Durability Rule Implementation

EPA-Industry Meeting
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Topic Overview

- Durability Implementation Updates
  - Manufacturer meetings and approvals
  - New Durability Webpage
  - Manufacturer Guidance Letter
- Equivalency Factors (EFs)
  - EF Process
  - BAT Calculator Inputs
  - EF Equation Format
- Next Steps
- Contacts

Durability Implementation Updates

- ## Manufacturer meetings and approvals
  - 3 approvals; 4-5 pending approvals

- ## New Durability Webpage
  - Under development
  - Website address will be link included in the pending manufacturer guidance letter

- ## Manufacturer Guidance Letter
  - Should be issued in the next 1-2 weeks
  - Main concern: Equivalency Factors (EFs)

EF Process Steps

- For each durability group:
  - Measure histogram on EPA's Standard Road Cycle (SRC)
    - Calculate bench aging time (hours) on EPA's Standard Bench Cycle (SBC) using EPA's Bench Aging Time (BAT) calculator
  - Measure histogram on manufacturer's customized SRC or alternative road cycle (ARC)
    - Calculate bench aging time (hours) on EPA's SBC using EPA's BAT calculator
  - Determine the equivalency factor (EF) using the BAT calculated aging time based on the customized SRC/ARC aging hours and EPA's SRC aging hours

EF Process:
BAT Calculator Inputs

Enter following inputs:

BAT Calculator

Miles represented in Histogram	26
Useful Life Miles	120,000
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensitivy (R)	18500

Bench Aging Hours at Ref Temp	**1201.7**
Adjusted to include In-Use Factor	**1321.9**

Bench aging hours based on catalyst histogram and inputs

- Histogram Mileage
- Useful Life Miles
- Reference temperature (T_r)
- In-Use Correction or A-Factor
- R-Factor

BAT Calculator: Mileage Input Concern

- What useful life mileage should be input into the BAT Calculator?

- **Answer**
  - SRC: Use the applicable FUL (120k/150k)
  - ARC: Use the useful life mileage that achieves the durability objective
    - Actual mileage on ARC that equates to SRC FUL (Note: may be less than applicable FUL)
    - Applicable FUL (120k/150k)

EF Equation Concern

- ## Final Rule format
  - EF = SRC aging time / ARC aging time

- ## Proposed Rule format
  - EF = ARC aging time / SRC aging time

Example EF Calculations

BAT hours for ARC and SRC
(based on 120k FUL and catalyst histogram data)

ARC

Miles represented in Histogram	58
Useful Life Miles	120,000
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensitivy (R)	18500

Bench Aging Hours at Ref Temp	1645.3
Adjusted to include In-Use Factor	**1809.8**

SRC

Miles represented in Histogram	26
Useful Life Miles	120,000
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensitivy (R)	18500

Bench Aging Hours at Ref Temp	1201.7
Adjusted to include In-Use Factor	**1321.9**

- Using the final rule format,
  – EF = SRC aging time / ARC aging time
  – 1321.9 hrs / 1809.8 hrs = **0.730395**

- Using the proposed rule format
  – EF = ARC aging time / SRC aging time
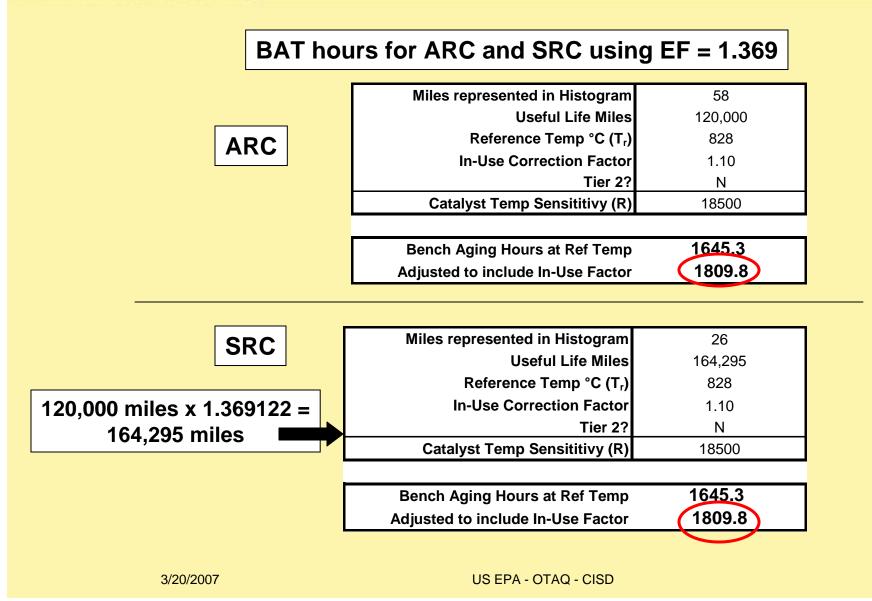 – 1809.8 hrs / 1321.9 hrs = **1.369122**

SRC Calculations: EF Final Rule Format

BAT hours for ARC and SRC using EF = 0.7304

ARC

Miles represented in Histogram	58
Useful Life Miles	120,000
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensititivy (R)	18500

Bench Aging Hours at Ref Temp	**1645.3**
Adjusted to include In-Use Factor	**1809.8**

SRC

120,000 miles x 0.730395 = 87,647 miles

Miles represented in Histogram	26
Useful Life Miles	87,647
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensititivy (R)	18500

Bench Aging Hours at Ref Temp	**877.7**
Adjusted to include In-Use Factor	**965.5**

SRC Calculations: EF Proposed Rule Format

BAT hours for ARC and SRC using EF = 1.369

ARC

Miles represented in Histogram	58
Useful Life Miles	120,000
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensititivy (R)	18500

Bench Aging Hours at Ref Temp	**1645.3**
Adjusted to include In-Use Factor	**1809.8**

SRC

120,000 miles x 1.369122 = 164,295 miles ➡

Miles represented in Histogram	26
Useful Life Miles	164,295
Reference Temp °C (T_r)	828
In-Use Correction Factor	1.10
Tier 2?	N
Catalyst Temp Sensititivy (R)	18500

Bench Aging Hours at Ref Temp	**1645.3**
Adjusted to include In-Use Factor	**1809.8**

Next Steps

- Include a technical amendment in the Component Durability Final Rule to correct EF equation format: ARC/SRC instead of SRC/ARC

- Interim solution: Manufacturers should provide SRC/ARC and the inverse value, ARC/SRC

- This will be discussed in the pending manufacturer guidance letter

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