Working with MOVES2004 Input and Output

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Acknowledgements

- John Koupal

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Outline

- **Working with Input**
  - What the Input Data Manager does
  - Preprocessing steps produce input data sets
  - How to specify input data sets in MOVES GUI
- **Working with Output**
  - Post-processing scripts
  - Exporting MOVES output to EXCEL
  - Example SQL to summarize output

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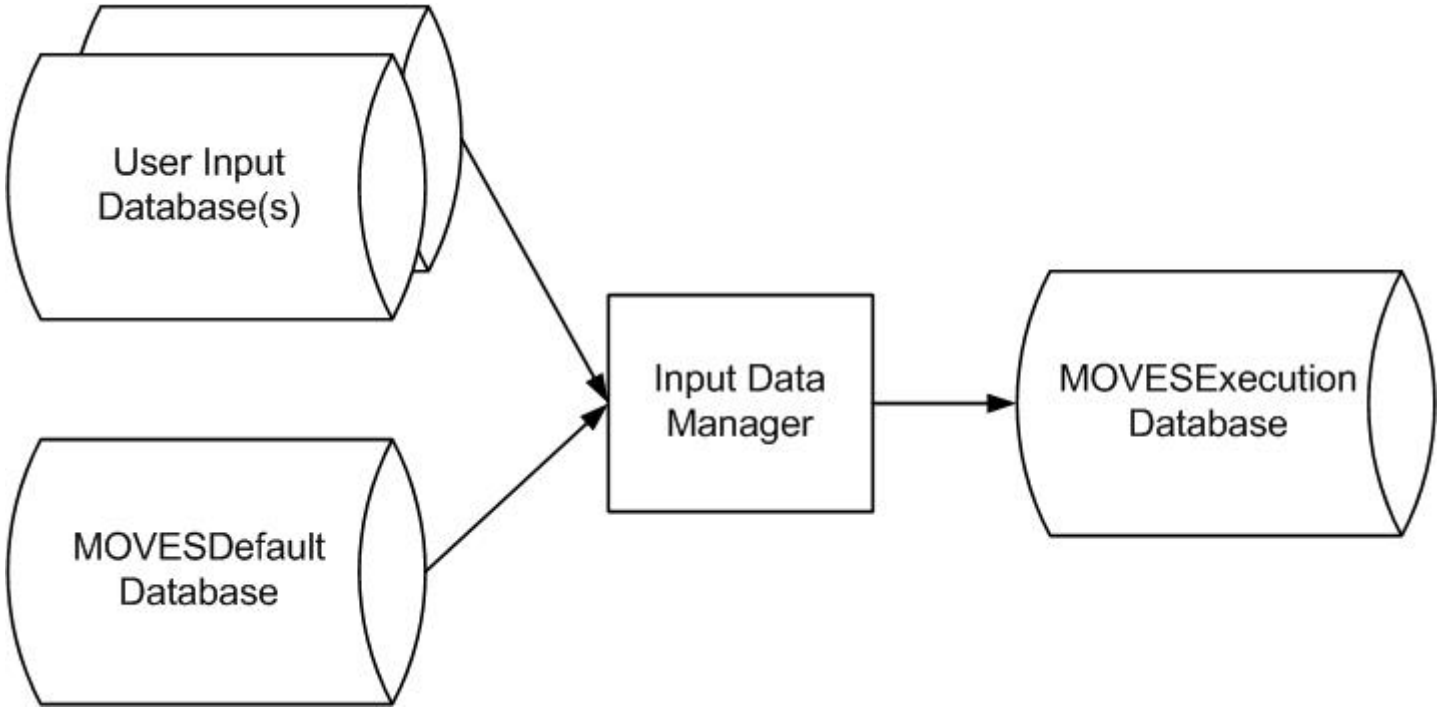
The Role of the Input Data Manager



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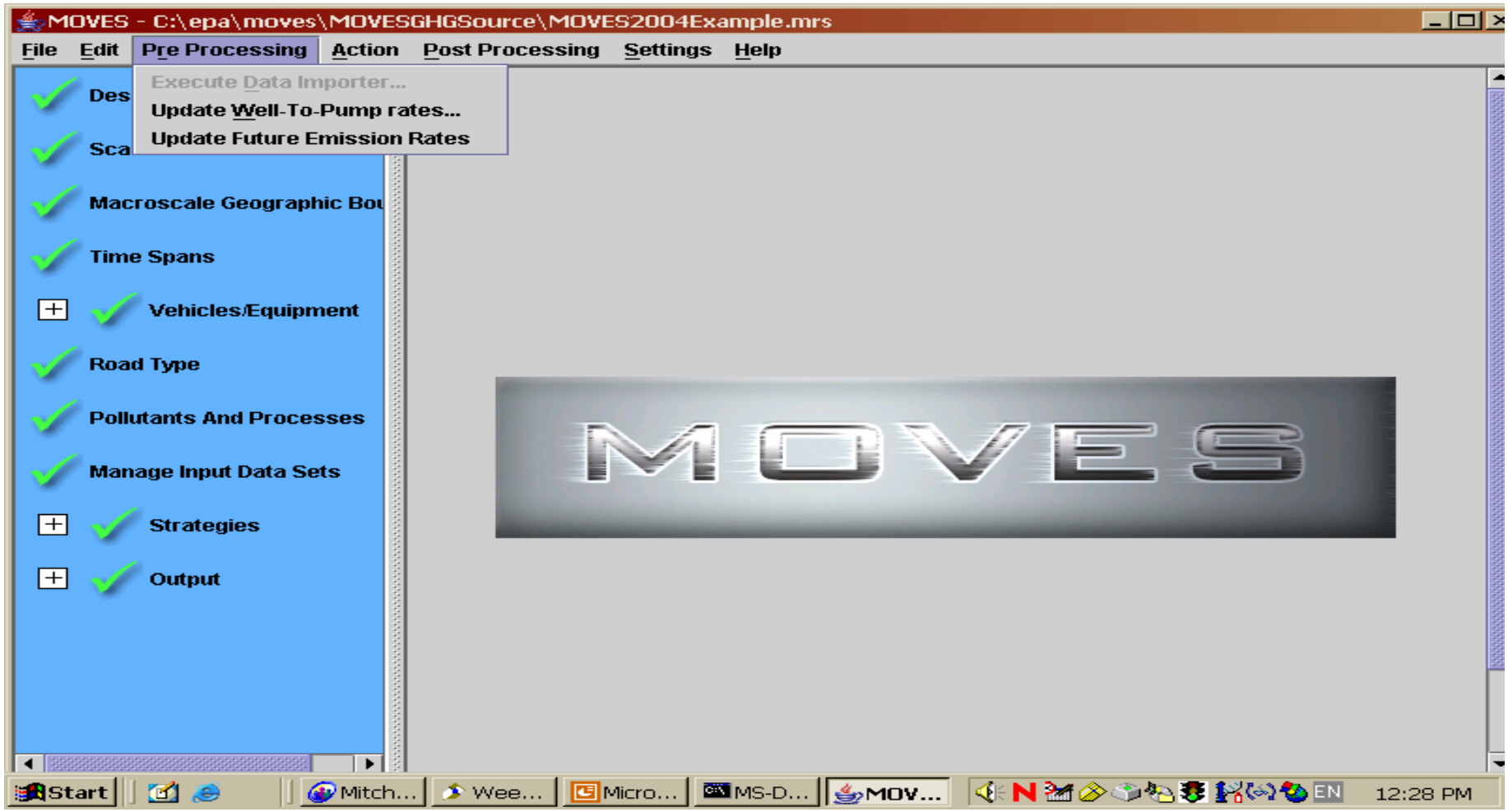
Pre-Processing Steps
Produce Input Databases

- **Placeholder for Data Importers**
- **"Update Well-To-Pump Rates"**
  - GREET Model Interface
- **"Update Future Emission Rates"**
  - Future Emission Rate Creator (FERC)
- **Building our own input database to enter local VMT**

Pre-Processing Steps



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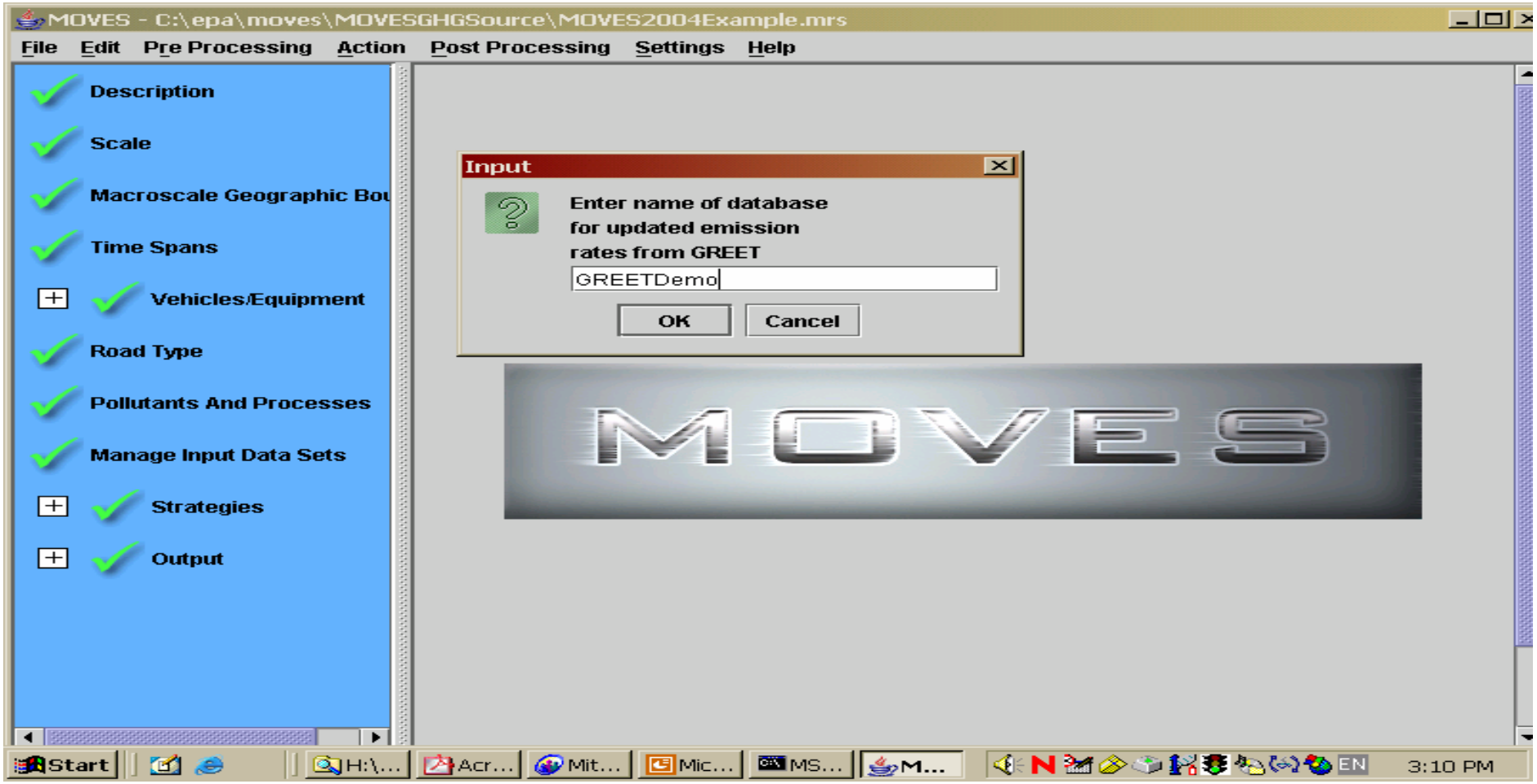
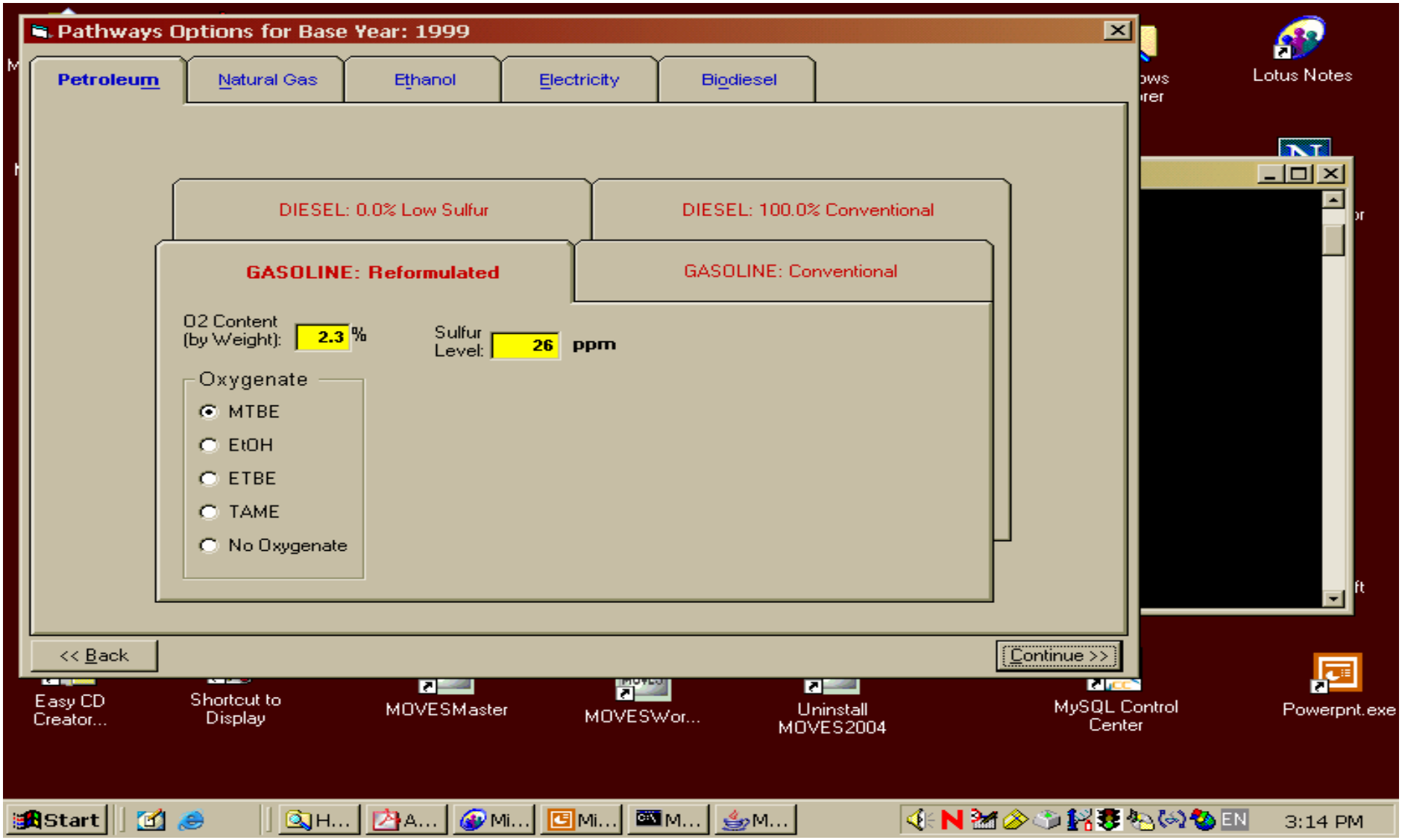
"Update Well-To-Pump Rates"

- Invokes GREET GUI program
- Should be selected by users wishing to customize well-to-pump energy and emission effects via GREET
- Results in an updated table of well-to-pump factors to be specified as input data

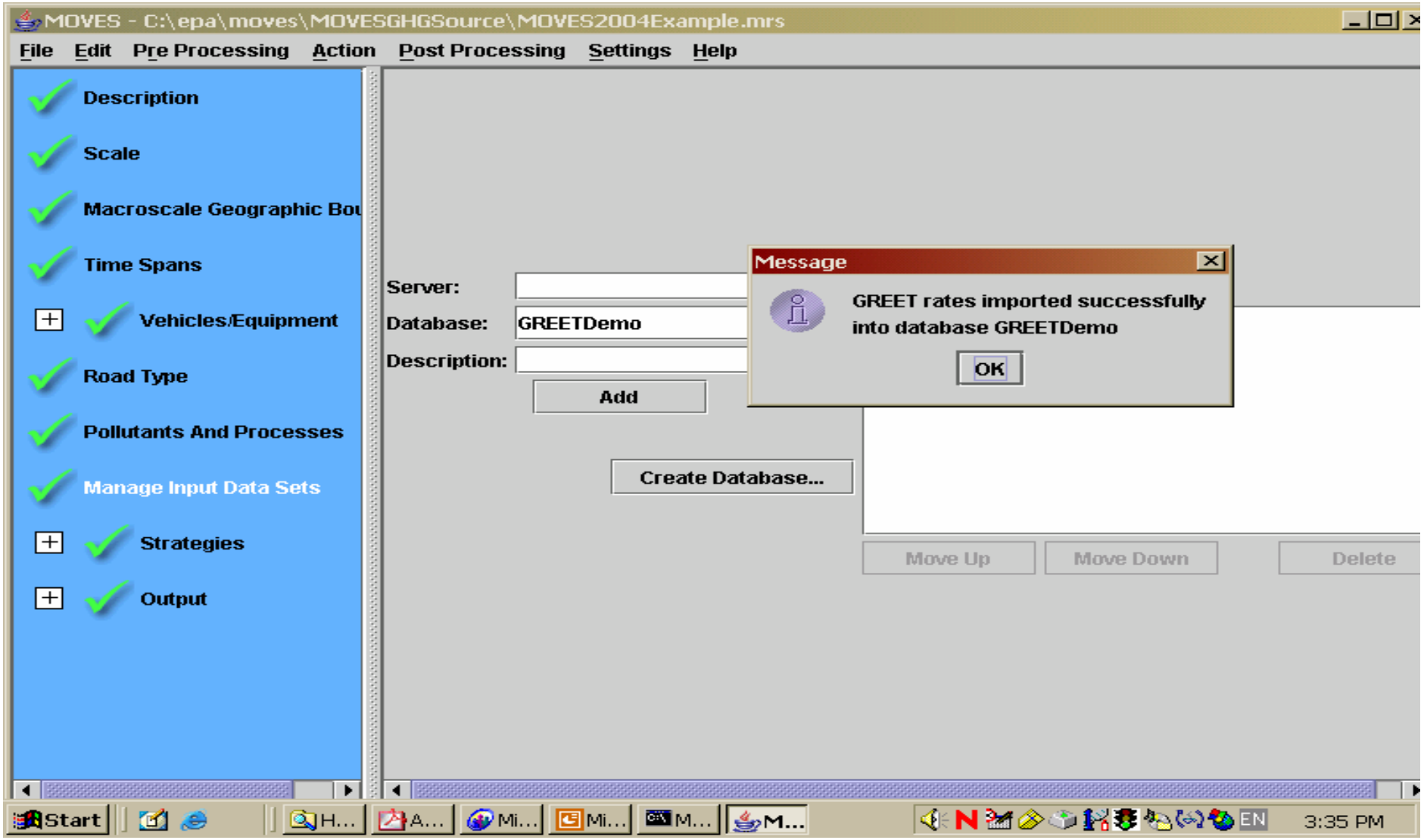
Example: Running GREET to Produce an Input Database



Running GREET - Continued



Running GREET - Continued



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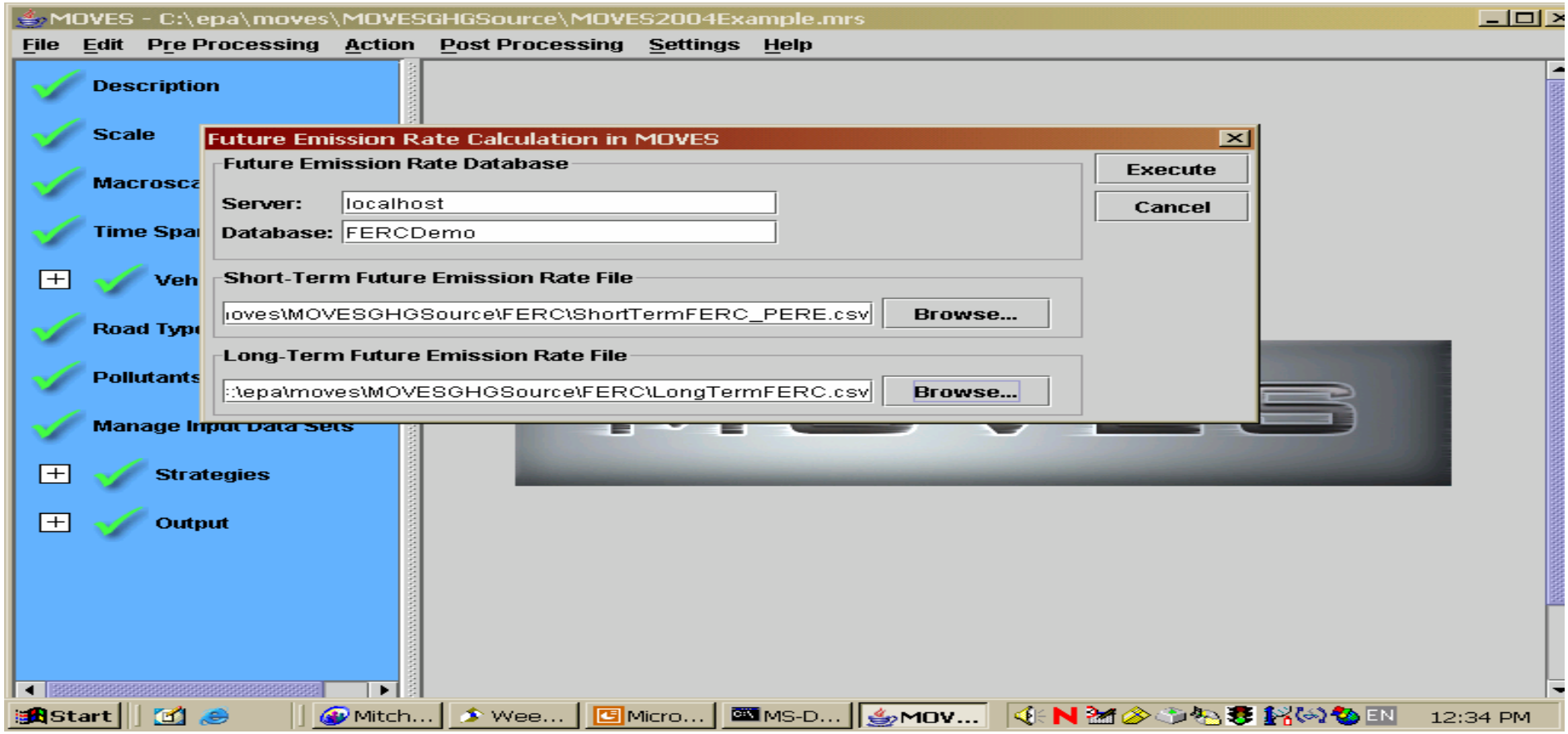
"Update Future Emission Rates"

- Invokes Future Emission Rate Creator (FERC)
- Should be selected by users wishing to customize energy and emission rates for advanced technology, alternative fuel and/or future model years
- Results in an updated table of emission rates to be specified as input data

Example: Running FERC to Produce Input Database



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Customizing MOVES for Local Areas

- **Broad range of options for local users**
- **Minimum requirements:**
  - Redefine modeling domain
  - Replace national VMT with local VMT
  - Replace activity allocation factors
- **Additional options:**
  - Age distributions
  - Temporal allocation
  - Average speed distributions
  - Driving patterns from in-use survey
  - Etc.

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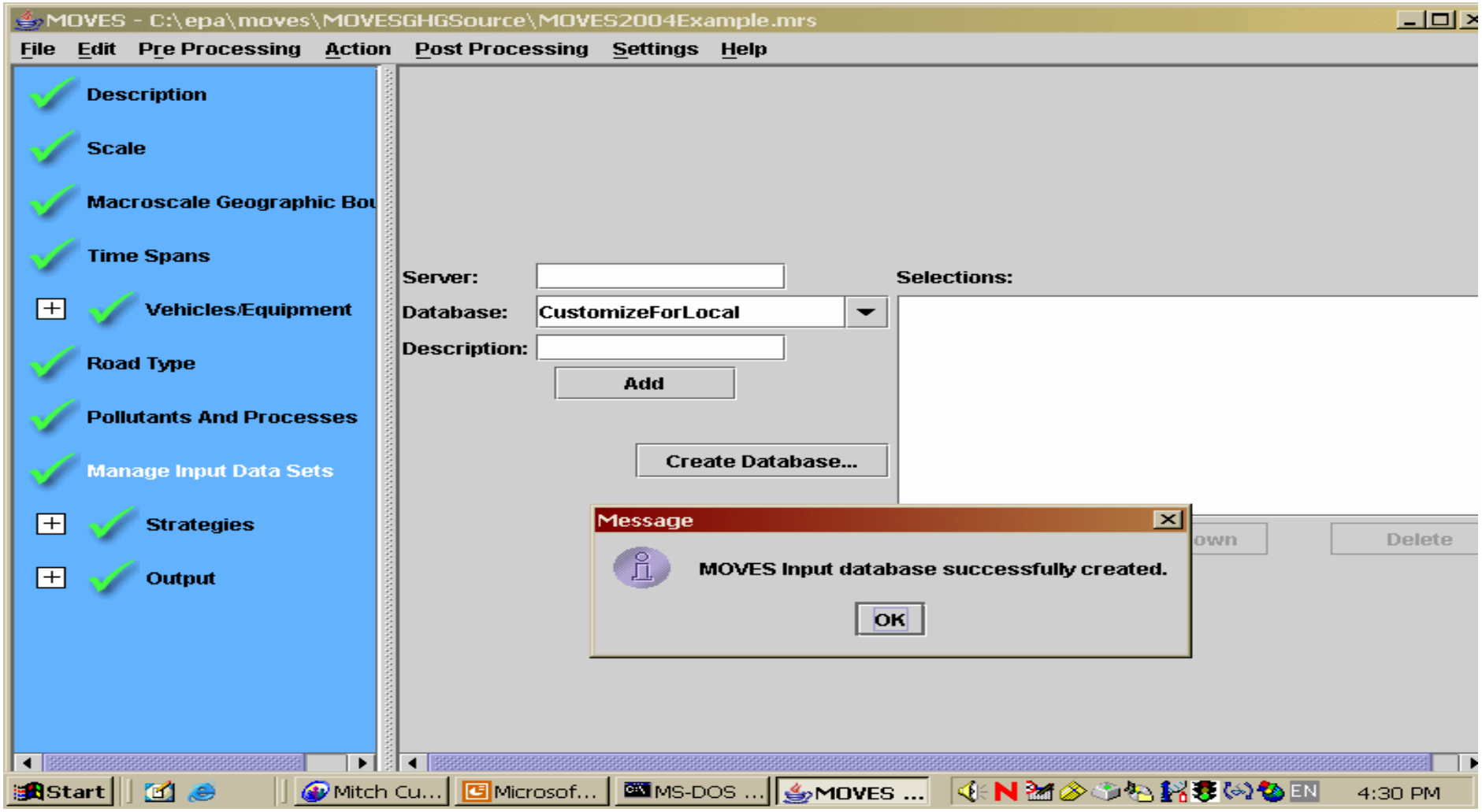
Creating Customized Databases

- **Default data can be replaced by user-supplied data via MySQL**
- **Example: user wishes to replace national VMT (in table HPMSVTypeYear) with local VMT for 1999 base year**
- **Steps:**
  - Place new data in tab-delimited text file
  - Use MOVES GUI to create an empty input database
  - Use MySQL script to load data records for 1999 from text file
  - Add new user input database to run specification

Use MOVES GUI to Create Empty Input Database



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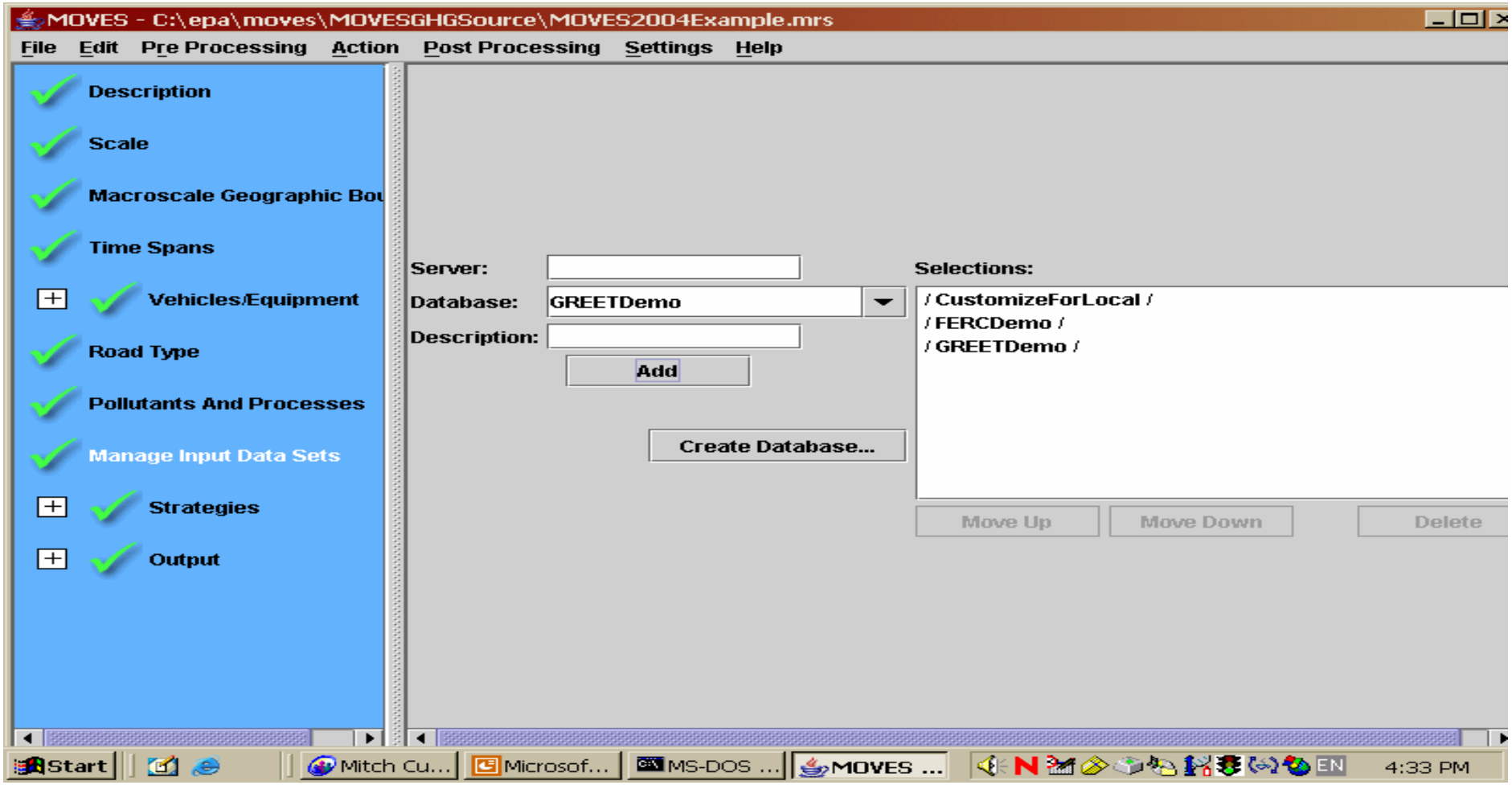
MySQL Script to Replace National VMT Defaults

```
USE CustomizeForLocal;
LOAD DATA INFILE 'C:/VMT.TXT' INTO
   HPMSVtypeYear;
```

Adding Our Three Input Databases to the Run Specification



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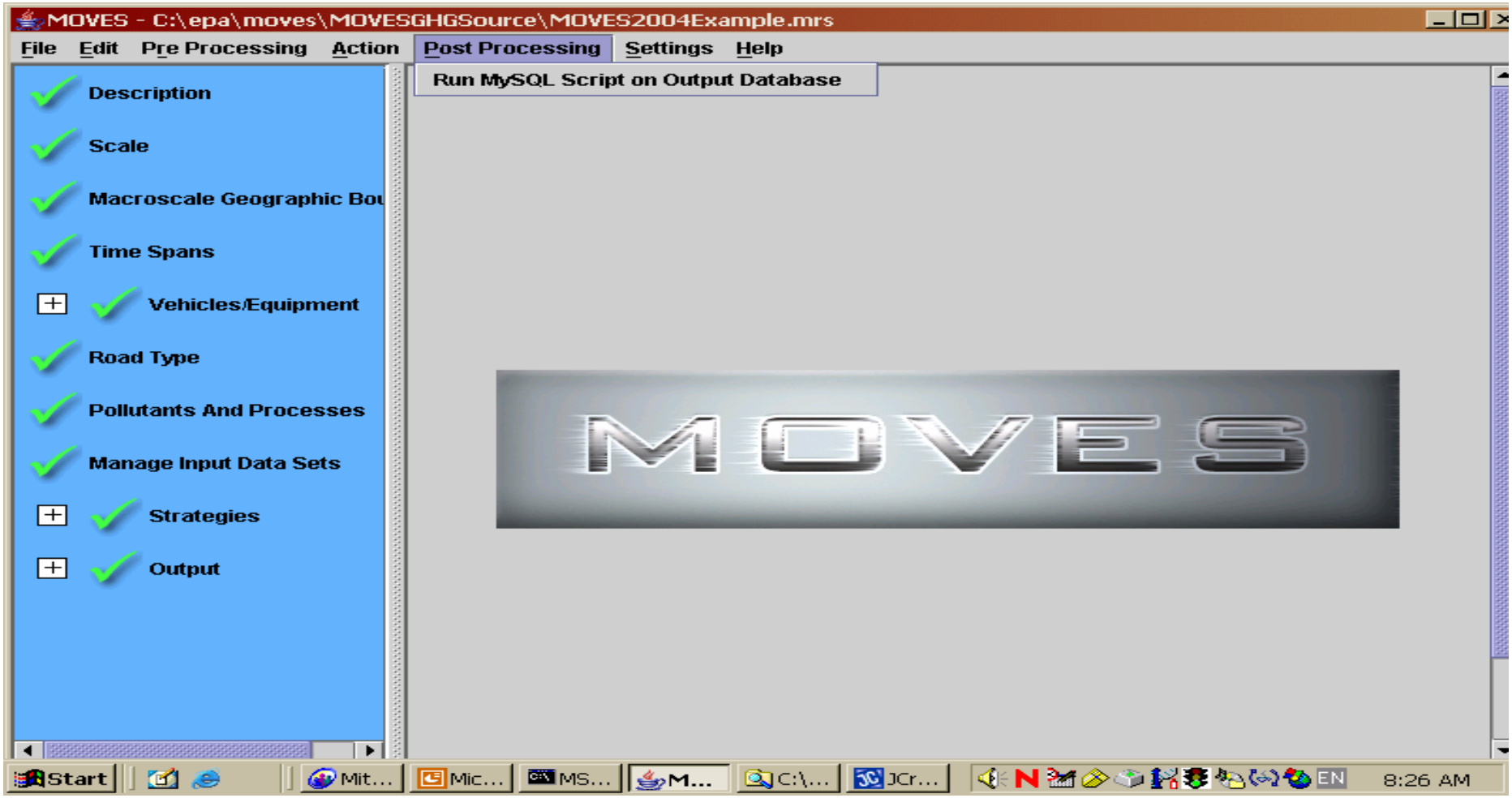
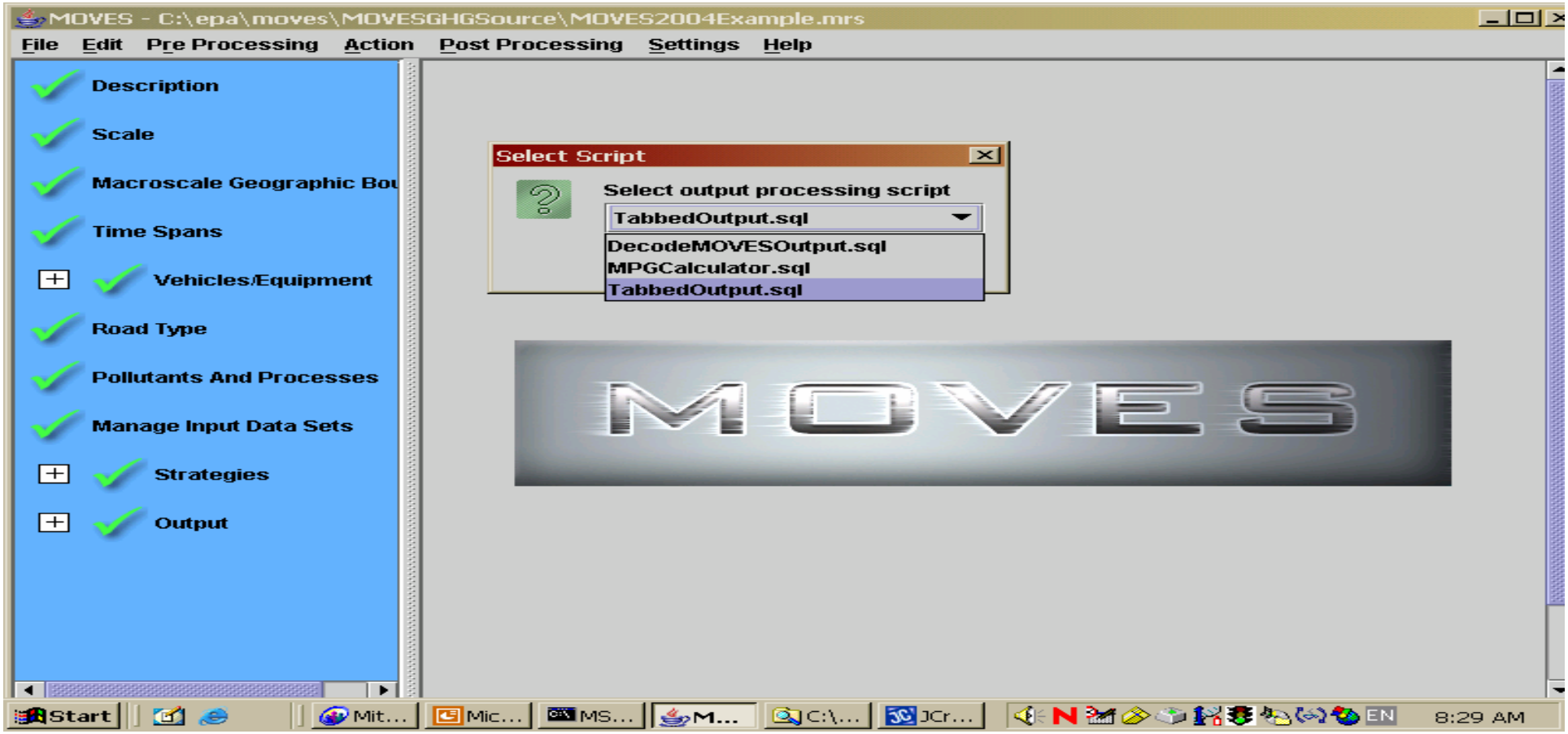
Post-Processing Scripts

- **Supplied with MOVES2004**
  - DecodeMOVESOutput.sql
    - Adds text fields explaining numeric category ids
  - MPGCalculator.sql
    - Adds MPG table to output database
  - TabbedOutput.sql
    - Converts MOVESRun, MOVESActivityOutput and MOVESOutput tables to tab-separated ASCII text files suitable for reading by EXCEL
- **User may add scripts named "xxxxx.sql" to the …\database\OutputProcessingScripts directory**

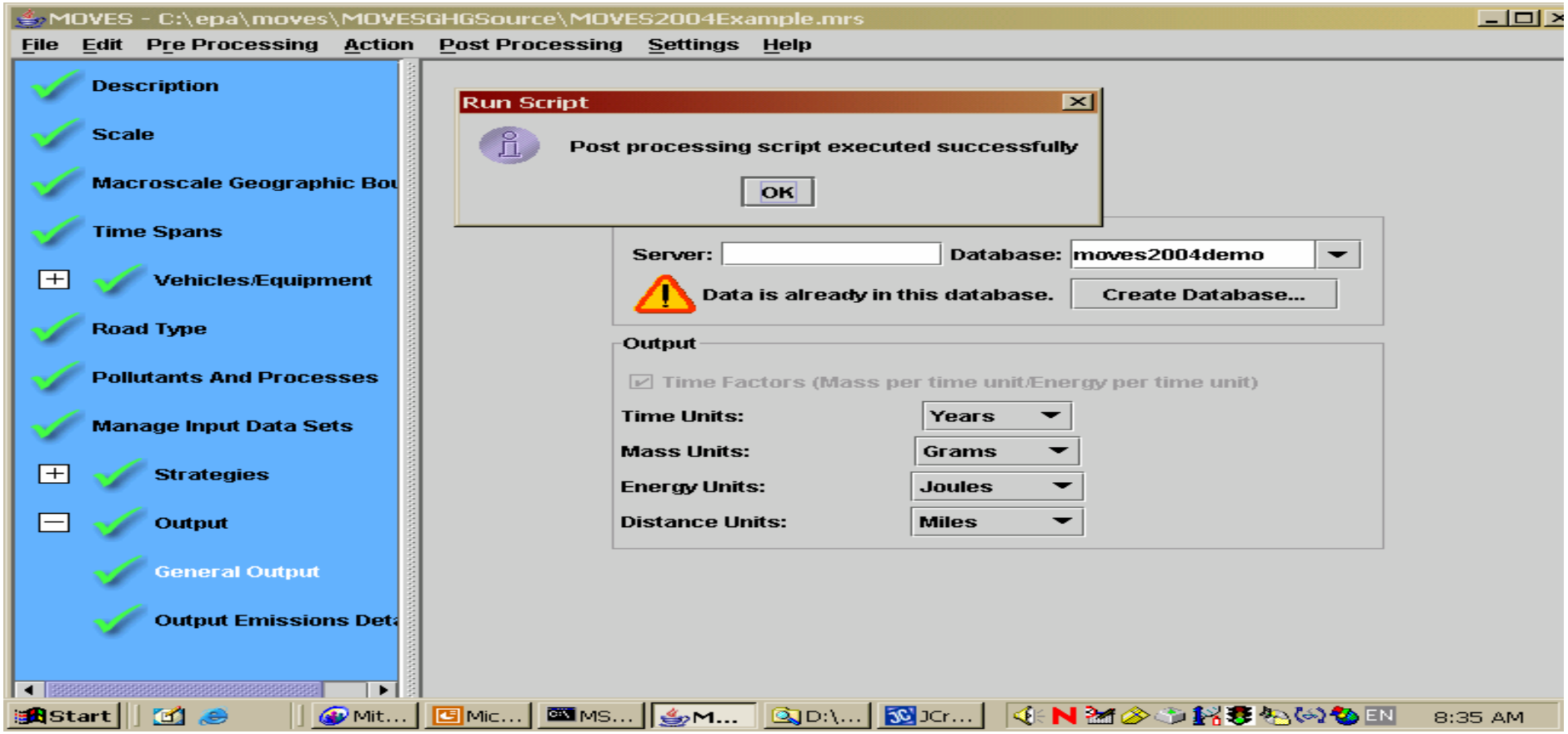
Post Processing Menu



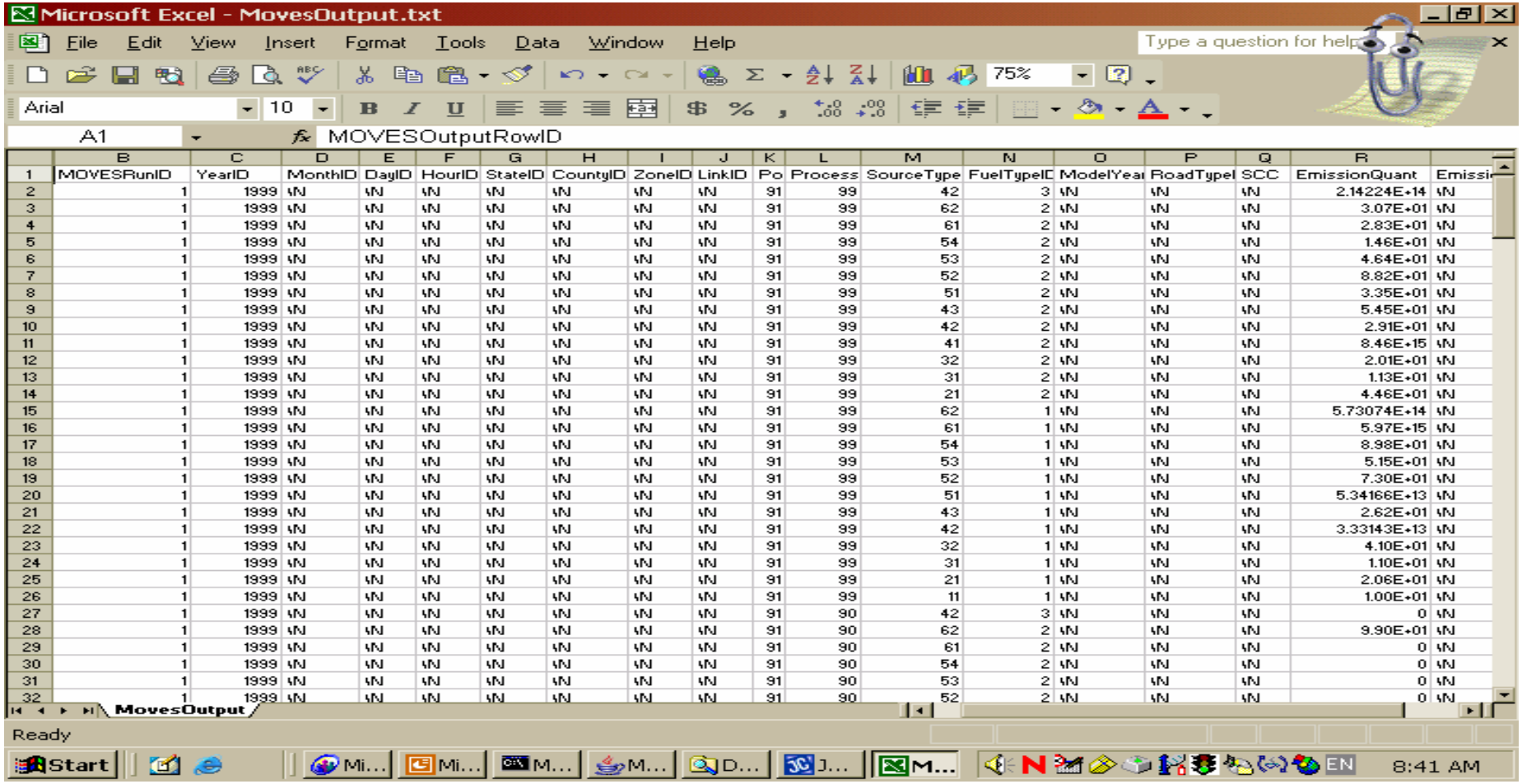
Post-Processing Scripts
Exporting MOVES Output



Exporting MOVES Output (continued)



MOVESOutput Exported to Excel



	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	MOVESRunID	YearID	MonthID	DayID	HourID	StateID	CountyID	ZoneID	LinkID	Po	Process	SourceType	FuelTypeID	ModelYear	RoadTypeI	SCC	EmissionQuant	Emissi
2	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	42	3	\N	\N	\N	2.14224E+14	\N
3	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	62	2	\N	\N	\N	3.07E+01	\N
4	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	61	2	\N	\N	\N	2.83E+01	\N
5	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	54	2	\N	\N	\N	1.46E+01	\N
6	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	53	2	\N	\N	\N	4.64E+01	\N
7	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	52	2	\N	\N	\N	8.82E+01	\N
8	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	51	2	\N	\N	\N	3.35E+01	\N
9	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	43	2	\N	\N	\N	5.45E+01	\N
10	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	42	2	\N	\N	\N	2.91E+01	\N
11	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	41	2	\N	\N	\N	8.46E+15	\N
12	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	32	2	\N	\N	\N	2.01E+01	\N
13	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	31	2	\N	\N	\N	1.13E+01	\N
14	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	21	2	\N	\N	\N	4.46E+01	\N
15	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	62	1	\N	\N	\N	5.73074E+14	\N
16	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	61	1	\N	\N	\N	5.97E+15	\N
17	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	54	1	\N	\N	\N	8.98E+01	\N
18	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	53	1	\N	\N	\N	5.15E+01	\N
19	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	52	1	\N	\N	\N	7.30E+01	\N
20	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	51	1	\N	\N	\N	5.34166E+13	\N
21	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	43	1	\N	\N	\N	2.62E+01	\N
22	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	42	1	\N	\N	\N	3.33143E+13	\N
23	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	32	1	\N	\N	\N	4.10E+01	\N
24	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	31	1	\N	\N	\N	1.10E+01	\N
25	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	21	1	\N	\N	\N	2.06E+01	\N
26	1	1999	\N	\N	\N	\N	\N	\N	\N	91	99	11	1	\N	\N	\N	1.00E+01	\N
27	1	1999	\N	\N	\N	\N	\N	\N	\N	91	90	42	3	\N	\N	\N	0	\N
28	1	1999	\N	\N	\N	\N	\N	\N	\N	91	90	62	2	\N	\N	\N	9.90E+01	\N
29	1	1999	\N	\N	\N	\N	\N	\N	\N	91	90	61	2	\N	\N	\N	0	\N
30	1	1999	\N	\N	\N	\N	\N	\N	\N	91	90	54	2	\N	\N	\N	0	\N
31	1	1999	\N	\N	\N	\N	\N	\N	\N	91	90	53	2	\N	\N	\N	0	\N
32	1	1999	\N	\N	\N	\N	\N	\N	\N	91	90	52	2	\N	\N	\N	0	\N

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Example SQL to Summarize Output

```
SELECT MOVESRunID, count(*), sum(distance)
FROM MOVESActivityOutput
GROUP BY MOVESRunID;

SELECT MOVESRunID, pollutantID, processID,
    count(*), sum(emissionQuant)
FROM MOVESOutput
GROUP BY MOVESRunID, pollutantID, processID;
```

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Summary

- "Direct" MOVES inputs and outputs are MySQL databases.
- But MOVES input databases can be produced by pre-processing steps.
- Post-processing steps can be used to analyze/export moves output databases.
- Several pre- and post-processing mechanisms are included in MOVES2004.
- More will be added by EPA and others.