

EPA SmartWay Truck Emissions
Test Protocol Workshop

**EPA Planned Hybrid
Truck Testing at
Environment Canada**



Goal of the Test Program

- Collect emissions data as “proof-of-concept” for heavy duty emissions test procedures
- Use the current existing SmartWay test protocol procedures and make adaptations as experience is gained
- Focused on hybrids to compliment current market interest

Implementation of the Test Program

- Perform emissions testing (including fuel economy via CO₂ measurement) on multiple conventional vehicles and multiple hybrid vehicles on chassis dynamometers and on test tracks (for select scenarios)
- Correlation testing with Southwest Research Institute on selected scenarios
 - The coordination with SwRI will be handled by SmartWay (Joseph Bachman)

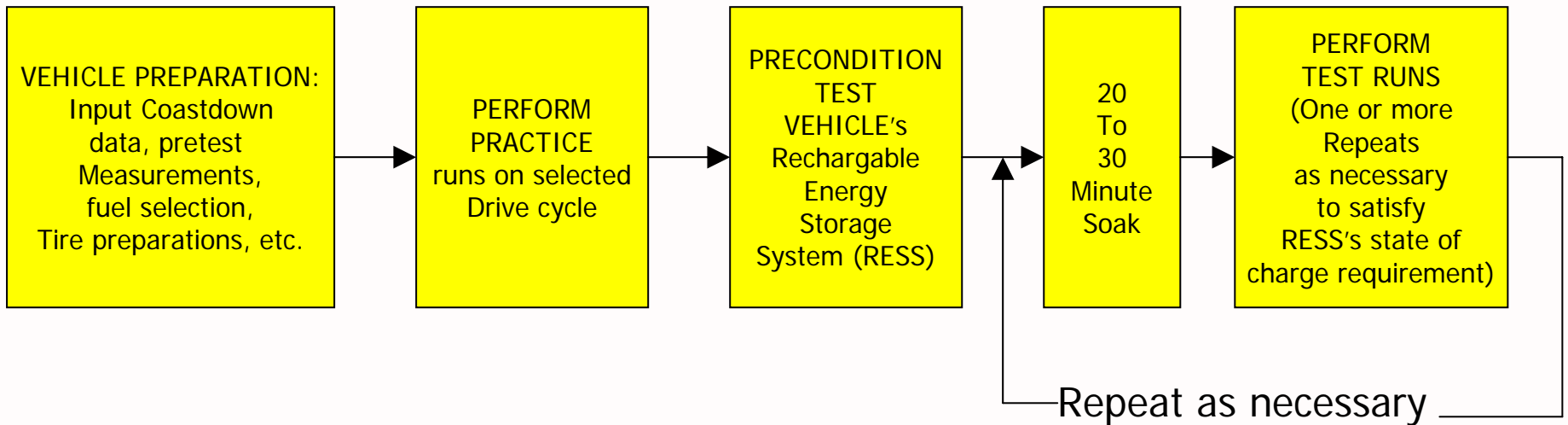
Benefits of the EC Testing

- Refinement of SmartWay test protocol
- Quantifying benefits of hybrids
- Determining relative equivalence between test track and chassis dynamometer methods
- Quantifying test-to-test variability on **both** chassis and track testing
- “Testing out” the statistical method in the current test protocol

Benefits of the EC Testing (cont.)

- Studying the effect of PTO or auxiliary loads
- Determining if the tolerances for target test trace vs. actual are adequate for chassis dynamometer testing
- Determining if test procedures are as robust as LD certification
- Data obtained from this study may help characterize the typical CO₂ consumption rate of a typical truck or hybrid truck

Steps of Chassis Dynamometer Testing



Environment Canada Facilities

- Chassis Dynamometer can test up to a Class 8 truck (75 k lbs)
 - Constant volume and bag sampling capabilities
 - NO_x, CO, HC, PM, and CO₂
- Test track for performing coastdown and emission testing
 - Royal Canadian Mounted Police – good for testing refuse haulers and utility trucks – may not be suitable for Class 8 trucks or transit buses (not an oval track)
 - Have access to a nearby oval track that belongs to Transport Canada

Testing Resources

- EC to cover costs for testing hybrid and conventional vehicles using their chassis dynamometer
 - EC prefers tests to be performed in batches (e.g., transit buses in summer, utility trucks in fall, etc.)
- EPA to furnish test vehicles and associated costs
 - EPA needs to re-engage hybrid stakeholders from the 2005-2007 timeframe to acquire test vehicles
 - Currently soliciting manufacturers to donate vehicles for testing for two or three weeks at a time
 - Arrange lease agreements for vehicles if manufacturers cannot donate test vehicles

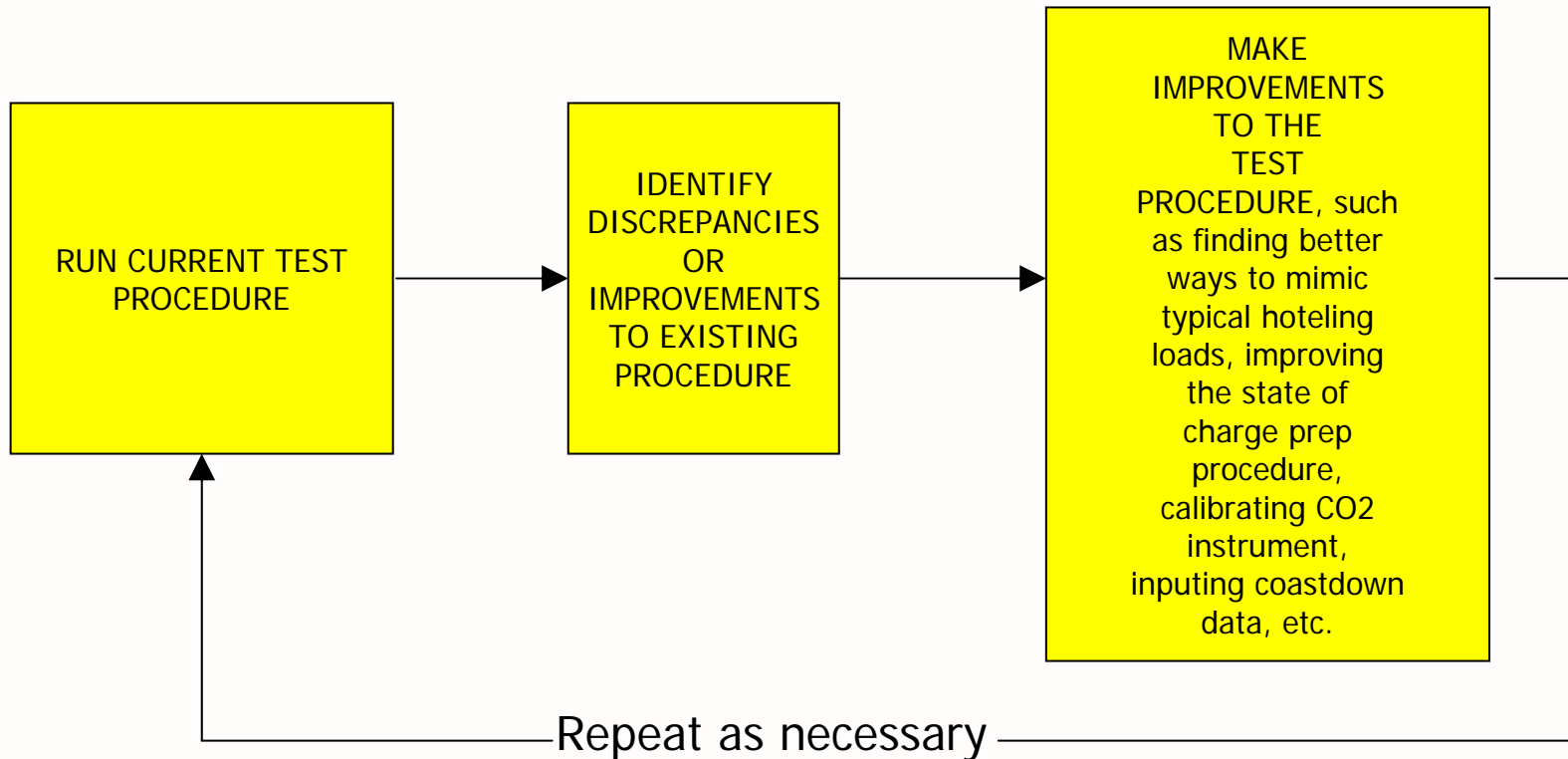
Test Vehicle Selection

- Conventional and hybrid refuse haulers
- Conventional and hybrid transit buses 40'
- Conventional and hybrid articulated 60' transit buses
- Conventional and hybrid Class 8 Line Haul trucks
- Conventional and hybrid Parcel Delivery Truck
- Conventional and hybrid utility truck

Vehicle	Chassis Dyno	Track	w/AC	w/Aux Load or PTO
Class 8 Truck	X	X	XX	XX
Class 8 Hybrid	X	X	XX	XX
Refuse Hauler Truck	X		XX	XX
Hybrid Refuse Truck	X		XX	XX
Transit Bus	X		XX	
Hybrid Transit Bus	X		XX	
Articulated Transit Bus	X		XX	
Hybrid Articulated Bus	X		XX	
Utility Truck	X	X		XX
Hybrid Utility Truck	X	X		XX
Parcel Delivery Truck	X	X		
Hybrid Parcel Delivery Truck	X	X		

XX=track+chassis tests; a Coastdown curve needs to be constructed for each test vehicle. Part of this matrix can be repeated at SwRI for correlation purposes. PTO=power take off (e.g., refuse hauler waste can arm lifters). Aux loads = hoteling loads (heating the cab, run electrical appliances, etc.)

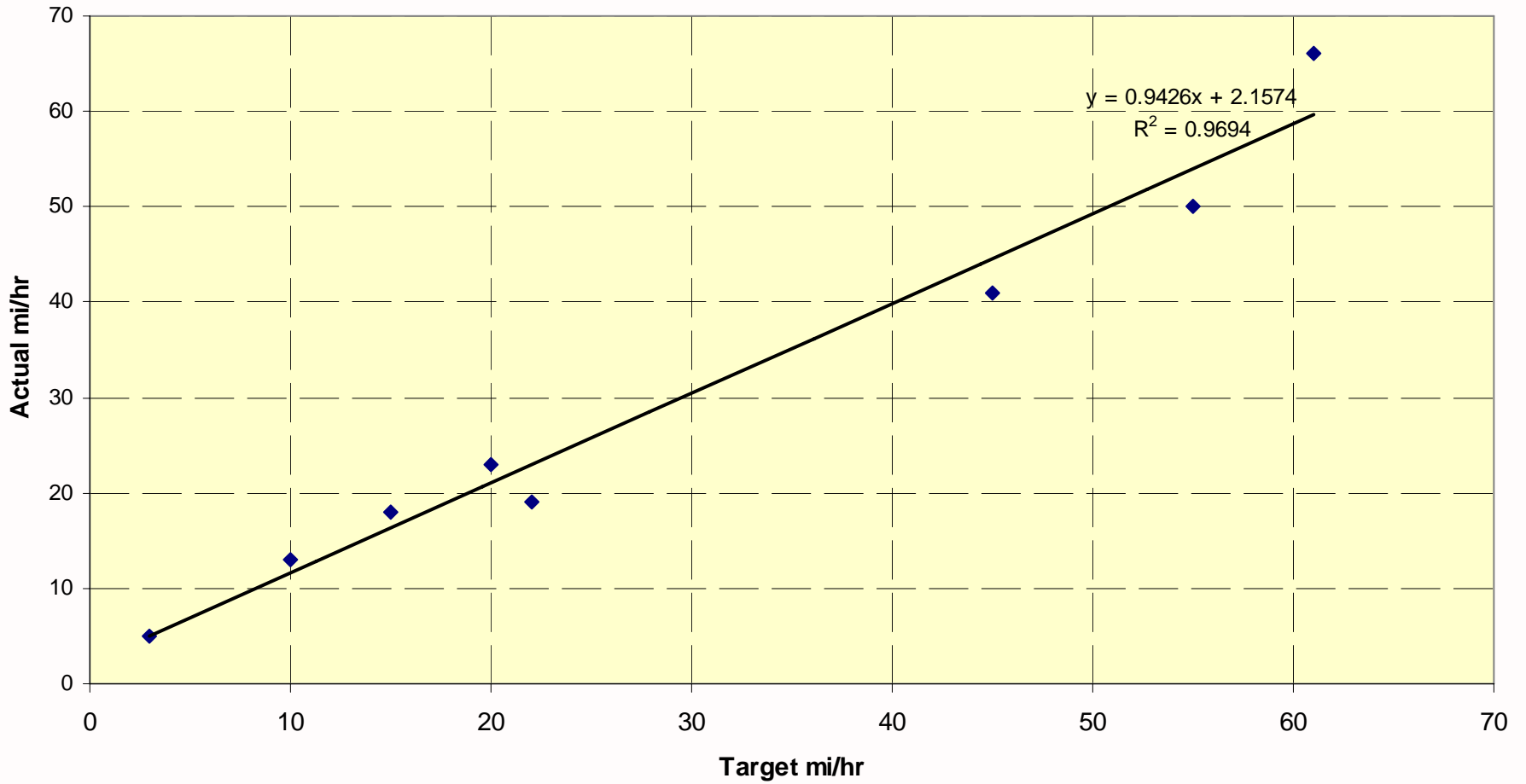
Feedback Loop for Evaluating Test Protocol



Feasibility of Track Testing for Certain Vehicle Types / Cycle Statistics

- Purpose of running cycle statistics is to show the feasibility of performing test track testing with confidence that a driver can follow the drive trace accurately
- Depending on the complexity of the drive trace, certain drive cycles will be less difficult than others
 - Line Haul may be less difficult than a Manhattan Bus cycle
- Target (trace) MPH value should almost equal the actual MPH recorded via datalogger
 - Set a limit on the R^2 value ≥ 0.9

Cycle Statistics (cont.)





Contact

Han Lim

LIm.Han@epa.gov

(202) 343-9286