Sequence VH Surveillance Panel Call
October 24, 2024, Webex

Roll Call:

Afton:	B. Maddock, A. Stone
Ford:	M. Deegan, R. Zdrodowski
GM	T. Cushing, B. Cosgrove
Haltermann:	W. Hairston, E. Hennessy, I. Mathur
IMTS:	S. Clarke, D. Passmore
Infineum:	J. Anthony, T. Dvorak, A. Ritchie (Chair)
Intertek:	A. Lopez
Lubrizol:	T. Catanese
OHT:	J. Bowden
Oronite:	R. Affinito, R. Stockwell
SwRI:	D. Engstrom, T. Kostan, P. Lang, M. Lochte
TEI:	D. Lanctot
TMC:	R. Grundza
Valvoline:	A. Sawant

Chair's Comments

- Meeting minutes from 10/10 are posted.
- Chair Ritchie started the meeting and outlined the agenda items:
  1) Fuel Inventory & New Batch Status
  2) ICF proposal
  3) Old Business
  4) New Business

Fuel Inventory & New Batch Status

Test Stand Activity:

- IAR ran 6 tests in October.
  - Ordered another tanker of fuel, which is 10 tests, and will order another load in December.
  - IAR has 3 tests worth of fuel on site and will start running on high-gravity fuel in November.
- Lubrizol will receive drums of high gravity fuel next week and will run a fuel dilution experiment and calibration test November.
- SwRI has 4-6 weeks of test fuel on site.
  - SwRI ran 6 tests in October.
  - Plans to run 8 tests in November after bringing a 4th stand online.
- Valvoline has not run any tests recently and does not have any tests scheduled.
- Afton is running 4 tests/month.
- Industry is at capacity, about 14 test per month and could go up to 20 tests/month with new stands coming online.

New Fuel Batch Status:

- Haltermann has sent the contract.
    - Labs are reviewing contract for final approval.
- Haltermann has started blending the new batch and will have more detail by next meeting.
- Batch is being blended in new tank.
- Should be ready for matrix by late November.

ICF Discussion

- Ford asked the SP to consider Afton's ICF proposal.
- Afton's statistician presented slides to gauge the interest of the SP in applying an ICF to account for the severe calibration results at Lab A & Lab G.
    - Pro:
        - Allows labs with severe calibration results calibrate stands more easily.
    - Cons:
        - Applying an ICF to results that are still trending down does not accurately represent the performance of the test.
        - An ICF will allow labs to calibrate, but the SA's will continue to grow and not accurately represent the performance of candidates.
- A majority of SP members, including TMC, believe that the industry should continue testing with this fuel batch without an ICF since the supply will be exhausted in a few more months.
- TMC Comments:
    - Fuel degradation over time has happened with past Sequence V fuel batches.
    - The degradation was not as noticeable while using the DJ batch because half of the fuel was used for VG.
    - An ICF will correct the current results but will not be accurate for results that are trending on the same direction.
    - ICF is to help labs calibrate but will not help candidates.
    - It is possible that the stand differences are exacerbating the issue.
- SwRI believes applying an ICF will allow the results to drift further from target instead of being capped by the SA limit.
- Infineum's statistician showed a chart indicating that an ICF would not address the lab differences.
- Oronite believes all the labs verified calibration test results should be considered valid whether or not they are on target.
    - Agrees that more calibration tests may be a good solution to reduce SA lag and produce more data to determine the source of severity.
- There was no consensus from the SP that an ICF should be pursued further.
- The statisticians agreed to research further options to address the severity drift.

Old Business:

New Business:

The meeting ended at 10:00 am EDT.
The next meeting will be held on 11/7/2024 9am EDT.

VH FUEL SEVERITY

November 7, 2024

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Stats Group

- Amanda Stone, Afton/New Market
- Amy Ross, Valvoline
- Jo Martinez, Chevron Oronite
- Martin Chadwick, Intertek
- Phil Scinto, Lubrizol
- Ricardo Affinito, Chevron Oronite
- Rich Grundza, TMC
- Seth Demel, Shell
- Todd Dvorak, Infineum
- Travis Kostan, SwRI

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Summary of Options

1. Do nothing and allow the SAs to carry the fuel severity for the remainder of the fuel batch.
2. Implement an AES ICF of 0.36 for fuel batch lots N-000010-11 and later. Total adjustment (ICF+SA) will be capped at 1.8 standard deviations, which would be 0.90 for AES.
   - This analysis is excluding the 3 recent extreme results.
3. Implement an ICF of 0.64for AES, an ICF of 0.14 for AEV50, and an ICF of -0.23 for RAC (transformed) for fuel batch lots N-000010-11 and later.
   - This analysis is including all valid AC, AF, and OC results.
   - This option is not recommended by the statistics group.

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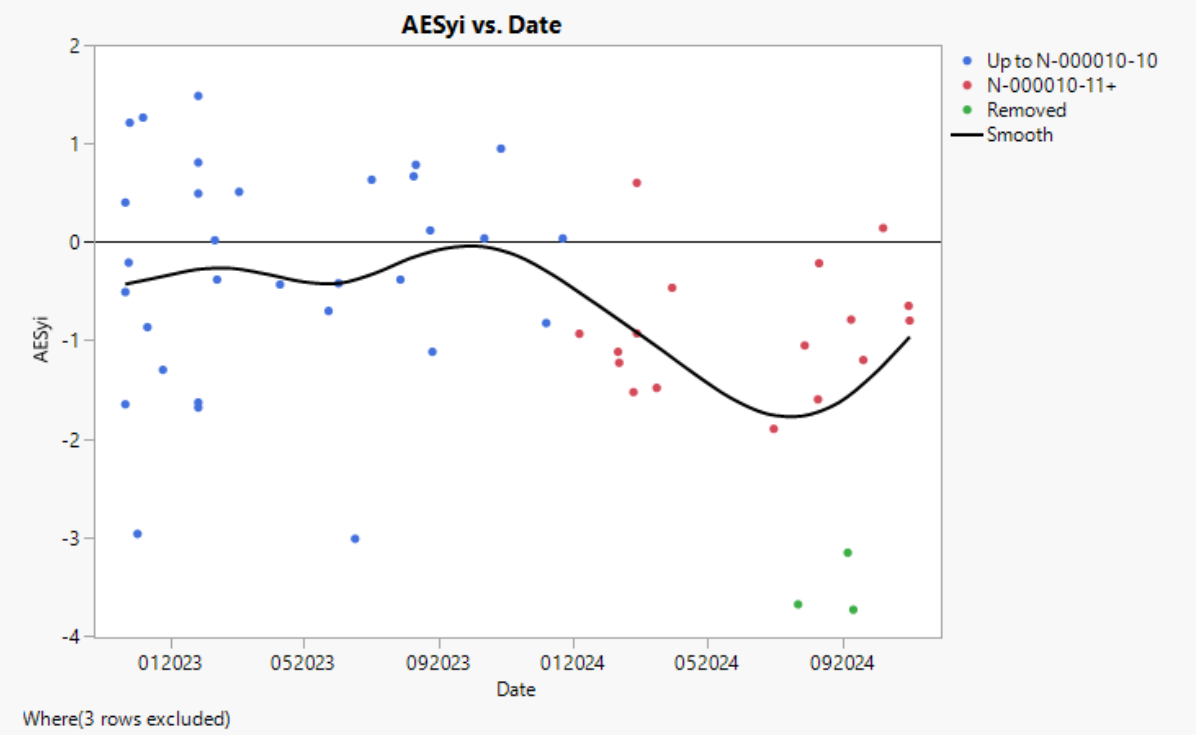
Statistically Significant Differences in Fuel Batches

- Batches N-00010-11+ show as significantly different from previous batches for AES when we include all data and when we exclude the 3 recent extreme points
  - AES plot shown below, additional plots in Appendix



w/o Green	ICF	P-Value
AES	0.36	0.0166
AEV50	--	0.2588
APV50	--	0.8128
RAC (Transformed)	--	0.1782

All Data	ICF	P-Value
AES	0.64	0.0002
AEV50	0.14	0.0208
APV50	--	0.5556
RAC (Transformed)	-0.23	0.0175

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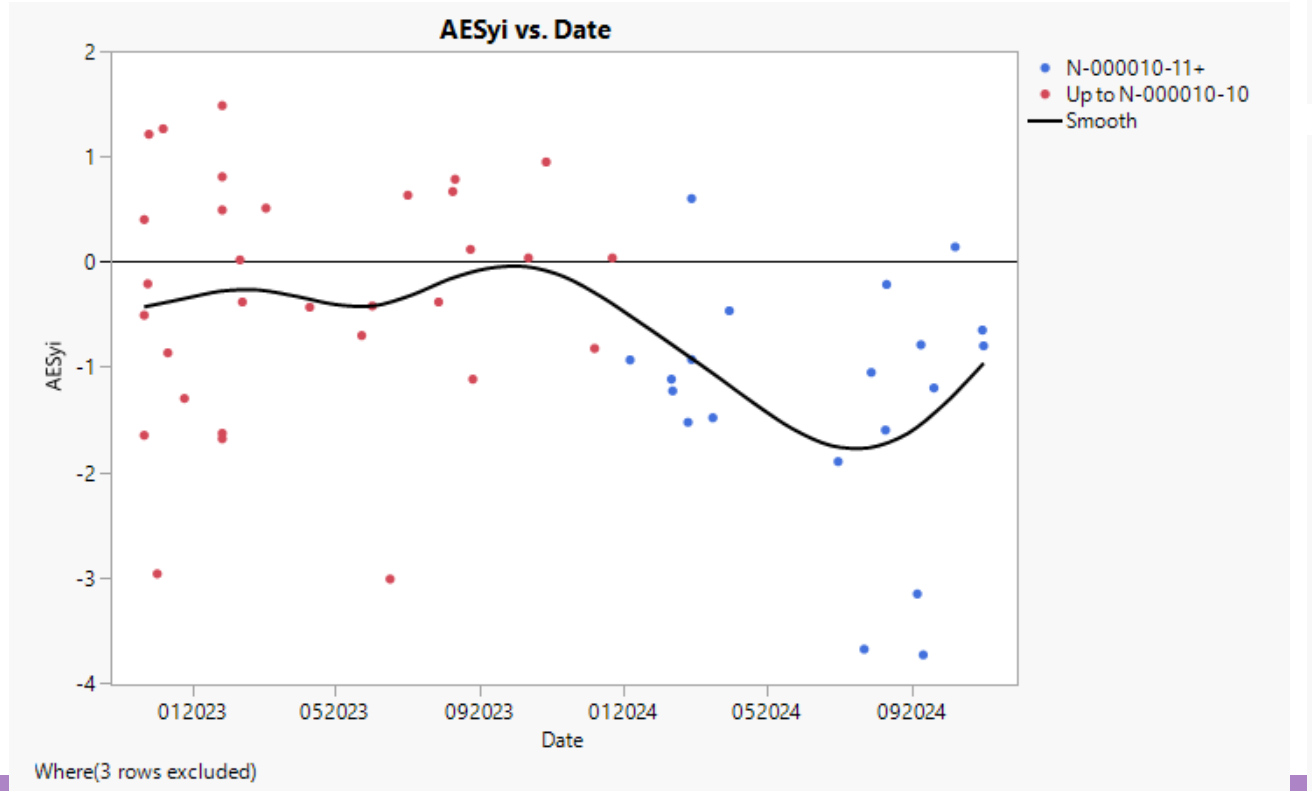
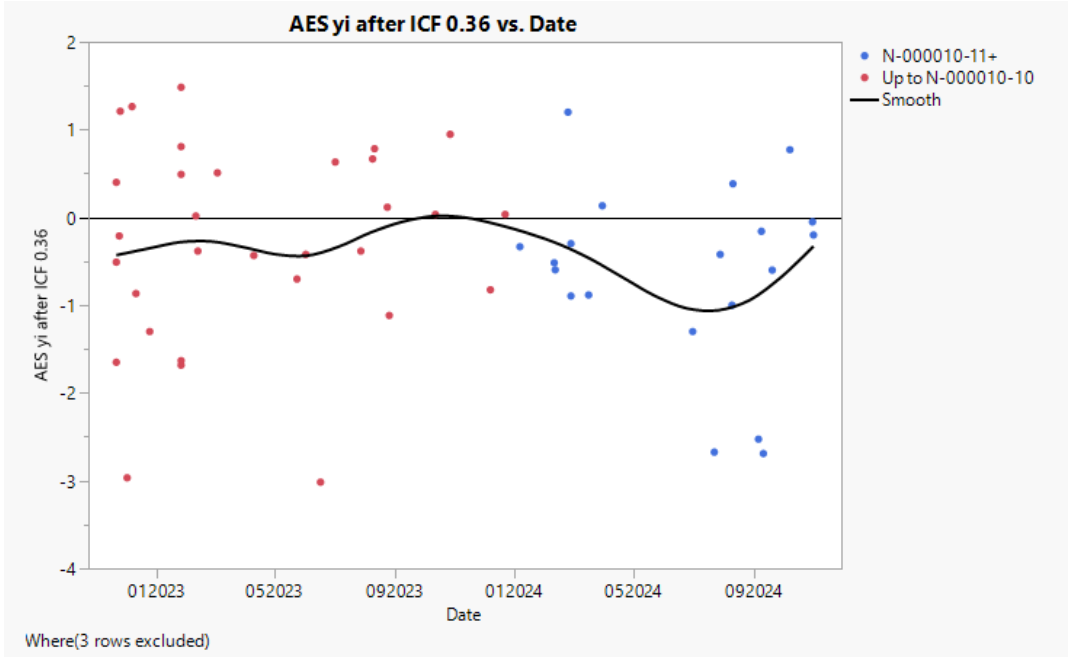
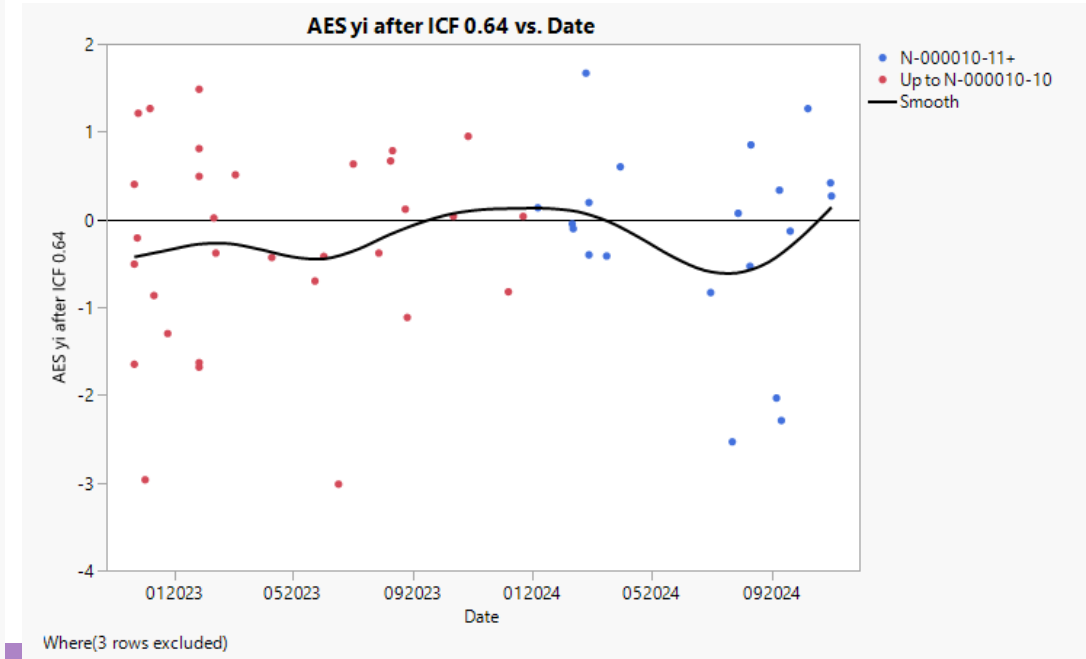
AES Before and After Proposed ICF Options

- Since batch N-000010-11 all but two references have been below target.
- Both ICF options improve AES yi balance







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APPENDIX

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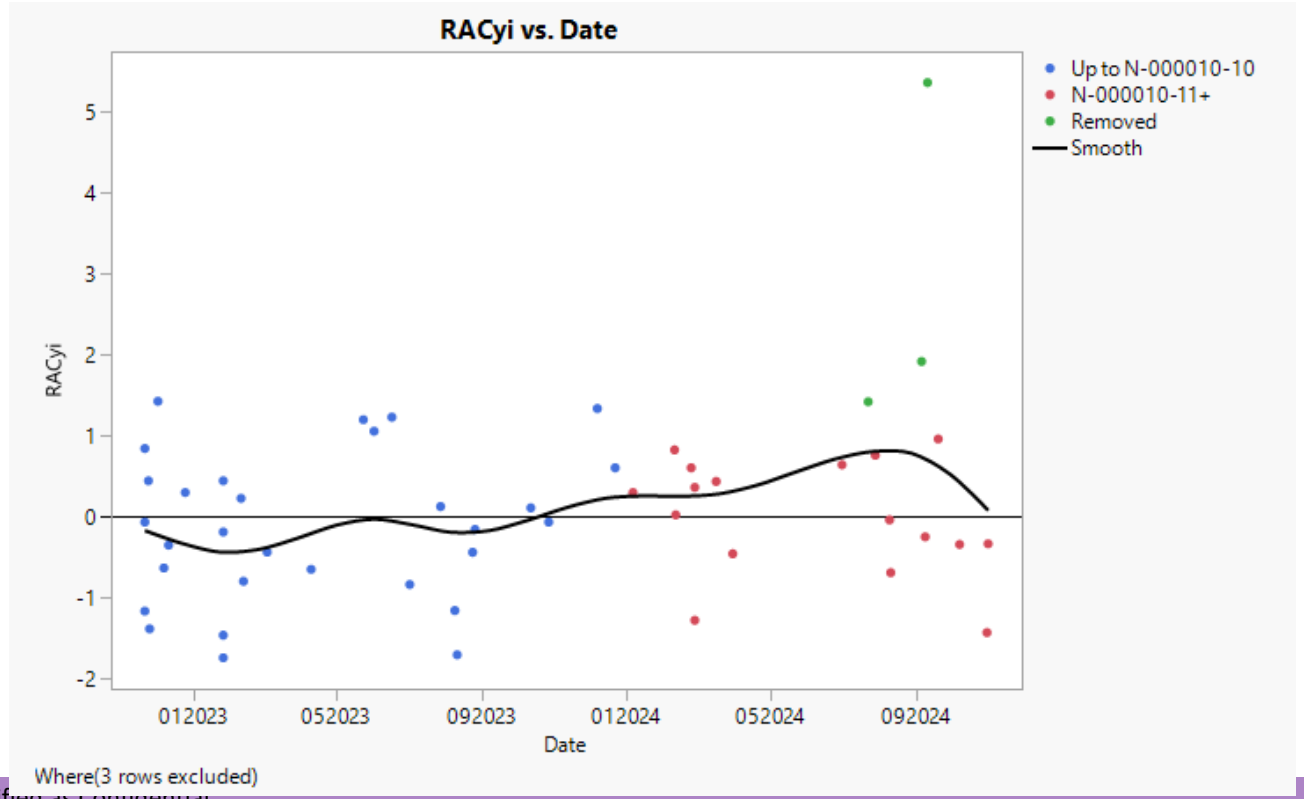
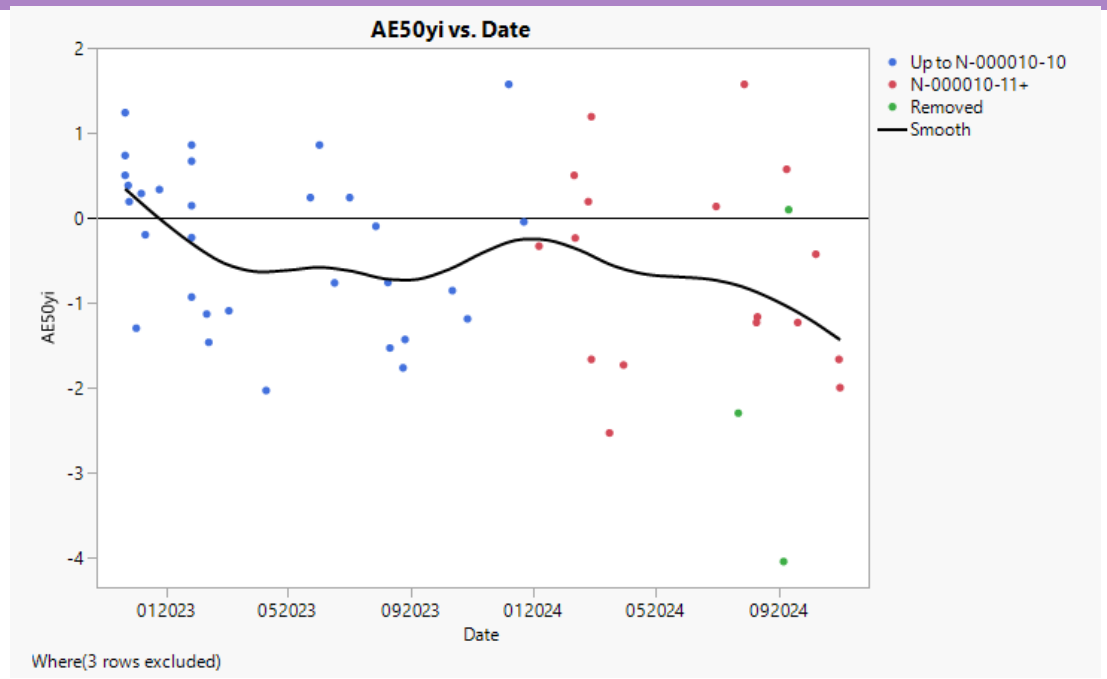
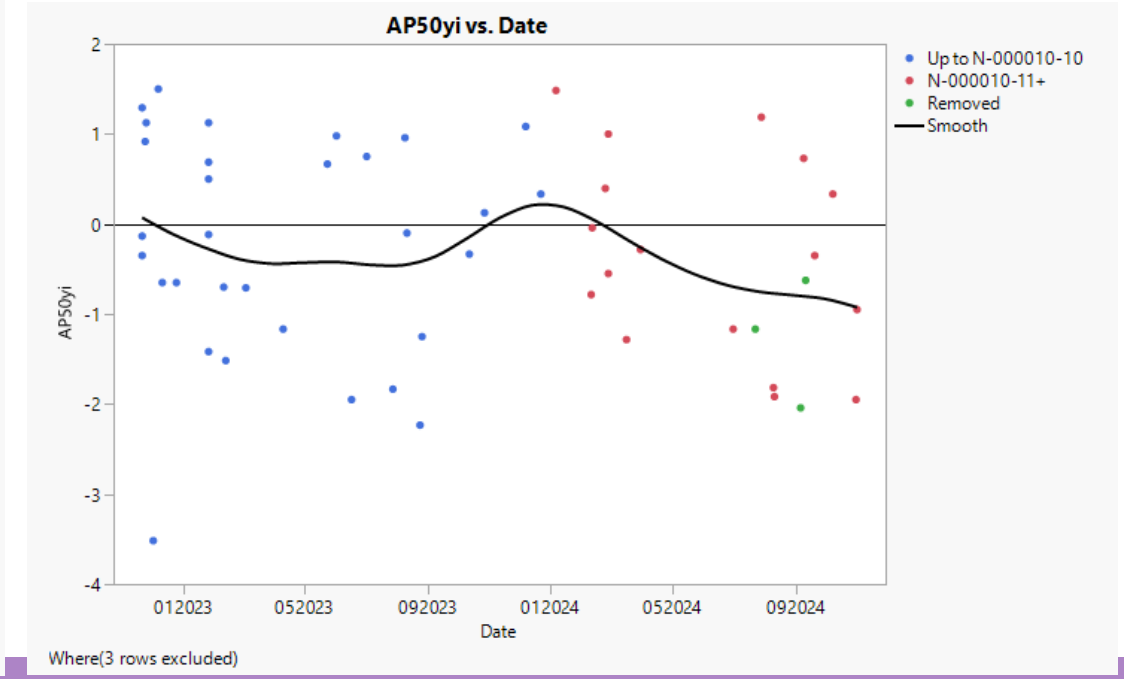
RAC, AEV50, AEP50 Yi Plots







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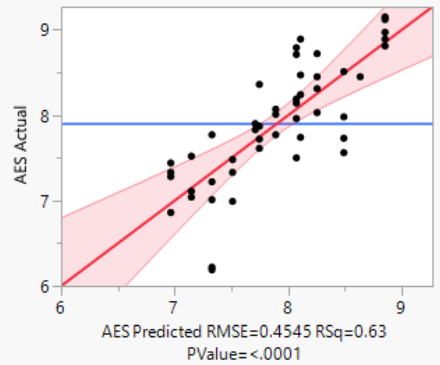
AES and RAC without 3 Low Points

Response AES

Whole Model

Actual by Predicted Plot



Summary of Fit

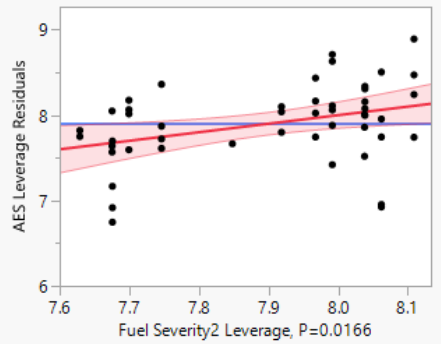
RSquare	0.629843
RSquare Adj	0.585777
Root Mean Square Error	0.454502
Mean of Response	7.900833
Observations (or Sum Wgts)	48

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	7.8988766	0.085741	92.12	<.0001*
Fuel Severity2[N-000010-11+]	-0.181308	0.072672	-2.49	0.0166*
LTMSLAB[A]	0.3991702	0.115367	3.46	0.0013*
LTMSLAB[B]	0.1807643	0.185448	0.97	0.3353
LTMSLAB[D]	-0.19902	0.127964	-1.56	0.1274
IND[931]	-0.371897	0.068144	-5.46	<.0001*

Fuel Severity2

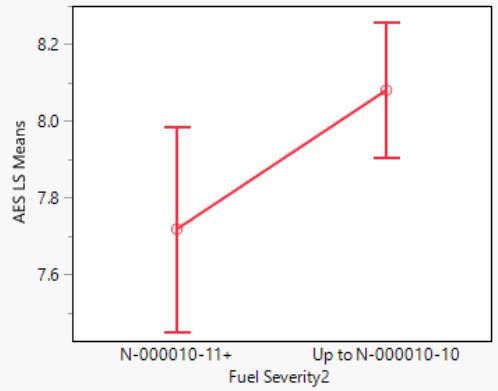
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	7.7175689	0.13274402	7.62647
Up to N-000010-10	8.0801843	0.08743389	8.05129

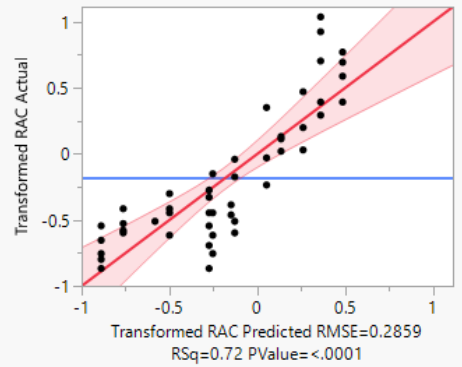
Least Squares Means Plot



Response Transformed RAC

Whole Model

Actual by Predicted Plot



Summary of Fit

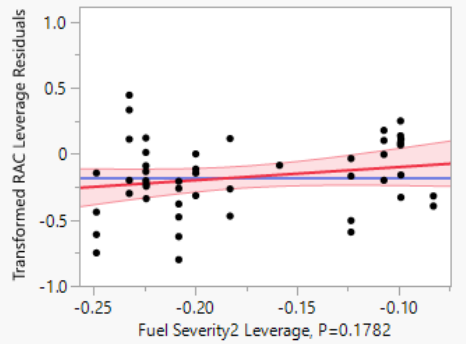
RSquare	0.719378
RSquare Adj	0.685971
Root Mean Square Error	0.285918
Mean of Response	-0.17679
Observations (or Sum Wgts)	48

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-0.181688	0.053938	-3.37	0.0016*
Fuel Severity2[N-000010-11+]	0.0625987	0.045717	1.37	0.1782
LTMSLAB[A]	-0.32729	0.072575	-4.51	<.0001*
LTMSLAB[B]	-0.021003	0.116662	-0.18	0.8580
LTMSLAB[D]	0.0615947	0.0805	0.77	0.4485
IND[931]	0.3174058	0.042868	7.40	<.0001*

Fuel Severity2

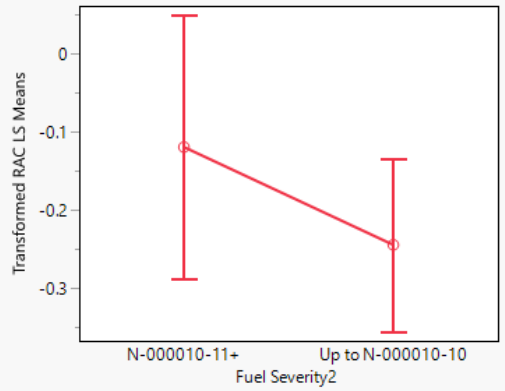
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	-0.1190897	0.08350671	-0.06770
Up to N-000010-10	-0.2442872	0.05500297	-0.23662

Least Squares Means Plot



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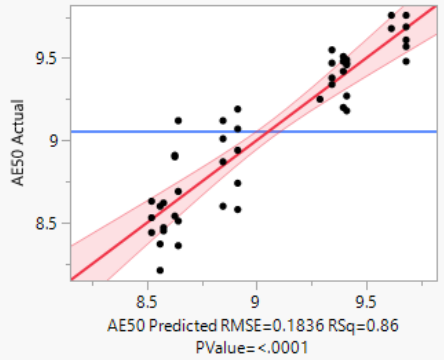
AEV50 and APV50 without 3 Low Points

Response AE50

Whole Model

Actual by Predicted Plot



Summary of Fit

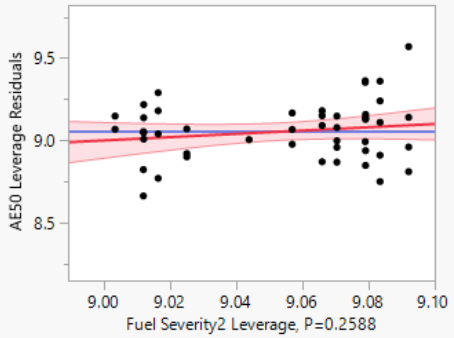
RSquare	0.857313
RSquare Adj	0.840326
Root Mean Square Error	0.183554
Mean of Response	9.053542
Observations (or Sum Wgts)	48

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	9.0265448	0.034627	260.68	<.0001*
Fuel Severity2[N-000010-11+]	-0.0336	0.029349	-1.14	0.2588
LTMSLAB[A]	-0.033493	0.046592	-0.72	0.4762
LTMSLAB[B]	-0.155383	0.074895	-2.07	0.0442*
LTMSLAB[D]	-0.04908	0.05168	-0.95	0.3477
IND[931]	-0.384523	0.027521	-13.97	<.0001*

Fuel Severity2

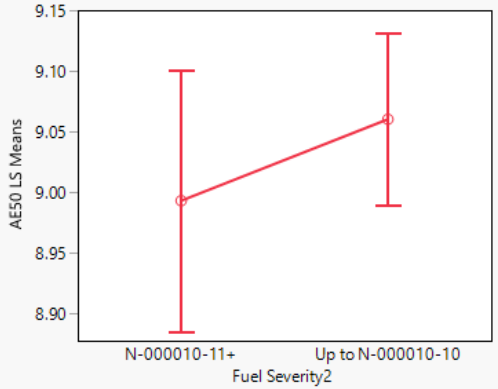
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	8.9929448	0.05360980	8.93941
Up to N-000010-10	9.0601447	0.03531091	9.11613

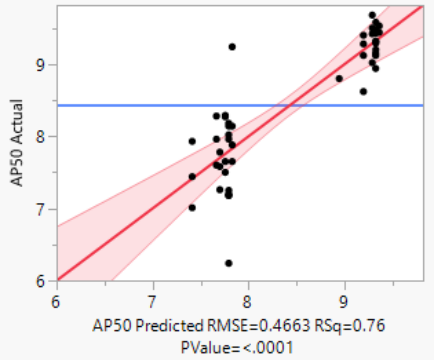
Least Squares Means Plot



Response AP50

Whole Model

Actual by Predicted Plot



Summary of Fit

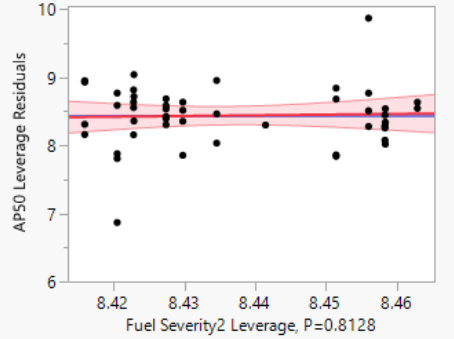
RSquare	0.762902
RSquare Adj	0.734676
Root Mean Square Error	0.466343
Mean of Response	8.43625
Observations (or Sum Wgts)	48

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	8.4401723	0.087975	95.94	<.0001*
Fuel Severity2[N-000010-11+]	0.0177704	0.074566	0.24	0.8128
LTMSLAB[A]	0.0999528	0.118373	0.84	0.4032
LTMSLAB[B]	-0.24458	0.19028	-1.29	0.2057
LTMSLAB[D]	0.0080646	0.131299	0.06	0.9513
IND[931]	-0.765644	0.06992	-10.95	<.0001*

Fuel Severity2

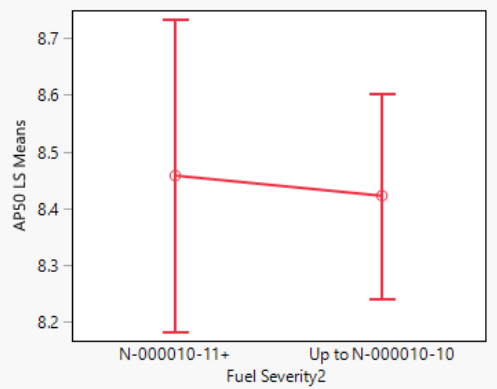
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	8.4579426	0.13620257	8.32941
Up to N-000010-10	8.4224019	0.08971191	8.49484

Least Squares Means Plot



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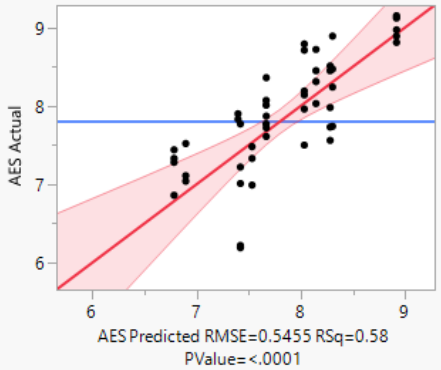
AES and RAC with All Data

Response AES

Whole Model

Actual by Predicted Plot



Summary of Fit

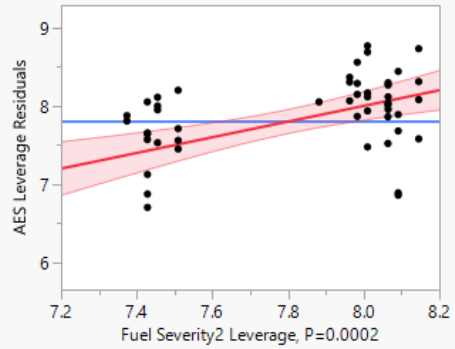
RSquare	0.576112
RSquare Adj	0.529014
Root Mean Square Error	0.545458
Mean of Response	7.803137
Observations (or Sum Wgts)	51

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	7.7202597	0.090448	85.36	<.0001*
Fuel Severity2[N-000010-11+]	-0.318084	0.079883	-3.98	0.0002*
LTMSLAB[A]	0.5735826	0.129784	4.42	<.0001*
LTMSLAB[B]	-0.063791	0.194971	-0.33	0.7450
LTMSLAB[D]	-0.198847	0.145709	-1.36	0.1791
IND[931]	-0.306597	0.077867	-3.94	0.0003*

Fuel Severity2

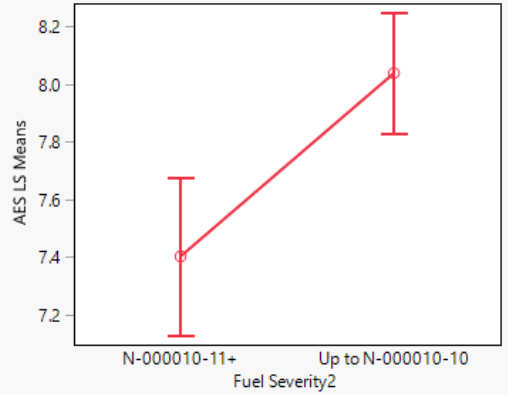
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	7.4021761	0.13568984	7.41850
Up to N-000010-10	8.0383434	0.10350187	8.05129

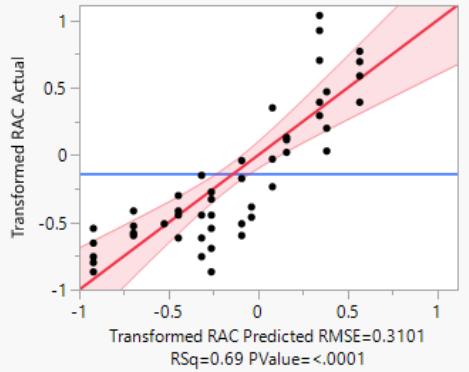
Least Squares Means Plot



Response Transformed RAC

Whole Model

Actual by Predicted Plot



Summary of Fit

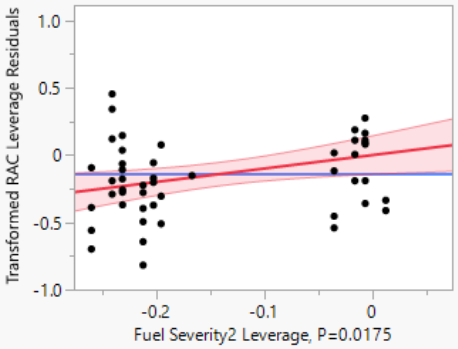
RSquare	0.692761
RSquare Adj	0.658623
Root Mean Square Error	0.310135
Mean of Response	-0.1395
Observations (or Sum Wgts)	51

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	-0.124484	0.051427	-2.42	0.0196*
Fuel Severity2[N-000010-11+]	0.1120926	0.04542	2.47	0.0175*
LTMSLAB[A]	-0.382475	0.073792	-5.18	<.0001*
LTMSLAB[B]	0.0135172	0.110856	0.12	0.9035
LTMSLAB[D]	0.0923215	0.082847	1.11	0.2710
IND[931]	0.3022441	0.044273	6.83	<.0001*

Fuel Severity2

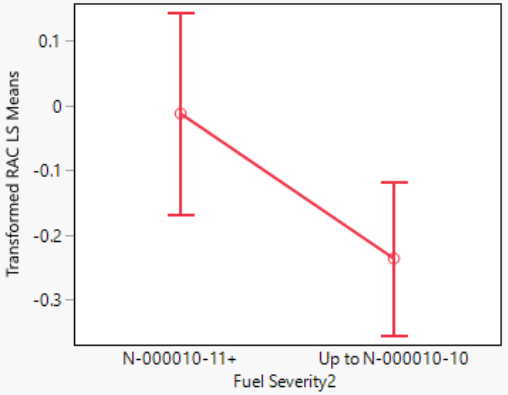
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	-0.0123917	0.07715016	0.01103
Up to N-000010-10	-0.2365769	0.05884881	-0.23662

Least Squares Means Plot



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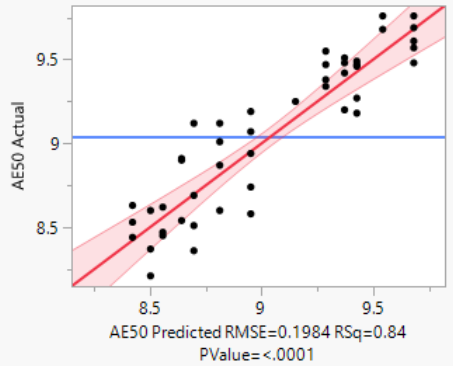
AEV50 and APV50 with All Data

Response AE50

Whole Model

Actual by Predicted Plot



Summary of Fit

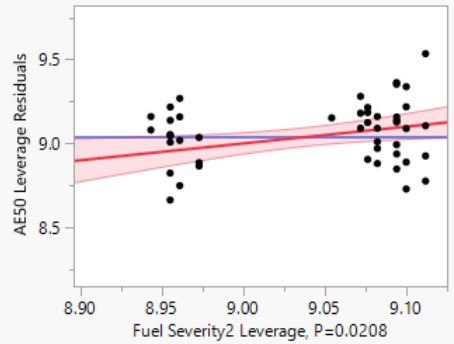
RSquare	0.837314
RSquare Adj	0.819237
Root Mean Square Error	0.198354
Mean of Response	9.036863
Observations (or Sum Wgts)	51

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	8.9734175	0.032891	272.82	<.0001*
Fuel Severity2[N-000010-11+]	-0.069598	0.029049	-2.40	0.0208*
LTMSLAB[A]	0.0186497	0.047196	0.40	0.6946
LTMSLAB[B]	-0.256125	0.070901	-3.61	0.0008*
LTMSLAB[D]	-0.036419	0.052987	-0.69	0.4954
IND[931]	-0.365259	0.028316	-12.90	<.0001*

Fuel Severity2

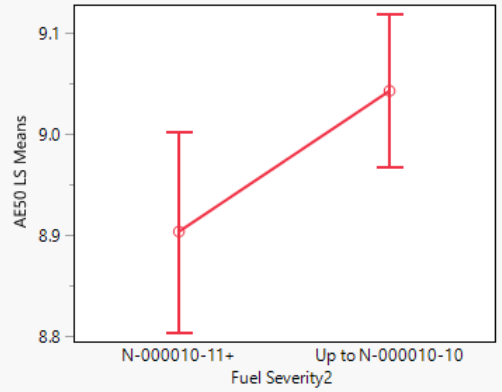
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	8.9038192	0.04934319	8.91400
Up to N-000010-10	9.0430159	0.03763814	9.11613

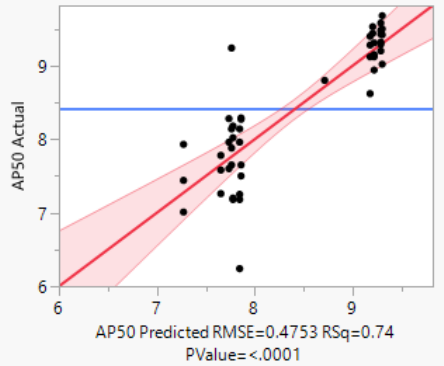
Least Squares Means Plot



Response AP50

Whole Model

Actual by Predicted Plot



Summary of Fit

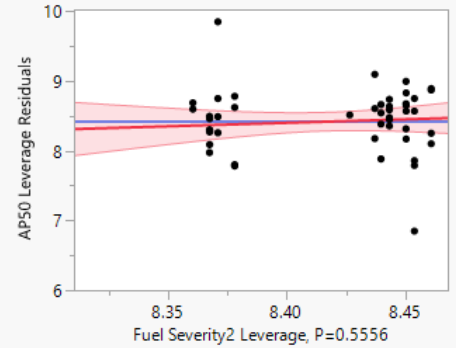
RSquare	0.741866
RSquare Adj	0.713184
Root Mean Square Error	0.475286
Mean of Response	8.416275
Observations (or Sum Wgts)	51

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	8.357667	0.078812	106.05	<.0001*
Fuel Severity2[N-000010-11+]	-0.04133	0.069607	-0.59	0.5556
LTMSLAB[A]	0.1816188	0.113088	1.61	0.1153
LTMSLAB[B]	-0.406303	0.169888	-2.39	0.0210*
LTMSLAB[D]	0.0576462	0.126964	0.45	0.6520
IND[931]	-0.720811	0.067849	-10.62	<.0001*

Fuel Severity2

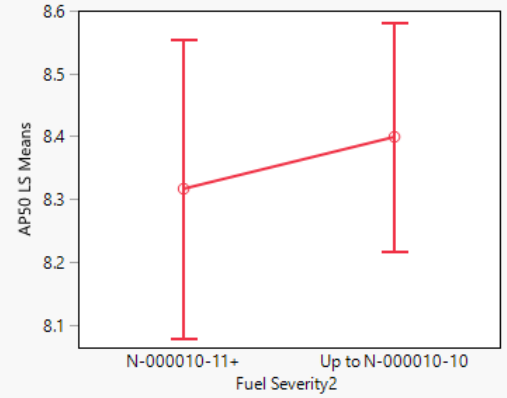
Leverage Plot



Least Squares Means Table

Level	Least Sq Mean	Std Error	Mean
N-000010-11+	8.3163375	0.11823364	8.29450
Up to N-000010-10	8.3989966	0.09018658	8.49484

Least Squares Means Plot



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