

# MOVES Emissions Inventory Quality Assurance Tool

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2017 International Emissions Inventory  
Conference

# Background

- Latest version of MOVES - MOVES2014a
- Applications of MOVES
- Quality and integrity of user inputs critical
- Long MOVES run times (e.g,. Annual runs)

# Background

- MOVES performs limited QA
- Input errors => Duplication of effort
- Texas - large state (254 counties)

# Overview

- TCEQ and TTI recognized need for QA tool
- QA checks focused on Texas data
- QA output
- Option to create MOVES output summary

# Overview

- Performs QA based on MOVES14a
- No license or installation suite
- GUI facilitates user selection of inputs
- Works with MySQL to perform QA operations

# QA Tool – Basic Operation

## GUI

- Stage 1 – MySQL Connection/Input Specs
- Stage 2 – Specific Inputs/Outputs

## QA

- Creates MySQL scripts, other files
- Executes MySQL scripts in DOS

## Output

- Write QA output
- Performs clean up of temporary files

# QA Tool GUI

## Stage 1

- MySQL Connection Inputs
  - Port
  - Username
  - Password
- Input Specifications
  - Database Type
  - Input Type

The screenshot shows a window titled "MOVES Inventory Mode QA Tool" with two tabs: "MySQL Connection Inputs/Input Type Specifications" (active) and "Inputs/Outputs". The active tab contains the following fields and controls:

- MySQL Connection:** A section with a note: "(NOTE: A yellow shaded button indicates the MySQL connection has not been established.)"
- MySQL Data Folder:** A label next to the "MySQL Connection" section.
- Port:** A text input field containing "3307".
- Username:** A text input field containing "moves".
- Password:** A text input field containing "moves".
- Database Type:** A dropdown menu.
- Inputs Type:** A dropdown menu.
- Buttons:** A "Clear" button and a yellow "Establish MySQL Connection" button.

# QA Tool GUI

## Stage 2

- Outputs
  - Execution Listing
  - QA Output
  - MOVES Output Summary
- Temporary File Options
- MOVES Default Database
- Database Specific Inputs
  - Name
  - County
  - Year
  - Season/Day Type

MOVES Inventory Mode QA Tool

MySQL Connection Inputs/Input Type Specifications Inputs/Outputs Exit

Specify Outputs

Listing Output:  Browse

QA Output:  Browse

MOVES Output Summary:  Browse

☐ Keep MySQL Script ☐ Keep MySQL QA Output Clear Outputs

MOVES Default Database:

Database	county(D (SPS))	Year	Season/Day Type
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Clear Database Inputs Run Create Input File



# QA Process

## Creation of External Files

MySQL Scripts

DOS Batch File



## Execution of External Files

Command Prompt Window

Execute DOS Batch File



## Processing Script Output

Save QA results

Retain/Delete Temporary Files

# QA Checks - CDBs

- 365 individual checks - 26 tables
- Basic Checks
  - Table exists
  - Number of records
- Data validation
  - Valid values
  - Sums of distributions
- Focused on Texas-specific data

# QA Checks – Inventory Mode Output

- 26 individual checks - 4 output tables
- Basic Checks
  - Table exists
  - Number of records
- Data Validation
  - Valid values
  - Checks moveserror table
- Activity and emissions output summary

# QA Tool Outputs

- Execution Summary (Listing) Output
- Tab-delimited QA Output

Database	Table	Check Condition	Check Description
cdb_1	avft	GOOD	No errors or warnings found
cdb_1	county	ERROR	Table does not exist
cdb_1	countyyear	WARNING	Table does not exist (default used if not found)

# QA Tool – Activity and Emissions Output

							Motorcycle - 11	Passenger Car - 21
Database	County	Year	Season	ActivityType/ Pollutant	Emissions Process	Units	Gasoline - 1	Gasoline - 1
MVS_out	48021 - Bastrop County	2014	Annual	distance – 1	N/A	mi	571909.8	5.69E+08
MVS_out	48021 - Bastrop County	2014	Annual	starts – 7	N/A	starts	511252	67429000
MVS_out	48021 - Bastrop County	2014	Annual	Carbon Monoxide (CO) – 2	Running Exhaust - 1	ton	9.318388	1722.725
MVS_out	48021 - Bastrop County	2014	Annual	Carbon Monoxide (CO) – 2	Start Exhaust - 2	ton	2.509385	641.4039

# MOVES Test Run

- Description of MOVES run
  - Annual Run
  - Pollutants: VOC, CO, NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>
- MOVES run time – approximately 300 minutes (5 hours)
- MOVES QA tool run time – 15 seconds

# Summary

- Potential to save a substantial amount time and resources
  - Detects potential problems prior to MOVES runs
  - Detection of errors in MOVES inventory mode output
  - Activity and emissions output summaries
- Establishes standard protocol for QA checks/procedures
- Ensures consistency across geography and time

# Future Work

- Phase II discussions with TCEQ
  - Inclusion of MOVES rate mode
  - Other refinements
- Expansion for applications outside Texas
- Other Opportunities
  - MOVES Run Spec (MRS) QA
  - Non-road



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# Questions?

