily with a custom data loader created specifically for SAMS. Examples of this type data loading include the Bridge Data Loader, FARS (Fatality Analysis Reporting System) Data Loader, Signs Data Loader, and manually specified crash data loading.

The sections below provide the basic knowledge required to run the various data loaders in SAMS, including a troubleshooting section (Appendix A: Troubleshooting the Automated Data Staging Process).

1.2. Version Information

Version Num.	Edit Date	Edited By	Comments
1.0	June 3, 2014	Matt Hiland	Accept all changes and modify version number.

2. Automated Nightly Data Staging

Automated Data Staging in SAMS is a system that loads a nightly crash file from (Mississippi Department of Public Safety (DPS) into the SAMS Warehouse. This system currently runs in each SAMS environment (development, system test, and production) and is composed of the following:

- SAMS Data Staging Service – A vb.net Windows 2003 service running on the SAMS application server. This service specifies the time for the nightly load to run each night, loads records in their raw format from Access to Oracle, and handles the log file for the staging operation.
  - Install location
    - C:\Program Files********\SAMS Data Staging Service (default).
  - Configuration Settings
    - Set in data_staging_service.exe.config, located in the installation folder. This file sets the download time, working directory, log file location, connection strings, port settings, and email settings.
    - TableMap.xml describes the mapping between the incoming Access database tables and the Oracle staging tables. The field names between the tables are identical, but the table names are different.
    - Log file Location: located in c:\dataStagingService.log by default. This is set in the <system.diagnostics> element.
      - The log file contains information on the starting time of each staging run, the duration of each staging step, and diagnostic information from exceptions that occurred during the staging process.
- MDPS ReportBeam file – compressed MS Access file which is published nightly and contains all crash records added/updated in the DPS system over the last 24-hour period.
- SAMS_STAGE.SAMS_STAGE_LOAD Oracle package - This PL/SQL package contains procedures and functions that process crash records from the DPS source format through aliasing and snapping into the SAMS Warehouse. Appendix B: SAMS_STAGE_LOAD Package Overview provides additional details.
- SAMS.SAMS_WAREHOUSE_LOAD Oracle package – This package is responsible for processing the new/updated crash records from the staging schema into the SAMS warehouse schema. Appendix C: Sams_Warehouse_Load Package Overview provides additional details.
- The SAMS_DD.SCID_AUDIT table is populated with crash-level information related to the process that inserted or updated the record, as well as the date and filename from the load file.

- SAMS Logging – Primarily occurs on the application server in the log file. Much of the information in this file is also available in SAMS_DD.SAMS_STAGE_LAST_V which contains the raw results of the last staging operation to complete within the system.
- SAMS_STAGE.EMAIL_HANDLER Oracle package – Responsible for sending notifications emails once a loading process has completed.
- SAMS Admin Data Loading Page – Used to manually kick off nightly crash loads to catch up after a staging component failed.

Automated data staging sends a nightly log of the staging results to the members of the SAMSDATAOPS email group at MDOT. This email includes a summary of the load results, as well as an indicator of the filename loaded and the elapsed runtime for the operation. Relevant information is also loaded into the SAMS_DD.SCID_AUDIT table.

2.1. Staging Process Overview

- The service waits to receive the name of a file to process. The service can generate the filename at a preset time based on the SAMS naming conventions and the current date, or the SAMS web application administrative page may transmit the filename.
- The service process receives the name of the file to be processed. If the service is currently loading a file, the filename(s) are stored in a queue and processed in the order in which they are received.
- The service attempts to download the file from the URL set in the configuration file. If the service cannot download the file, it logs the error in Oracle and in the trace log.
- The file is decompressed using the WinRAR command line utility. The utility installation directory and command-line arguments are set in the configuration file. Once the file has been decompressed, the .rar file is deleted (this can be set in the configuration file as an option). The service then logs success/failure in Oracle and the trace log.
- The service connects to the Oracle staging schema and issues a stored procedure call to truncate the staging tables. The service then logs success/failure in Oracle and the trace log.
- The service establishes connections to the Access database and to the Oracle staging schema. The service obtains the XML file that describes the table mapping between the Access database tables and the Oracle tables and loads the data row-by-row from each Access table into the corresponding Oracle table. If a row fails to load, the service logs the failure in Oracle and in the trace log file. The service continues to load the remaining rows after encountering a failure.
- The service issues a stored procedure call to start the Oracle staging process. The service waits until the stored procedure call returns. The service logs any exceptions thrown by the stored procedure to the trace log file. See Appendix B: SAMS_STAGE_LOAD Package Overview for details.
- The service can optionally send an email detailing the number of rows loaded and the number of rows that failed for each file processed.

2.2. Additional facts about the SAMS Data Staging service:

- If the Oracle DB server is rebooted, it is important to restart the SAMS Data Staging service on the SAMS web server as it maintains an open connection to the database.
- Within the SAMS website, under the Admin/Data Loading options, select Crash Data as the load type, to launch a manual load.
- The SAMS Data Staging service can accept instructions for multiple loads at once from the application. Just use SHIFT or CNTRL to select multiple entries from the list. When you do so, the service will queue these requests and issue the jobs individually to the service.
- Re-running a file that has already completed successfully does not have a negative impact on the process.
- If a SAMS Analysis operation is running when the staging operation attempts to kick off, the staging process will not be allowed to push data to the SAMS warehouse. These records will pause in the staging schema and then will join the records from the next nightly stage and proceed into SAMS.
- Currently the SAMS Staging service in all SAMS environments kicks off at 11:00 pm central time. This time is set in a configuration file used by the Data Staging Service and can be changed. It is not recommended to move it much earlier in the evening, as there is no guarantee that the source file from MDPS will be available much before this time.
- Project team members receive nightly emails from the SAMS Staging service via an email distribution group used by MDOT called "SAMSDATAOPS."

3. Manual Data Loading from a Nightly File

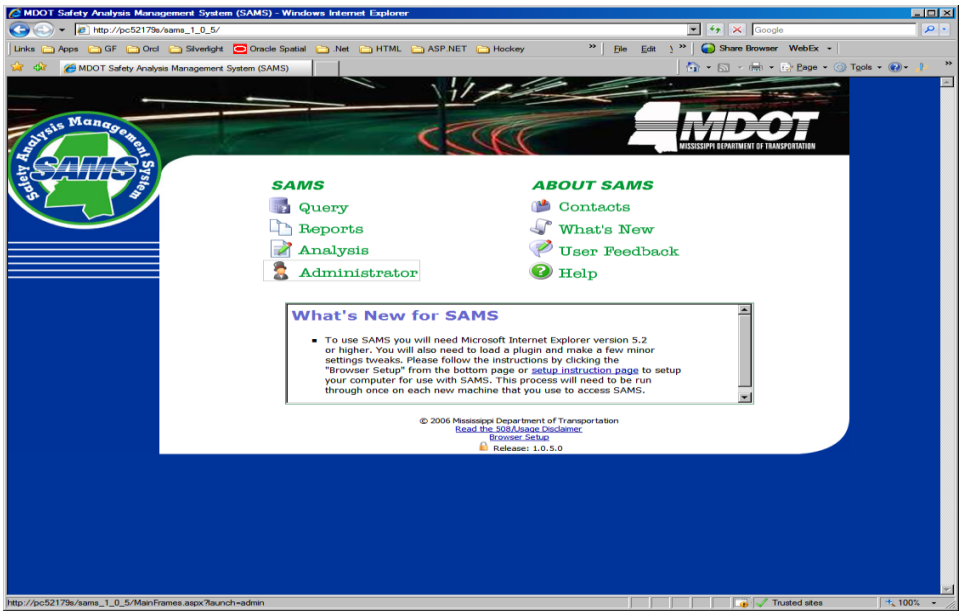
SAMS manual data loading deals primarily with data loaded via a custom data loader. In contrast to Automated Data Staging, this loader is not initiated at a scheduled interval, but is launched by a SAMS_ADMIN user via the Data Loading page of the SAMS web application.

This system currently runs in each SAMS environment (development, system test, and production), and is composed of the following:

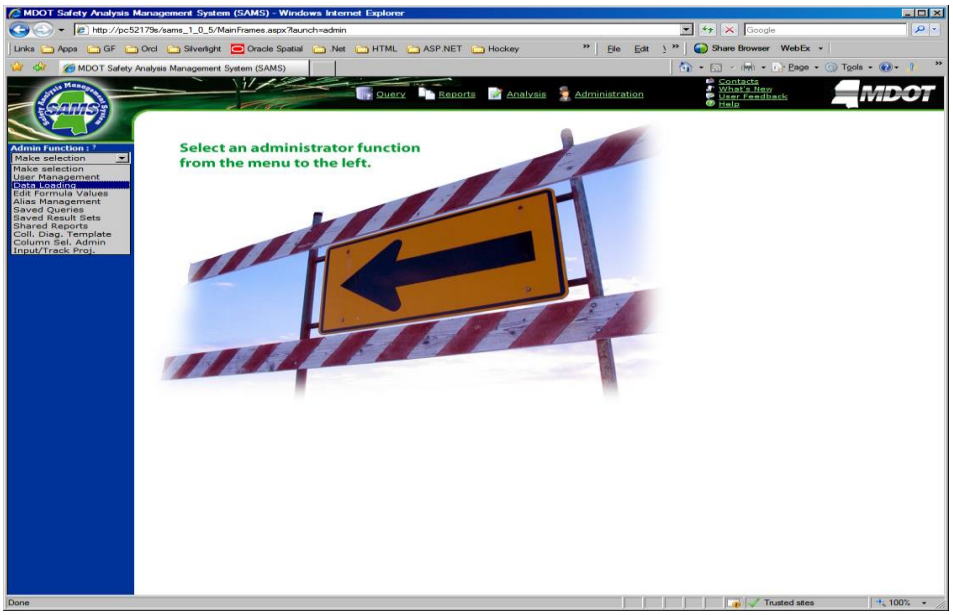
- SAMS Admin Data Loading Page – The main access point in SAMS to launch the loader for any of the following data themes:
  - FARS Data updates
  - Bridge Data
  - Signs Data
- SAMS Data Loading Host Service - Windows 2003 service running on the SAMS application server. This service listens for a job, passed via the Administration page of the SAMS web application, to load data into the SAMS Oracle Warehouse.
- This service and supporting files are located at C:\Program Files********\MDOT SAMS Data Loading Host\ directory.
- Tasks.xml file – lists parameters used for each individual data loader. Adding or removing jobs from this file will expose them to the SAMS web application in the Admin section.
- SAMS_STAGE.BASEMAP_LOAD package – this package includes stored procedures and functions used to load the data into the SAMS Warehouse.
- Database Link to GISPROD – This DB Link allows SAMS to load bridge data from a view in the GISPROD Oracle instance at MDOT.
- SQLLDR – used to load certain data flat files into the SAMS Warehouse.
- SAMS_DD.SCID_AUDIT Table is populated with crash-level information related to the process that inserted or updated the record, as well as the date and filename from the load file.

3.1. Launching the Nightly File Manually

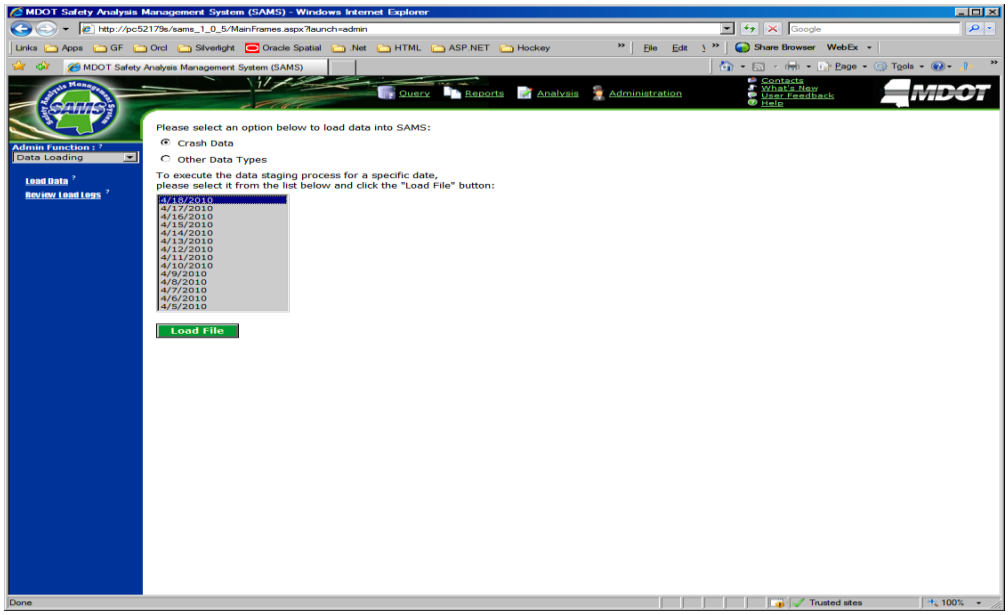
- Login to SAMS as a user in the member of the SAMS_ADMIN active directory group.
- Select the Administrator link from the SAMS splash screen.



- Select **Data Loading** from the menu on the left:



- Next, select the **Load Data** link. When the options are displayed in the right panel, select **Crash Data**. Once that has been selected, SAMS will generate a list of load files for the last few weeks. Please select the **desired load date** from the list presented, and click the **Load File** button as shown below:



- SAMS will prompt the user with the filename received by the service. Once you receive this notification, you may close your browser.
- Monitor your email* for a notification email concerning the completion of the process. (*Assumes that the user initiating the load is in the SAMSDATAOPS email distribution list at MDOT.)

4. SAMS Nightly Staging Configuration

This section describes the configuration of the nightly crash data loader used in SAMS through the various files used to detect the correct input and output of the system.

4.1. SAMS Data Staging Service Settings

Used for automated nightly staging and crash loading via the SAMS Administrator section.

Services dialog

- Normal services interface control (Start service, Stop service, Disable service, set to Automatic)
  - Service Name: **SAMS Data Staging Service**
  - Service should be set to Automatic in case server is rebooted.

Log file

- Located at:
  - C:\dataStagingService.log

SAMS Data Staging Service configuration file

- Located at:
  - C:\Program Files********\SAMS Data Staging Service\ data_staging_service.exe.config

- Example configuration file keys include:

Config Key	Description
DOWNLOAD_URL	File download location
AUTO_DELETE	Automatically delete downloaded and extracted files
WORKING_DIR	Working directory for extraction
DECOMPRESSION_APP	Application used for file decompression
TARGET_DIR	Directory for extracted files
STAGING_DB_CONNECTION_STRING	DB connection info for SAMS_STAGE user in Oracle instance appropriate for this deployment environment
USE_EVENT_LOG	Write exception messages to the local application event log
EVENT_LOG_SEVERITY	Threshold for logging event errors. Acceptable values are *normal*, *warning*, and *fatal*
SEND_EMAIL	True or False setting to indicate if non-oracle errors should be emailed
FROM_ADDRESS	Email address to specify as from address
TO_ADDRESS	Email address to specify as to address
CC	Email address for carbon copy distribution
SMTP_SERVER	IP address or name of SMTP server for mail relay
EMAIL_SEVERITY	Threshold for sending email notifications. Acceptable values are *normal*, *warning*, and *fatal*
TABLE_MAP_FILE	Path to the XML File that specifies the table mapping from Access to Oracle
samsStageListener	indicates log file location with path

EMAIL_HANDLER PL/SQL package

- Located in SAMS_STAGE schema.
- Has the following configuration variables in the SENDMAIL_STAGE_OK procedure:
  - INSTALLLOC – specifies the environment. (GEOD, DEV, TEST, PROD)
  - STRADDRTO – address to which system will send notification email.
  - STRSMTPSERVERNAME – SMTP server name for email dropoff.
  - STRADDRFROM – address from which to send notification email.

5. SAMS QA Data (Weekly) Processing

This section describes the use of the SAMS QA tool used in SAMS to process the weekly crash file from MDPS. The SAMS QA tool runs in the SAMS_QA schema which is a standalone environment for comparing data in SAMS to the most recent data file from MDPS that contains up to two years' worth of crash data.

The SAMS_QA process stages complete file records into the SAMS_QA schema similar in structure to the SAMS_STAGE schema. Once this process reaches the point where valid comparisons can be made, it utilizes a series of views that reference the main SAMS schema and the SAMS_QA stage tables to determine if crash records are missing. Once completed, the process sends a notification email including summary information for each core crash table.

Previously, the MDPS weekly full file was one massive file of all crashes to date. However, recent changes allow the system to be more efficient by consuming files on a year by year basis. As of January 2010, the SAMS_QA tools installed on MDOT TEST and PROD are set up to consume the most recent CURRENT.RAR file, which includes whatever fraction of the current calendar year is available, in addition to the 12 months of the full prior calendar year.

The SAMS_QA tool is composed of a two-part process consisting of data comparison and missing record loading. When loading missing records, logging is provided through the logging and auditing tables in the SAMS_DD schema.

5.1. Data Comparison

SAMS_QA supports data comparison in an Automated (scheduled) manner and a Manual (ad-hoc) manner. It is important to note that there are no differences in the files loaded by either approach, as far as the records they contain. The SAMS_QA tool simply loads and compares the last CURRENT.RAR file from MDPS.

- Automated Comparison - Automated execution of the QA tool on a weekly basis (currently set for Sunday mornings). This process consumes the DPS CURRENT.RAR file in order to identify missing records in SAMS. This process also includes notification via email.
- Manual comparison – In addition to the automated scheduled comparison, manual execution of the QA tool is supported. The steps to execute a manual SAMS_QA comparison are listed below:
  - Use Remote Desktop to connect to the appropriate web server for the PROD or TEST environment.
  - Open a command prompt and navigate to "C:\Program Files********\SAMS Data Stats."
  - Launch the standard data staging process, but process the "full file" supplied by DPS on Saturdays, by typing the following command:

    C:\Program Files******\SAMS Data Stats> datastats <file name>**

    - <file name> is like "ms_full_7_4_2009.rar" or "current.rar".

- The file is usually generated on a Saturday, so it should have that date in the file name.
- NOTE: Keep the command line window open and stay logged in on the server for the duration of the process, in order for this to process successfully.
- Once the process has completed, the user specified in the configuration file will receive a completion email. At MDOT, this is currently set to SAMSDATAOPS.

5.2. Processing Missing Records

Processing Missing Records identified by the SAMS_QA tool is part of the automated process that runs each Sunday but it is can also be manually launched from the command line. This portion of the tool is intended to be run after a SAMS_DBA has carefully considered the impact on current SAMS users relating to SAMS system use and database load demand.

Once SAMS_QA has been run, the following workflow processes missing records from SAMS_QA to SAMS:

- Remote Desktop to the appropriate web server for the PROD or TEST environment. Each environment would need to be run separately.
- Open a DOS prompt and run the following commands:
  - *C:> SQLPLUS <enter>exec*
    - *SQL> Conn SAMS_QA/<password>@SAMSTEST <enter>*
    - *SQL>EXEC SAMS_STAGE_LOAD.PROCESS_MISSING_CRASHES; <enter>*

    NOTE: Keep the command line window open and stay logged in on the server for the duration of the process, in order for this to process successfully.
- When the process has completed, the user specified in the configuration file will receive a completion email similar to the one received from nightly staging, without a file name listed at the top.
- To confirm that all identified crashes were staged between SAMS_QA and SAMS run the following routine in the DOS prompt with SQLPLUS connected as listed above in step 2:
  - *SQL> EXEC SAMS_STAGE_LOAD.OUTPUT_COUNTS; <enter>*

6. SAMS QA Configuration

Log file

- Located at:
  - C:\Program Files********\SAMS Data Stats\log\dataStats.log

SAMS Data Staging Service configuration file

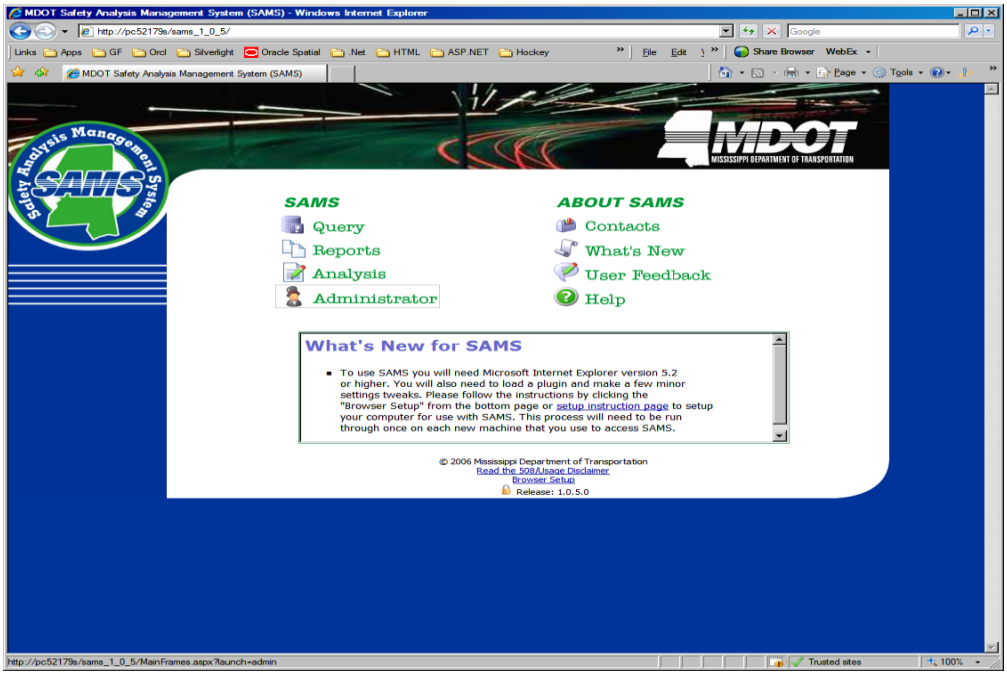
- Located at:
  - C:\Program Files********\SAMS Data Stats\config\TableMap.xml

7. FARS Data Loader

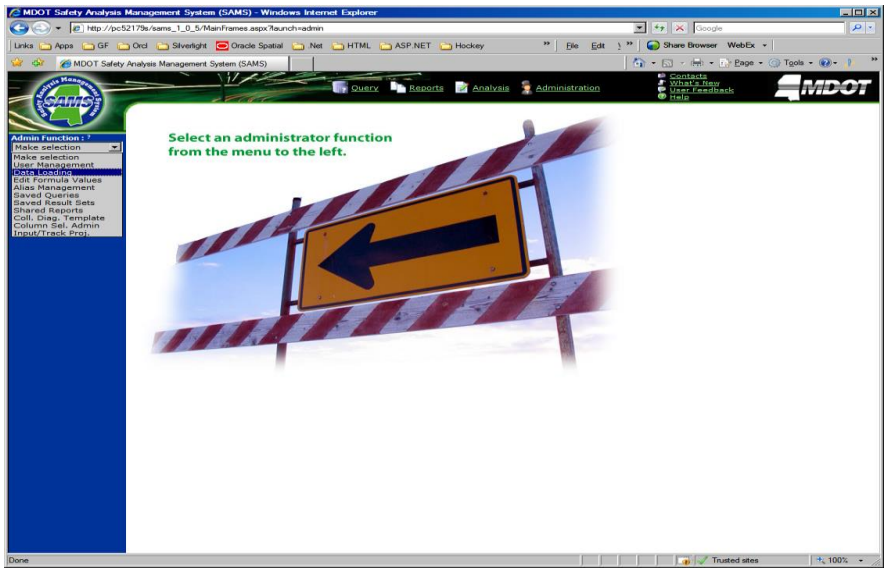
The Fatality Analysis Reporting System (FARS) Data loader is used in SAMS to process FARS Accident Injury Severity updates. The FARS data loader is launched from the SAMS Administrator area under the data loading menu. Input to the loader is provided via a delimited text file provided on a monthly basis from DPS. The loader relies on a few configuration files to specify the location of the data and how the columns are to be mapped. Details for these configuration settings are listed below.

7.1. Launching the FARS LOADER Manually

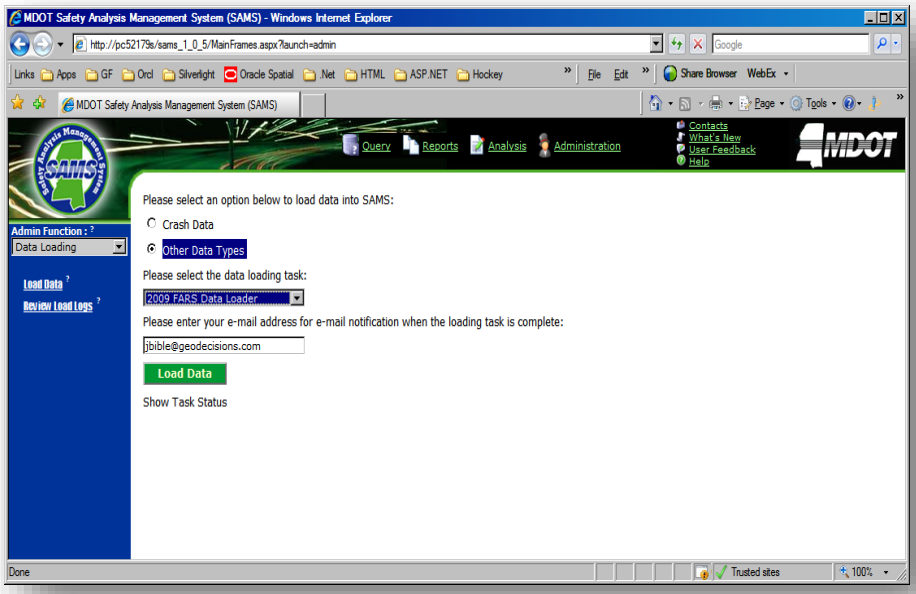
- Login to SAMS as a user in the member of the SAMS_ADMIN active directory group.
- Select the **Administrator link** from the SAMS splash screen.



- Select the **Data Loading** item from the menu on the left:



- Select the **LOAD DATA** link. The right panel will show choices for Crash Data and Other Data Types. Select **Other Data Types**. Next, SAMS will generate a list of possible data loading tasks. Select the **FARS loader** you want to run**, and confirm the e mail settings listed. Finally, select the **Load Data** button to launch the process.



- As long as the SAMS window remains open, the FARS Data Loader will attempt to refresh the process status every 15 seconds to indicate completion. Optionally, you can

close the current SAMS window and await the confirmation email concerning the completion of the process.

(** See the configuration section below if the desired FARS data load process is not listed.)

8. FARS Data Loader Configuration

The FARS data loader relies heavily on the SAMS Data Loading Host service which is found in the services dialog on the host web server. In order to run correctly, verify/adjust the following settings prior to starting the service and loading the data:

Location: C:\SAMS_Data_Loading_Host_Data_Files\FARS

- **For the purposes of this example we will assume the user would like to add Fars Data for 2009**
  - Copy the desired data file for loading (ex.: farsdata09.txt) into this folder.
  - Open the data file and confirm that there are no line breaks in the first row containing column names.
  - Copy a prior fieldmap.xml file and update field names as needed.

  (no periods are permitted in this file unless in double quotes)

  Abbreviated example:

```
<?xml version="1.0" encoding="utf-8" ?>
<FieldMap>
  <Map>
    <id>Accident</id>
    <sourceTable></sourceTable>
    <targetTable>FARS_ACCDNT_2009</targetTable>
    <MapPair>
      <Source>State</Source>
      <Destination>STATE</Destination>
    </MapPair>
    <MapPair>
      <Source>County</Source>
      <Destination>COUNTY</Destination>
    </MapPair>
....
```

- Open schema.ini and add entry for FARS 09 loader as follows:

  [farsdata09.txt]

ColNameHeader=True

CharacterSet=ANSI

Format=TabDelimited

MaxScanRows=0

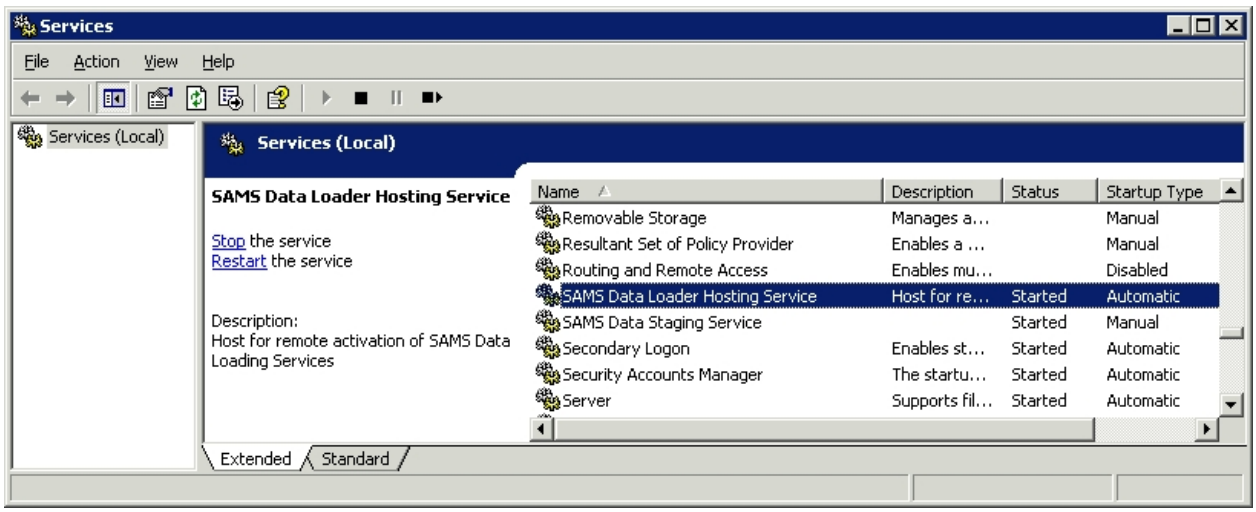
Location: C:\Program Files******\MDOT SAMS Data Loading Host**

- Update tasks.xml file with a new entry for this loader. This controls what task names appear in the list box in the SAMS Admin page used for launching the loader. An example task is as follows:

```
<task name="2009 FARS Data Loader"
    description="Load 2009 FARS data">
  <action
   Type="DataLoader.Actions.FARSProcedureCall"
    User="sams_stage"
    Password="XXXXXX"
    Instance="samstest"
    CommandText="SAMS_STAGE.SAMS_FARS_UPD.PREP_LOAD_TABLES"
    Year = "2009"
    IsReload = "False"
   />
  <action
   Type="DataLoader.Actions.FARSLoader2"
   FileName="C:\SAMS_Data_Loading_Host_Data_Files\FARS\farsdata09.txt"
   DestConnectionString="User ID=sams_stage;Password=XXXXX;Data Source=samstest"
   MapFile="C:\SAMS_Data_Loading_Host_Data_Files\FARS\FieldMap09.xml"
   />
  <action
   Type="DataLoader.Actions.FARSProcedureCall"
    User="sams_stage"
    Password="XXXXXX"
    Instance="samstest"
    CommandText="SAMS_STAGE.SAMS_FARS_UPD.UPDATE_SAMS_FARS"
```

```
    Year = "2009"
    IsReload = "False"
    FileName = "farsdata09.txt"
   />
  <logger
    Type="DataLoader.Loggers.EmailLogger"
    From="SAMS_DATA_PROCESSOR_TESTENV@MDOT.STATE.MS.US"
    SmtpServer="SMTPSRV.MDOT.STATE.MS.US"
    Subject="FARS Data Load Results"
    />
</task>
```

Start the SAMS Data Loading Host service via the services dialog on the web server of choice:



NOTE: If this is the initial run of the FARS loader in a new database environment, please also confirm the notification settings inside the contained in the **SAMS_STAGE.EMAIL_HANDLER** package, **SET_GLOBALS** procedure, as these will be utilized for email notification.

```
STRADDRTO := 'SAMSDATAOPS@MDOT.STATE.MS.US';
STRSMTPSERVERNAME := 'SMTPSRV.MDOT.STATE.MS.US';
STRADDRFROM := 'SAMS_DATA_PROCESSOR_TESTENV@MDOT.STATE.MS.US';
STRBGCOLOR := '#A6D7D1';
strSMTPServerPort := '25';
```

Appendix A: Troubleshooting the Automated Data Staging Process

Normally, each morning, the members of the SAMSDATAOPS group at MDOT will have a few email messages with a subject similar to "SAMS Data Stage successful for data loaded into PROD on 27-MAY-08." When this is not the case, and the staging email mentions an error, or the staging email doesn't appear at all, the following section can be used as a guide to solve common issues.

Troubleshooting this system usually involves knowledge of generic HTML error messages, MS Access error messages, Internet Explorer specific error messages, and Oracle error messages. The following list is not exhaustive, but should serve as a general reference for the most common errors encountered in the last few years of our monitoring of the SAMS Staging service.

Errors generally fall into two categories:

- Errors resulting in email not received – These errors can sometimes be discerned by checking the SAMS Data Staging log file in each SAMS environment. Some possible causes for these errors are mentioned in *section A1*.
- Errors included in email notification – These errors are more common, and are addressed in detail in *section A2*.

A1. Errors resulting in email not received

The SAMS Data Service utilizes an SMTP relay to send email via the SAMS_STAGE.EMAIL_HANDLER Oracle package. Obviously, this requires that the email server, the network, and the oracle server at minimum are up and communicating.

Some issues encountered in the past within the current architecture are as follows:

- Local SMTP server is down, or IP address/node name has changed.
- Incorrect setting of SMTP server IP address/node name for the local LAN in the SAMS_STAGE.EMAIL_HANDLER package body and staging service configuration file.
- Specifying an invalid FROM or TO email address in the SAMS_STAGE.EMAIL_HANDLER package body and staging service configuration file. NOTE: Addresses specified need to be within the local domain, as SMTP relay for outside email addresses is disabled by default. For example, if installed on SAMS PROD at MDOT, all TO and FROM addresses must have the @MDOT.STATE.MS.US suffix to be sent successfully.
- The local SMTP server may not be configured to allow SMTP drop-off from any machine on the LAN.
- The person expecting to receive the email isn't part of the SAMSDATAOPS group at MDOT.

A2. Errors included in email notification

Most SAMS Data Staging errors will be emailed by the notification in SAMS staging. It should include a paragraph such as the following:

File download failed: WebException:
Unable to connect to the remote server
at System.Net.WebClient.DownloadFile(Uri address, String fileName)
at System.Net.WebClient.DownloadFile(String address, String fileName)
at data_staging_library.DataStagingLibrary.FileDownLoader.DownLoadFile(String URL, String fileName, ICredentials downloadCredentials)

Or

ORA-03113: end-of-file on communication channel - SAMS Fatal Error: at Oracle.DataAccess.Client.OracleException.HandleErrorHelper(Int32 errCode, OracleConnection conn, IntPtr opsErrCtx, OpoSqlValCtx* pOpoSqlValCtx, Object src, String procedure)
at Oracle.DataAccess.Client.OracleException.HandleError(Int32 errCode, OracleConnection conn, String procedure, IntPtr opsErrCtx, OpoSqlValCtx* pOpoSqlValCtx, Object src)
at Oracle.DataAccess.Client.OracleCommand.ExecuteReader(Boolean requery, Boolean fillRequest, CommandBehavior behavior)
at Oracle.DataAccess.Client.OracleCommand.ExecuteReader()
at Oracle.DataAccess.Client.OracleCommand.ExecuteScalar()
at SAMSDataStagingLibrary.SAMSDataStagingLibrary.ProcessIDTask.Execute()
at SAMSDataStagingLibrary.SAMSDataStagingLibrary.DataStagingTask.Execute()
at data_staging_service.DataStagingController._timer_Elapsed(Object sender, ElapsedEventArgs e)

For the most part, the information that can be used to help determine the cause of the error lies in the first two lines. The grey area is more debugging info, which gives more info about the code location or module that trapped the error.

For the sake of brevity, only the first two lines of some common error messages are shown in the following sections to help aid with issue resolution. Errors are grouped into the following main categories:

- MDPS Output File Issues
- Oracle Communication Issues
- General Oracle Errors.

In most cases, the solution to the problem is to fix the identified offender, and re-launch the Data staging operation via the Admin functionality of the SAMS website.

A3. MDPS Output File Issues

- *File download failed: WebException:*
  The remote server returned an error: (404) Not Found.
  This error indicates that the staging service cannot locate the correct file to download. Some possible reasons for this include the file is missing, the file naming convention has been changed (rarely), or the internet connection to MDPS is down.

- *File extraction failed:*
  masterdb_incremental.mdb - CRC failed
  Unexpected end of archive
  This error indicates that the file downloaded from MDPS was corrupt, and the archive couldn't be extracted. The only solution for this is to request that VisualStatement regenerate the file. Then re-attempt the load manually from the SAMS Admin site.

- *File download failed: WebException:*
  The operation has timed out
  This error indicates that there has been a timeout in attempting to download the file requested from the MDPS server. Usually this means that the MDPS file could be found and the host server was responsive when the download request was issued, but something has since caused the process to fail.

- *File download failed: WebException:*
  Unable to connect to the remote server
  The SAMS Staging service cannot contact the MDPS server to initiate the download request. This could be caused by either a server or network infrastructure outage.

A4. Oracle connection issues

- ***ORA-03135: connection lost contact*** *- SAMS Fatal Error: at Oracle.DataAccess.Client.OracleException.HandleErrorHelper(Int32 errCode, OracleConnection conn, IntPtr opsErrCtx, OpoSqlValCtx* pOpoSqlValCtx, Object src, String procedure)*
  This error indicates that the SAMS web server was able to reach the SAMS Oracle instance when processing started, but that something interrupted that connection before the process was completed.

- ***ORA-03113: end-of-file on communication channel*** *- SAMS Fatal Error: at Oracle.DataAccess.Client.OracleException.HandleErrorHelper(Int32 errCode, OracleConnection conn, IntPtr opsErrCtx, OpoSqlValCtx* pOpoSqlValCtx, Object src, String procedure)*
  This error indicates that the SAMS web server lost contact with the Oracle data server at some point during the execution of the staging run. Normally, this error is seen when the database can be reached at staging initiation, but goes down for some reason.

  - *ORA-1034: ORACLE not available - SAMS Fatal Error: at Oracle.DataAccess.Client.OracleException.HandleErrorHelper(Int32 errCode, OracleConnection conn, IntPtr opsErrCtx, OpoSqlValCtx* pOpoSqlValCtx, Object src, String procedure)*

  This error indicates that the Staging Service cannot contact the Oracle database at the beginning of the Staging Operation. Possible issues could include the Oracle database is shutdown or non-responsive, or the network is down between the webserver and the Oracle database.

A5. General Oracle Errors

Errors of this type, with a specific Oracle error number and line number referring to one of the PL/SQL packages used to load Oracle data, usually mean that there is something in the code utilized by the loader that is causing an issue. Potential sources of this type error are numerous and are all handled with Oracle native error handling and standard error numbers.

- ***ORA-12899: value too large for column*** *"SAMS_STAGE"."GWM_CRASH_DEFAULT"."CRASH_IMPACT_PT_DESC" (actual: 22, maximum: 18)*
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 5893
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 5536
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 469

The above error was caused by a change in a column length in a data table, occurring after the data loader was written. The loader attempted to push a value with a larger data specification than allowed into the data table column. (

- *ms_part_1_21_2009.rar:**ORA-00054: resource busy and acquire with NOWAIT specified***
  ORA-06512: at "SAMS.SAMS_GEOM_UTIL", line 166
  ORA-06512: at "SAMS.SAMS_WAREHOUSE_LOAD", line 1507
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 480

This error indicates that a SAMS Data Staging process was attempting to load data into a data table that was locked by another process. Possible causes of this could be another update/delete/indexing operation is running against the table in question, or the table is being backed up at the time of the attempted staging service access.

- *Data loading from file ms_part_10_28_2008.rar failed:**ORA-01403: no data found***
  ORA-06512: at "SAMS_STAGE.SAMS_GEOM_UTIL", line 196
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 505
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 469
  ORA-06512: at line 1

This error indicates that the file retrieved from the MDPS server did not contain data elements for all the parent/child tables associated with storing a crash in the SAMS system. When this error was encountered before, there was only one record in the file, and it was a blank MUCR diagram with no corresponding crash record.

- *ms_part_10_19_2008.rar:ORA-30926: **unable to get a stable set of rows in the source tables***
  ORA-06512: at "SAMS.SAMS_WAREHOUSE_LOAD", line 746
  ORA-06512: at "SAMS.SAMS_WAREHOUSE_LOAD", line 1496
  ORA-06512: at "SAMS_STAGE.SAMS_STAGE_LOAD", line 477

This error indicates that a prior failed load has left some remnants in the SAMS_STAGE schema.
Resolution:

1. Execute the following from SQLPLUS logged in as the SAMS_STAGE user:
   a. SAMS_STAGE.SAMS_STAGE_LOAD.TRUNC_LOAD_TABLES
   b. SAMS_STAGE.SAMS_STAGE_LOAD.TRUNCATE_STAGE_TABLES
2. Then launch the SAMS Stage operation manually from the Admin section of the SAMS website. Verify in the corresponding email that the stage operation completed successfully.

Appendix B: SAMS_STAGE_LOAD Package Overview

This PL/SQL package contains a set of procedures and functions that process crash records from the DPS source format through aliasing and snapping into the SAMS Warehouse.

```
*This procedure is the main procedure called to stage the daily crash data from MDPS. It calls the
snapping procedures and the loading of the warehouse package in the SAMS schema. This is called by
the staging service which is fired when a dps file appears in the watch folder thru the automated process
each night or thru the manual process initiated from the SAMS application.*
PROCEDURE stage_crash (
    filename   VARCHAR2 DEFAULT NULL,
    procname   VARCHAR2 DEFAULT NULL
  ) IS
    intmaxid   PLS_INTEGER    := 0;
    tempname   VARCHAR2 (500) := NULL;
    vSysDate   date;

BEGIN
    get_process_time;
    vSysDate := SysDate;

*Grab max sams_crash_id from sams.crash table*
    SELECT MAX (sams_crash_id)
      INTO intmaxid
      FROM sams.crash;

*Starts the process by modifying the constraints and indexes for the load tables.*
    disable_crash_pk;
    swdc_snap.drop_st_index;
    create_load_index;
    swdc_snap.create_stg_index;

*The following %_INVALID procs only find results if the primary keys are invalid per record type.
They move invalid records from the _LOAD tables into the _INVALID tables*
    sams_crsh_invalid;
    sams_crsh_vhcl_invalid;
    sams_crsh_prsn_invalid;
    sams_crsh_ocp_invalid;
    sams_crsh_wrkzn_invalid;
    sams_crsh_wethr_invalid;
    sams_crsh_witns_invalid;
    sams_prsn_citat_invalid;
    sams_prsn_concirc_invalid;
    sams_prsn_safe_invalid;
    sams_crsh_mucr_invalid;

*The following is the data processing load into the main sams staging tables*
    sams_crsh_ld;
    sams_crsh_prsn_ld;
    sams_crsh_ocp_ld;
```

```
    sams_crsh_vhcl_ld;
    sams_crsh_mucr_ld;

The following is additional sams custom attribute conversion
    enable_crash_pk;
    upd_crsh_pk;
    upd_crsh_sev;
    upd_sams_crshtype;



Perform aliasing using the post state wide data cleansing (SWDC) aliasing packages
    swdc_alias.upd_sams_cityname
        swdc_alias.upd_sams_routename;
    update_crash_group;
    upd_sams_stat_cols;
    upd_sams_injury_sev;

Handles any data cleansing protected fields from SWDC edits
    preserve_dc_crash_recs ('nonxy');

Handles the CET Preserve Task
    copy_cet_data;
    preserve_cet_data('F');

The following attempts to snap a crash to the roadnetwork or intersection
    snap_crashes;

Handles new requirements for CET Preserve Task, called a second time to make sure preserved values
were not changed during the snapping process.
    preserve_cet_data('T');

Sets sams_latitude and sams_longitude on all records with non-null geometries to the coordinates
generated from the crash record geometry
    set_coords_from_geometry;

The following pushes data to warehouse passing Max ID
    build_gwm_stage_tables (intmaxid);
    stage_gwm;

Drop rtree to avoid 10G merge/domain index error.
    sams_geom_util.drop_rtree ('CRASH', 'GEOMETRY');

Audit support
    IF procname IS NULL AND UPPER (SUBSTR (filename, 1, 7)) = 'MS_PART'
    THEN
      sams_stage_util.add_audit_trail ('NIGHTLY STAGING', filename);
    ELSE
```

```
      sams_stage_util.add_audit_trail (procname, filename);
    END IF;

The following calls the sams package to merge the staged data into the warehouse.
    sams.sams_warehouse_load.warehouse_crash(vSysDate);

END stage_crash;
```

Appendix C: Sams_Warehouse_Load Package Overview

This package is responsible for processing the new/updated crash records from the staging schema into the SAMS warehouse schema.

```
PROCEDURE WAREHOUSE_CRASH(STARTDATE IN DATE) IS
This is the master staging procedure in the SAMS schema.

Detect if a statewide analysis is running, using a call to the GET_ANALYSIS_STATUS
Begin
   analysis_running := GET_ANALYSIS_STATUS;
   IF analysis_running <> 1 OR analysis_running IS NULL THEN
     analysis_running := 0;
   END IF;

   IF analysis_running = 0 THEN -- proceed with load
Drop the spatial index
      SAMS.SAMS_GEOM_UTIL.DROP_RTREE('CRASH','GEOMETRY');
      SAMS.SAMS_GEOM_UTIL.DROP_RTREE('CRASH','HIST_GEOM');

      COMMIT;

Start the warehouse load procedures
     WARE_CRASH_LD(STARTDATE);
     WARE_CRASH_PERSON_LD(STARTDATE);
     WARE_CRASH_OCCPNT_LD(STARTDATE);
     WARE_CRASH_VEHICLE_LD(STARTDATE);
     WARE_CRASH_MUCR_LD(STARTDATE);

Update global date values with data values pulled from Crash table.
Used in SAMS for validation of begin/end date.
     EXECUTE IMMEDIATE ('UPDATE SAMS_DD.SAMS_CRASH_GLOBAL_DATES SET (MIN_DATE,
MAX_DATE) = (SELECT MIN(REPORTED_DATE), MAX(REPORTED_DATE) FROM CRASH)');
     COMMIT;

Rebuild the spatial index
     SAMS.SAMS_GEOM_UTIL.BUILD_METADATA_RTREE('CRASH', 'GEOMETRY');

Call the procedure to update the drives license lookup. This procedure also rebuilds the statistics
materialized view.
     UPDATE_DL_CRASH_PERSON;

Update the snap_method_desc in GWM table
     UPDATE_SNAP_DESC;

Update the SLRS_ID in the CRASH and GWM table
     UPDATE_SLRS_ID;

Build the lookup table for countermeasures crash types
     BUILD_CRASH_TYPE_TABLE;
```

```
Log successful completion
        SAMS_STAGE.SAMS_STAGE_LOAD.SAMS_LOGGING ( NULL, 15, 2, 88, NULL, '',     NULL, NULL,
NULL );
    SAMS_STAGE.EMAIL_HANDLER.SENDMAIL_STAGE_OK;
  END IF;
END;
```