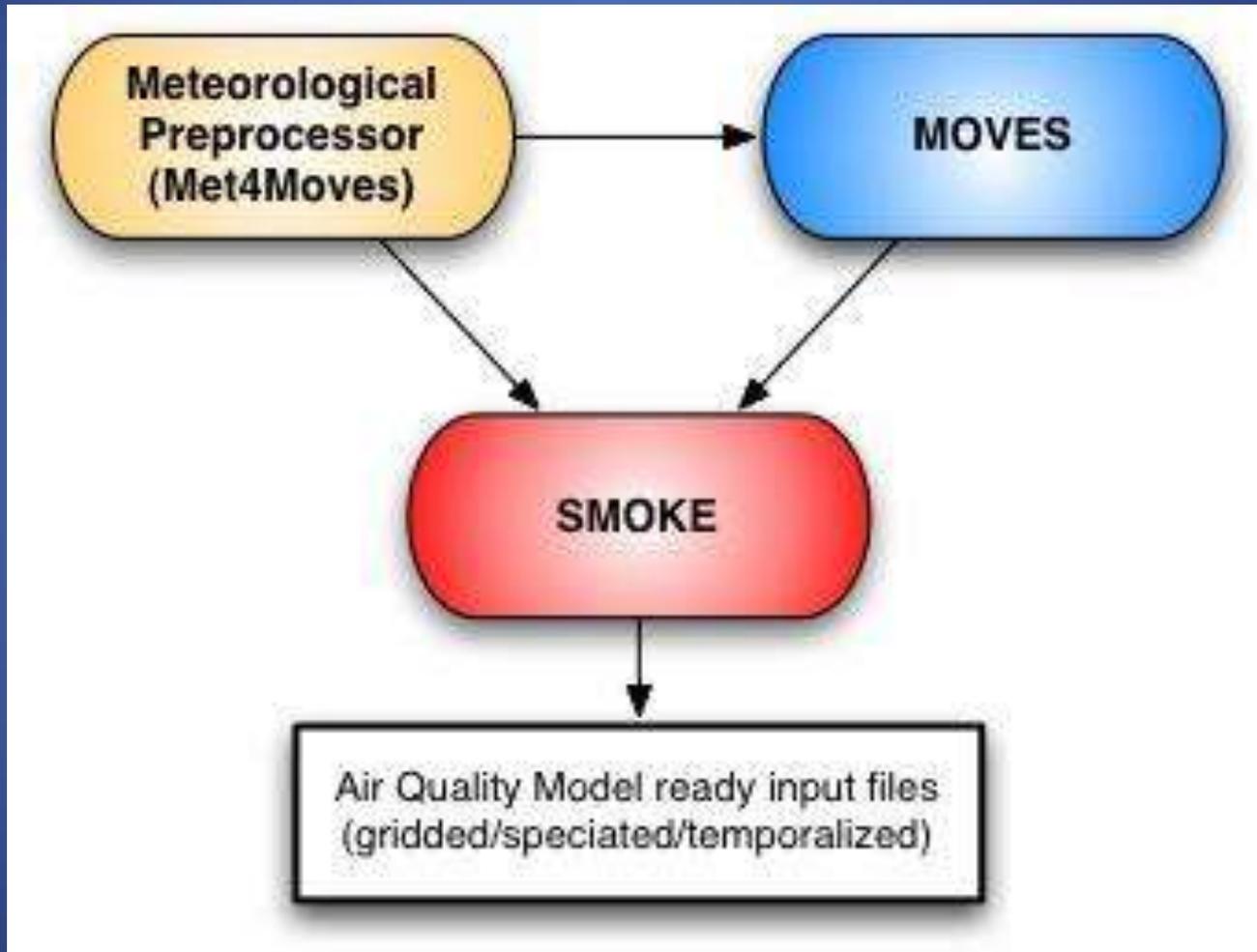


MOVES-AIRPACT4 Integration 2014

Northwest Airquest Annual Meeting
June 18 - 20, 2014

Basic SMOKE-MOVES Integration Flowchart



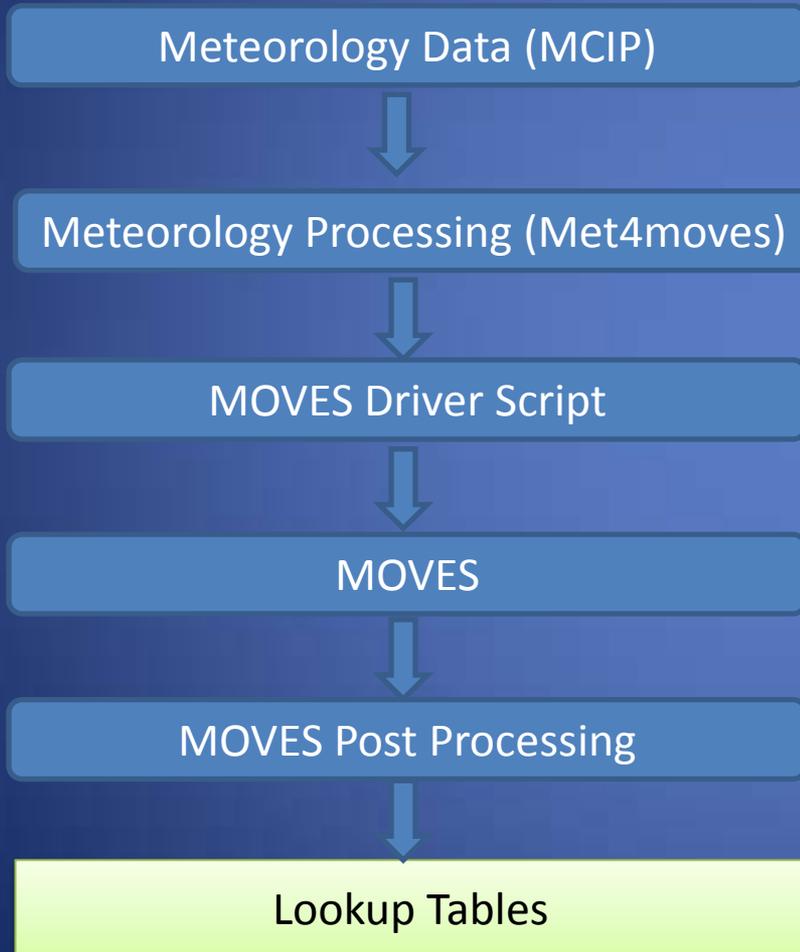
Graphic taken from “User’s Guide for the SMOKE-MOVES Integration Tool”, July 14, 2010, USEPA OAQPS and UNC Institute for the Environment; <http://www.smoke-model.org/index.cfm>

SMOKE MOVES PROCESS CATEGORY

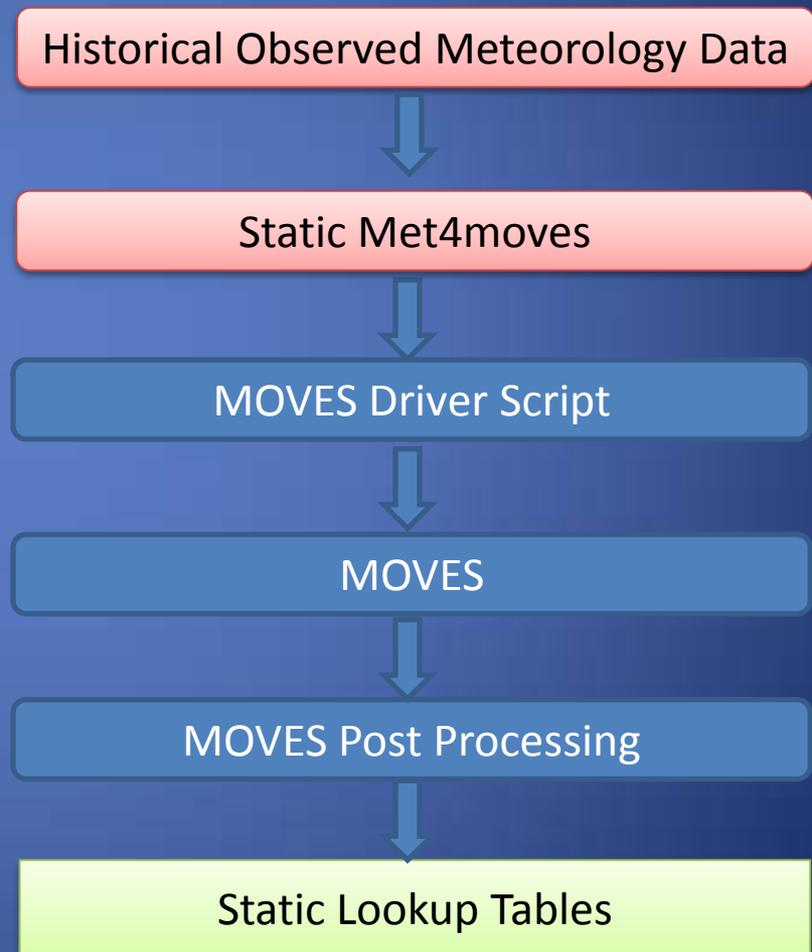
MOVES Lookup Table	Units	smokeProcID	Emissions Process
RatePerDistance (RPD)	Grams/mile	EXR CXR TIR BRK EPM EFL EFV	Running Exhaust Crankcase Running Exhaust Tire Wear Brake Wear On-road Evaporative Permeation On-road Evaporative Fuel Leaks On-road Evaporative Fuel Vapor Venting
RatePerVehicle (RPV)	Grams/vehicle/hour	EXS CXS EPM EFL CEI EXT	Start Exhaust Crankcase Start Exhaust Off-network Evaporative Permeation Off-network Evaporative Fuel Leaks Crankcase Extended Idle Exhaust Extended Idle Exhaust
RatePerProfile (RPP)	Grams/vehicle/hour	EFV	Off-network Evaporative Fuel Vapor Venting

Generate Lookup Table

Standard Way

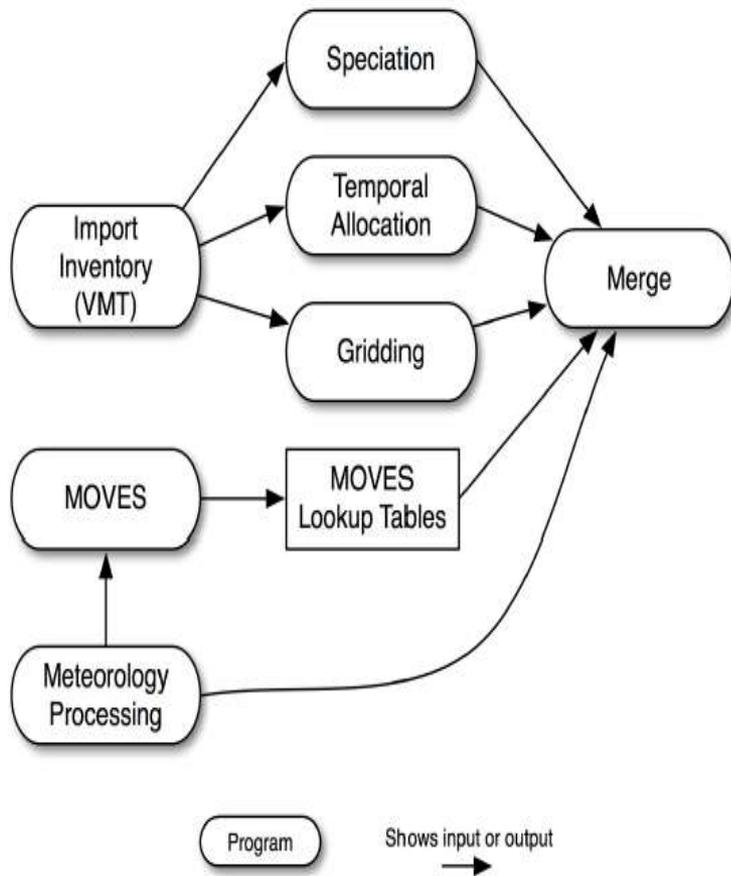


AIRPACT4 Way

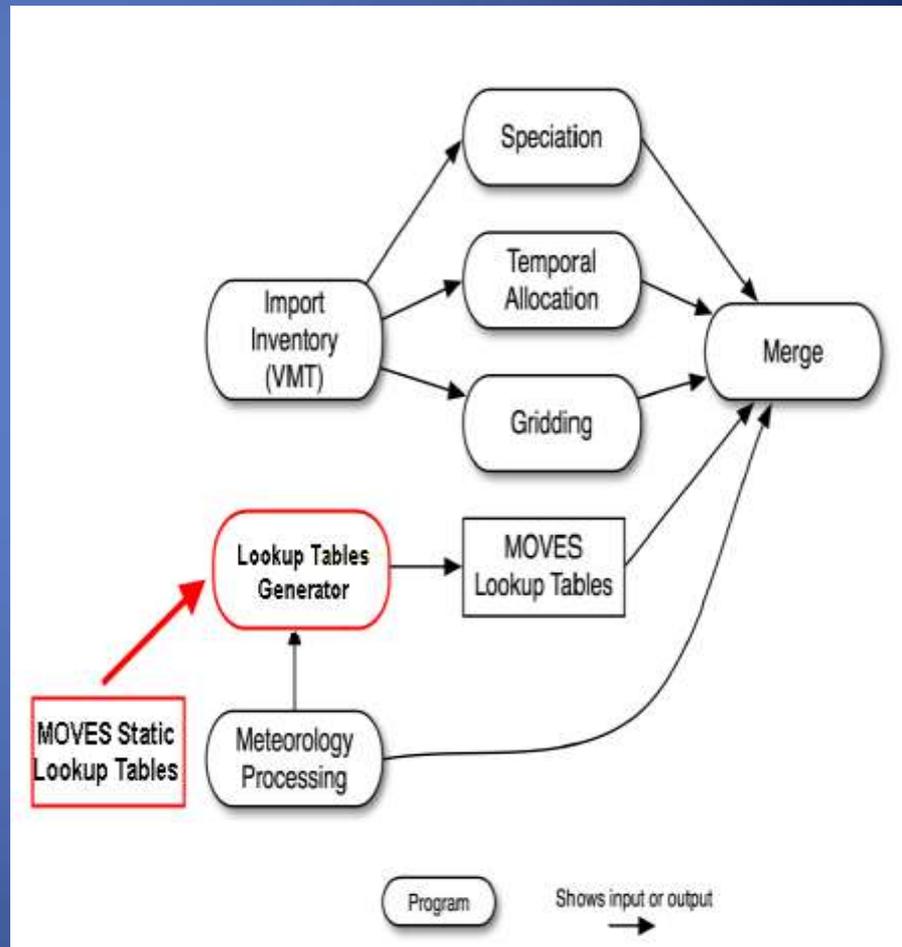


RatePerDistance (On-Network)

Standard Way

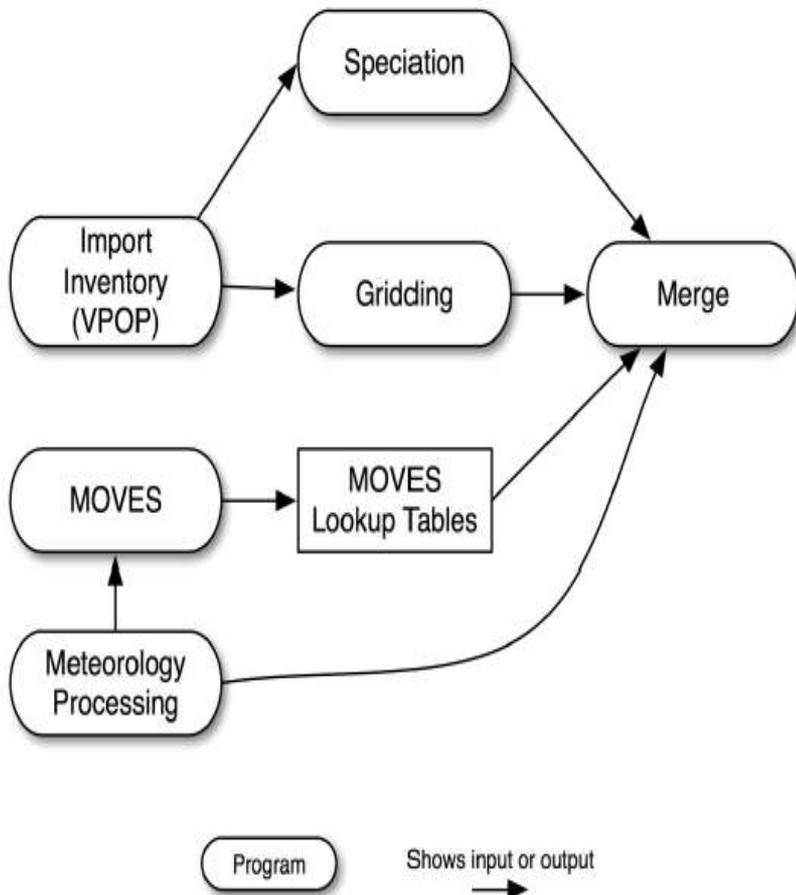


AIRPACT4 Way

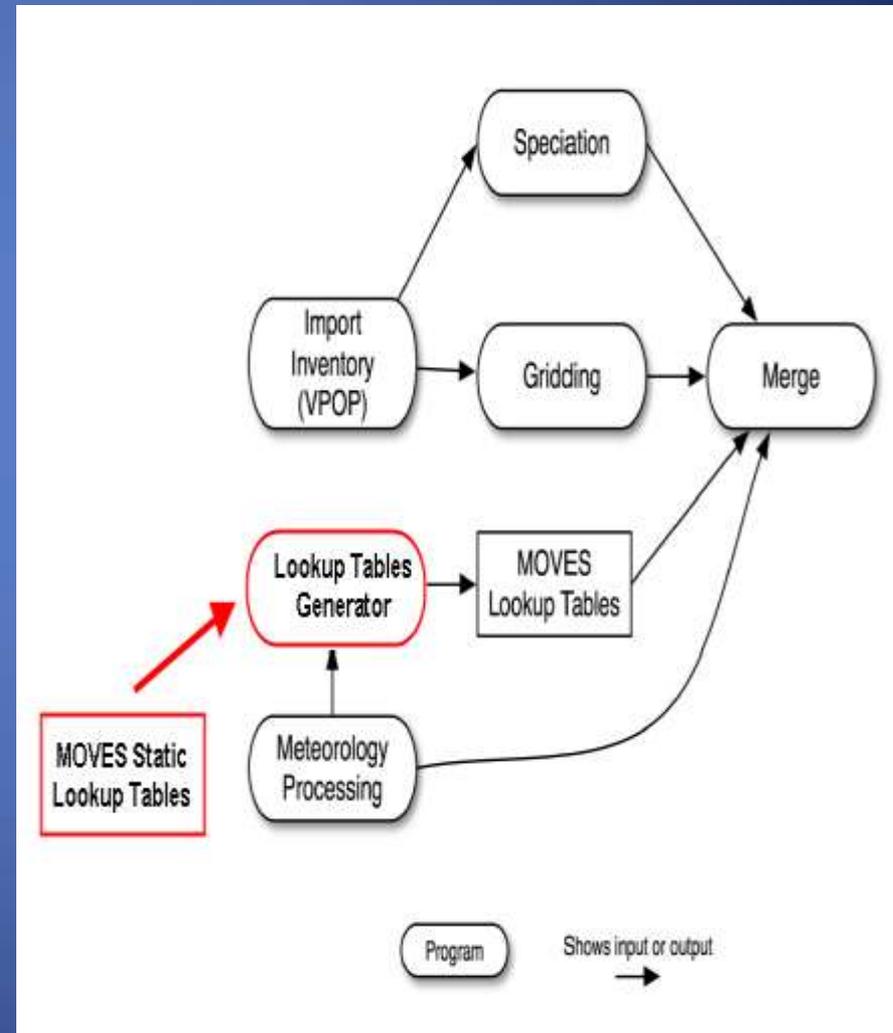


RatePerVehicle and RatePerProfile (Off-Network)

Standard Way

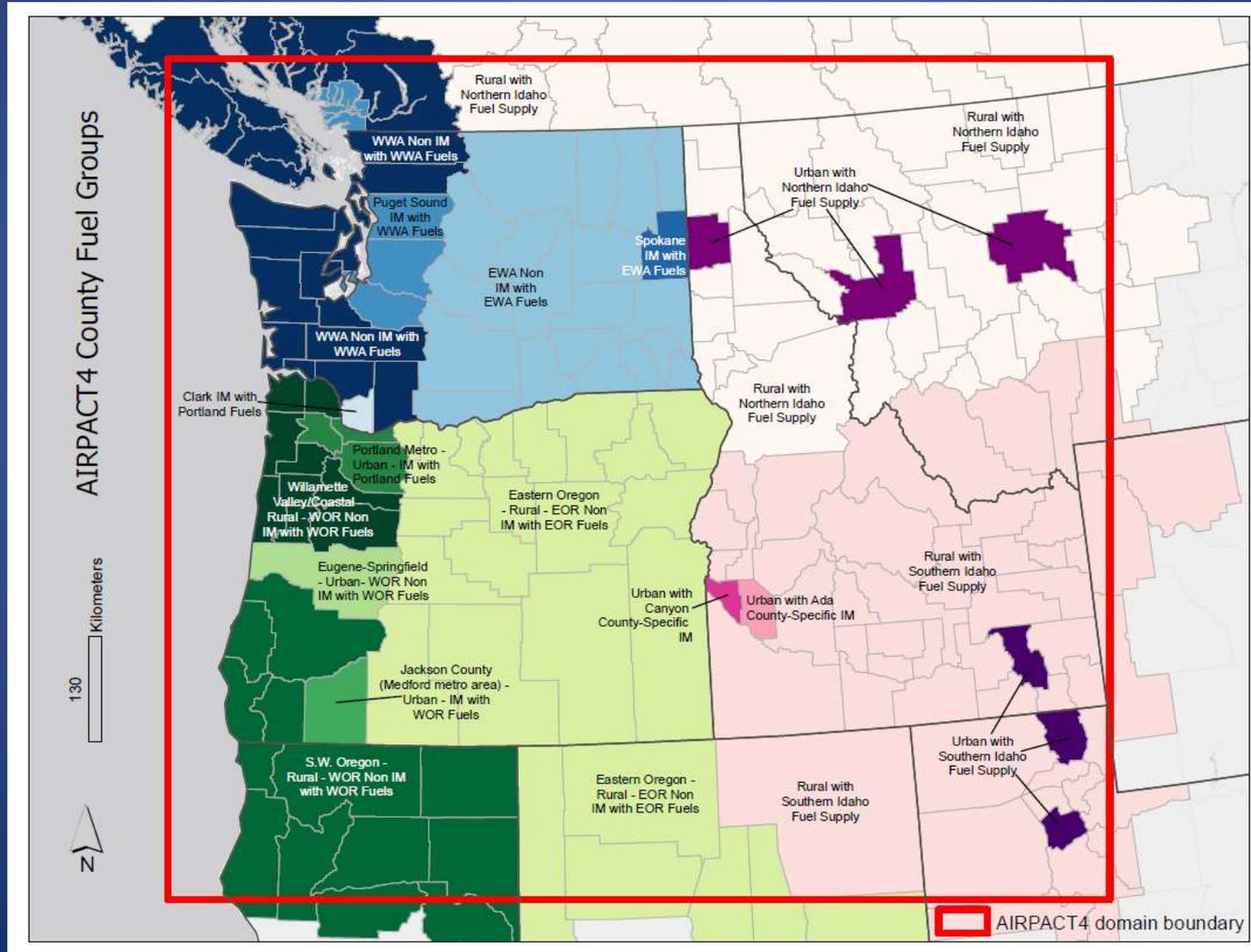


AIRPACT4 Way



What We have done (1)

County Groups and Reference Counties



What We have done (2)

Fuel Month Designations

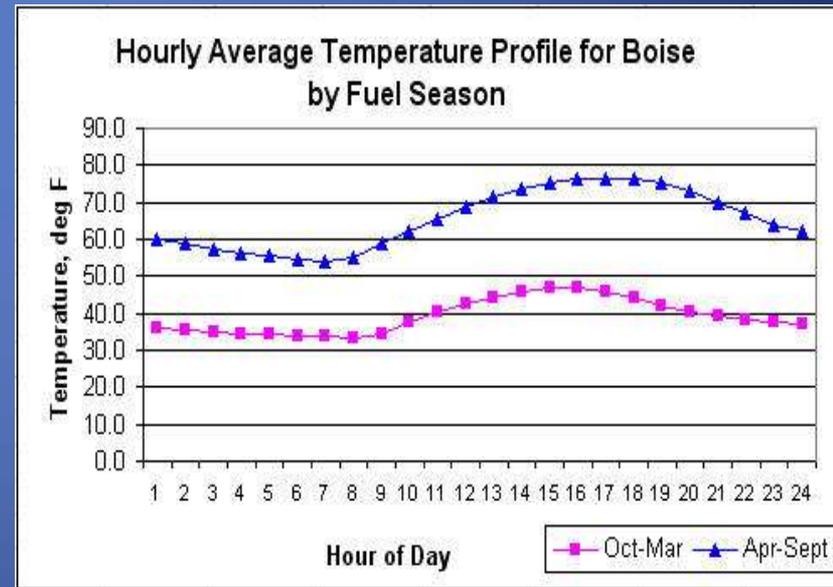
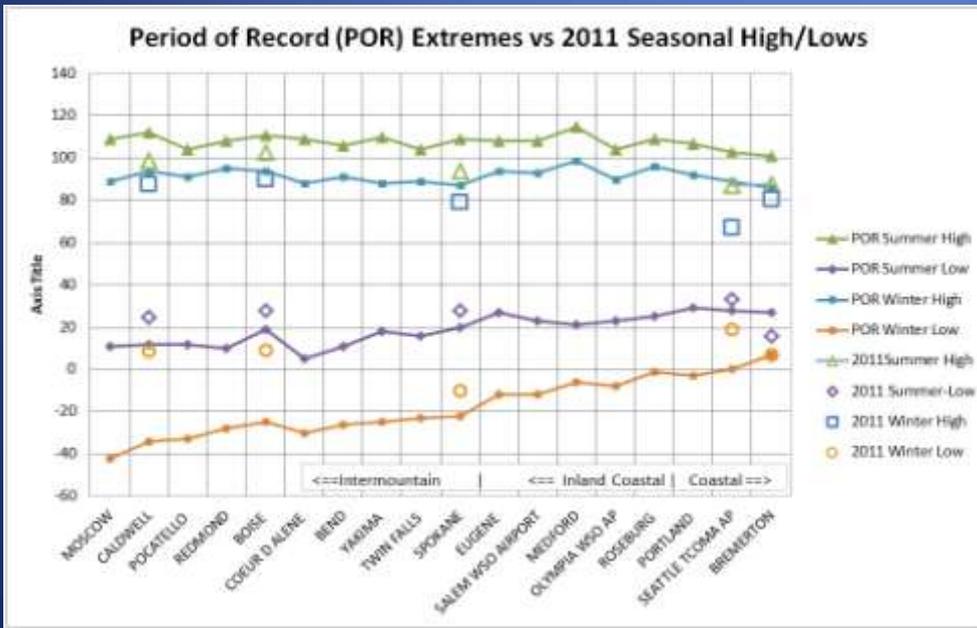
- Two Fuel Months chosen for MOVES-AIRPACT Integration
 - January
 - Represents Winter (November -- April)
 - July
 - Represents Summer (May -- October)

What We have done (3)

Historical Observed Meteorology

Historical Temperature Range will determine number of bins in Look-up tables.

Shape of Diurnal Temperature Profile affects the “Rate Per Profile” evaporative venting emissions – one set for each Reference County/Fuel Month Group



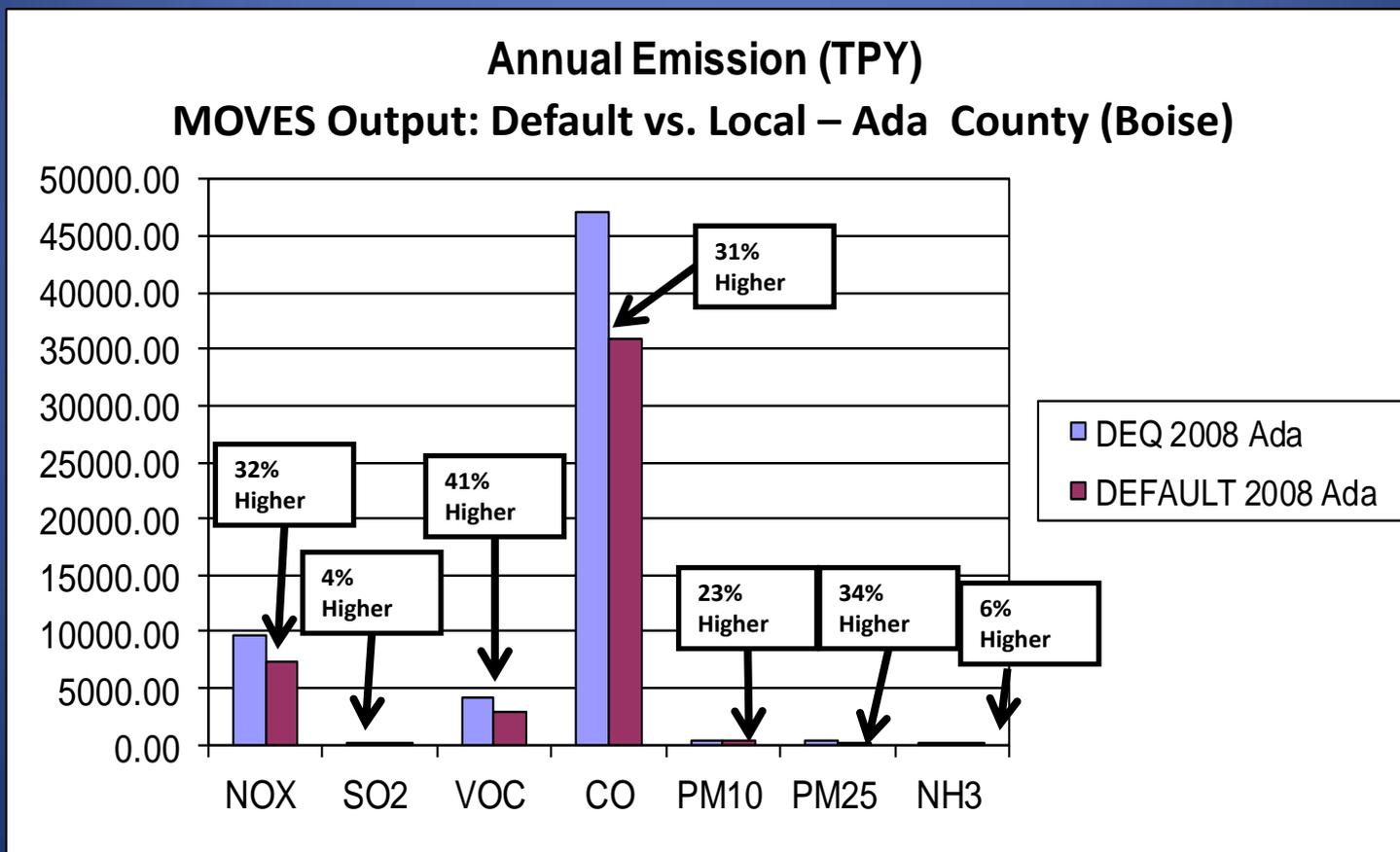
What We have done (4)

Current AIRPACT4 Setup

- Static Lookup Table Approach Used
 - Generated static lookup table in advance
 - Adapted SMOKE process for day to day duty
 - Integrated into AIRPACT4 Forecasting System
- SMOKE 3.0 with MOVES2010a
- Year 2011 National default Used
 - VMT and Vehicle Population
 - Static Emission Factor Lookup Tables

Tasks Remaining (1)

- Upgrade to use local inputs for MOVES and SMOKE



Tasks Remaining (2)

- Upgrade to SMOKE 3.5.1 with MOVES2010b
 - Bug fixes
 - required by gridded emissions reports generation Project for future SIP work
 - Other improvements
 - Latest MOVES2010b
 - Support daily gridded min/max temperatures in MOVES RPP processing

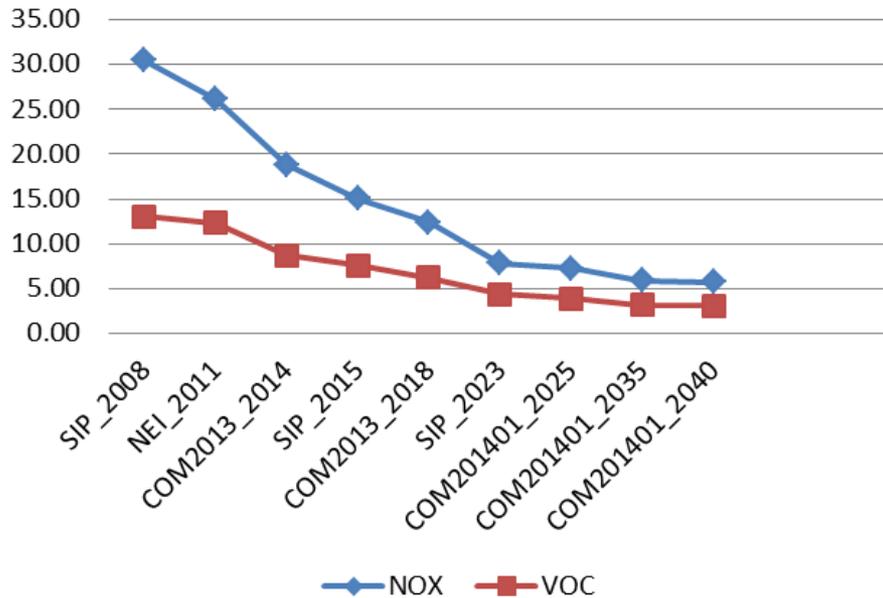
Preliminary Time Lines

- End of July
 - Receive local inputs from Washington, Oregon and Idaho
- End of August
 - Integrate local inputs into SMOKE-MOVES
 - Upgrade to SMOKE3.5.1 with MOVES2010b
 - Transfer new system to WSU

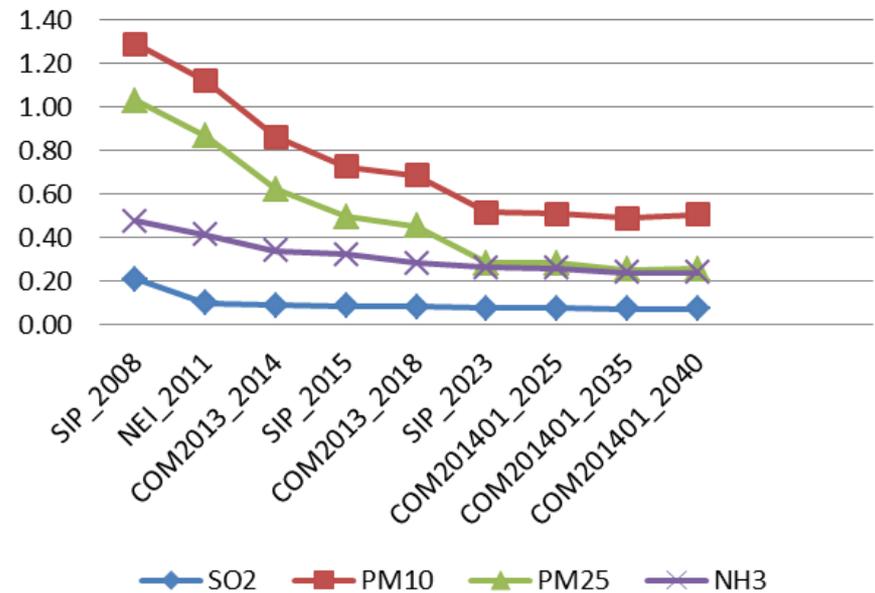
MOVES Emission Factor Trend

- Driven by Regulation and Technology

Emission Tons Per Million VMT



Emission Tons Per Million VMT



Future

- MOVES 2014
 - Tier 3 Motor Vehicle Emission and Fuel Standards
 - New vehicle emissions standards
 - New Gasoline sulfur standard
 - Phase-in schedules (between model years 2017 and 2015)
 - ? July 2014
- SMOKE Integrated with MOVES 2014
 - ??? Oct 2015
- AIRPACT4 Integrated with MOVES 2014
 - ?????? 2016

Table 1
Estimated Emission Reductions from the Final Tier 3 Standards
(Annual U.S. short tons)

	2018		2030	
	Tons	Percent of Onroad Inventory	Tons	Percent of Onroad Inventory
NO _x	264,369	10%	328,509	25%
VOC	47,504	3%	167,591	16%
CO	278,879	2%	3,458,041	24%
Direct PM _{2.5}	130	0.1%	7,892	10%
Benzene	1,916	6%	4,762	26%
SO ₂	14,813	56%	12,399	56%
1,3-Butadiene	257	5%	677	29%
Formaldehyde	513	2%	1,277	10%
Acetaldehyde	600	3%	2,067	21%
Acrolein	40	3%	127	15%
Ethanol	2,704	2%	19,950	16%