

AB679 Diesel Fuel Comparison Study Meeting – February 4, 2010

Panel Members Present: Floyd Vergara/CARB (for Dean Simeroth), Ken Kimura/WSPA, Michael Tunnell/ATA, Thomas Durbin/UCR CE-CERT, Matthew Schrap/CTA (returned after roll call of the Panel)

Teleconference: Roger Gault/EMA, Fred Cornforth/ConocoPhillips, Charles Schleyer/ExxonMobil

Air Resources Board (ARB) Present: Jim Guthrie, Aubrey Sideco, Robert Okamoto, Stephen d'Esterhazy, Alexander Mitchell

Public Present: Tom Fulks/Robert Bosch Diesel

Teleconference: Nick Economides/Chevron, Kim Waggoner/AIAM, Rasto Brezny/MECA, Jim Halloran/Caterpillar

Handouts

- Federal Diesel Research Study Presentation – Tom Durbin, February 4, 2010
- Draft Test Fuel Plan Chassis Dynamometer Testing
- Draft January 28, 2010 Spreadsheet – AB 679 Test Program Test Fuel Properties

Meeting and Presentation

Meeting started at 10:08 a.m.

Vergara opened the meeting with roll call of the Panel. A quorum was present. Schrap was not present at the time of roll call. Vergara attended as a Panel member in place of Simeroth. After roll call, Vergara explained that Economides was mistakenly added to the list of Panel members (as listed on the January 19, 2010 meeting notice) but was not formally on the Panel. Vergara stated that the Panel may further discuss his inclusion onto the Panel.

Attendees participating over the phone and remaining CARB staff in the room introduced themselves. Durbin mentioned he saw Schrap earlier that morning upon registering.

Vergara asked the Panel for approval of the September meeting minutes. Durbin noted two edits on page 1 and 8. Sideco noted the edits. Vergara asked for approval of the minutes with changes. Durbin motioned to approve. Seconded (Kimura). Vergara said the edits would be made and the minutes would be published on the ARB website.

Guthrie presented the results of the additional analyses of test fuels. Before beginning, he passed out the handout spreadsheet (Draft January 28, 2010 – AB 679 Test Program Test Fuel Properties). Vergara noted the name of the handout for those on the phone.

Schrap entered the meeting room.

Guthrie presented the test fuel spreadsheet with updated values as the spreadsheet in September was incomplete. There was discussion about whether the cetane numbers (CN) were consistent with the Panel's agreed upon properties. The Panel wanted to ensure that CARB diesel was higher than Fed A diesel which was to be higher than Fed B diesel.

Guthrie sent out an email on October 13 reporting the completion of the table, including cetane analyses from Southwest Research Institute (SwRI). Cetane results were within the approved ranges and consistent with the Panel's initial thoughts. All properties that would impact NOx were consistent among the three fuels. Durbin sent samples to Cornforth who had additional analyses performed on the fuels.

Conoco Phillips (CP) listed their additional results in the fourth column of the table titled "COP analyses". These tests included API gravity, T50 and T90 distillation temperatures, and CN (613 CN method). Other than CN, CP's analyses were consistent with ARB and SwRI property values. The data confirmed the Panel's thoughts and all CNs were within the approved ranges. Guthrie stated he believes they found representative fuels and concluded his presentation.

Gault asked if the highlighted boxes in the table were highlighted because the numbers were outside the approved or fall back ranges. Guthrie affirmed and explained that only highlighted values were outside of the approved ranges.

Guthrie confirmed the most critical fuel properties by rank. The most critical results include aromatics and cetane. Fed B diesel had the highest aromatics and lowest CN, Fed A was in the middle, and then CARB diesel. CARB had the highest API gravity. Guthrie stated that this is what he wanted to see with the fuel.

Tunnell wanted to know why the T90 for the CARB sample was higher for CP. He asked if anyone had any thoughts on why the discrepancy was only present there and not in the other values. Guthrie was unable to explain why from his review with T50 being quite similar. Cornforth confirmed that the value was correct but had no explanation.

Tunnell asked if other analyses were coming in for the other properties. Guthrie was unsure of the plan, as the CP equipment was broken at the time. Testing was scheduled to be completed once the equipment was fixed.

COP was also higher on T90 for Fed B. Schleyer did not think five or ten degrees would have an impact. Guthrie confirmed that T90 has minimal impact on emissions and stated that aromatic and cetane values have greater importance. Before proceeding to the next item, Vergara asked for questions or comments regarding any other issues.

Durbin began his presentation with a brief overview of the engine and vehicle test plan. The second slide outlined the three-fuel test matrix, the three test engines (07 MBE

4000, 06 Cummins ISM, and 91 DDC 60) and the chassis dynamometer testing to be done on ten trucks.

Durbin discussed the engine testing status on slide 3. Testing for the MBE 4000 was completed and the results were discussed in the last meeting. Testing on the Cummins was completed. Testing on 1991 DDC 60 was currently in progress. Durbin would be covering preliminary results in this presentation and a draft memo would be submitted to ARB by the end of the month.

Durbin went over the details on the engine parameters on slide 4. He continued to slide 5 and presented the preliminary results on the Cummins and Detroit engines. The results were listed by pollutant. Generally, CARB fuel had the lowest emissions and in most cases, the results were able to differentiate the Fed A from Fed B fuels. Regulated emissions were within the expected ranges. CO₂ emissions revealed a slight one percent difference between the Fed and CARB fuels. Fed fuels were slightly higher. Trends were observed with the Fed B fuel providing better fuel consumption.

Gault was confused why there were higher CO₂ and lower brake specific fuel consumption. The results seemed to be inconsistent with expectations. Durbin stated seeing a one percent increase in CO₂ may be due to differences in density. Fuel consumption was reported in gallons and Fed fuel is denser. Therefore, a carbon weight factor would be corrected if lbs/bhp was used. Guthrie confirmed that a switch in the units would show the proper expected trend. Durbin affirmed that he would convert the units in his next set of data results (**Action Item**).

Durbin provided the NO_x results for the 2006 Cummins engine on slide 6. For the FTP cycle, a consistent trend was observed for increasing values from CARB fuel to Fed B. However, for the cruise cycle, both Fed fuels were higher than CARB but Fed B was lower than Fed A. The belief is that there was high instability with the engine running on the cruise cycle. The same issue was discovered in the biodiesel testing and the electronics needed to be fixed after the first engine was put on the dynamometer. Testers then worked to get the engine as stable as possible.

Gault questioned the larger error bars that were present. The Panel's explanation believes the anomaly that occurred only at the end of the testing was a result from the Fed B going back and forth with the CARB diesel fuel. The last six tests revealed differences in both Fed B and CARB fuel while also showing higher error bars.

Cornforth questioned whether statistical tests had been completed to prove statistical significance. Durbin stated he would address the question in later slides.

Durbin presented the NO_x 1991 DDC 60 engine on slide 7. Testing was being conducted that week. FTP had been completed the day before while cruise would occur on that day as well as the following day. The NO_x emission axis was scaled differently to accommodate the significant increase between the 1991 and 2006 and 2007 engines. The statistics had been completed for the FTP cycle but not for the cruise cycle.

Durbin provided a summary of NO_x results for all three engines on slide 8. Statistics were presented with the actual results. P values represent the probability that there would be differences between the two different values. The p values compare the differences between the Fed A and Fed B fuels to the CARB fuel. The values appear low and the differences between the CARB and two Fed fuels are significant. All results appear to be within the range expected by the Panel.

A phone participant asked why there was no data for the 2007 engine with the Fed A fuel. Durbin explained the situation in the last meeting but summarized the situation that occurred. Due to time constraints in coordination programs and the logistics of getting the proper Fed A fuel, ARB felt it was appropriate to move forward with sending the vehicle to MTA. The vehicle was not expected to return for completion of the runs, as the costs of resetting the engine would be unfeasible.

Durbin left blank spaces in the slots for the cruise cycle of the 91 engine but would fill them upon test completion. Testing was expected to be done between Fed A and Fed B as follow up on the differences between the two fuels. For the Cummins engine, all FTP statistics were significant. However, for the Cruise cycle the expected trend for Fed A to B was inverted. Slide 6 presents the case more clearly in the width of the error bars surrounding the average.

Gault asked if the p value of .02 was significant for the 2006 Cummins engine running on the cruise cycle with the Fed B fuel, as it was a magnitude greater than all other the p values presented. Durbin responded that the p value was representative of a 95% confidence level and that the value was still under the .05 limit.

Tunnell commented that he would like to see actual values along with the differences and p values if the values could be incorporated into the table. Tunnell also asked if the differences in the Cruise cycle were expected to be seen as in the case for the FTP cycle. Durbin responded that they would have expected the cruise to give larger differences because it is a more aggressive cycle. However, that was not being seen which might be related to the fine-tuning that is present in the FTP operating regime. In some cases, differences were seen in the MTBE 4000 that were not seen in the Cummins. A larger difference was observed compared to FTP. Tunnell brought up the fact that at the biodiesel workshop, there were numerous questions relating to sample size and if there were other data sources that could be used to supplement this effort or if this study was the only work available. Durbin responded that this was going to be the majority of the study, but that they would be conducting chassis testing to simulate real life applications in accordance with the legislative mandate. However, there will be a loss in the precision for chassis testing results. For this program, ARB engine certification testing has also been used as a comparison and seems to be consistent with results received so far. Guthrie stated the NO_x results are consistent with test programs seen in the past and that these same test programs were the basis for the EPA model. Guthrie thought newer technology would be less sensitive to fuel changes as shown with the DDC 60 having the greatest difference for NO_x. Guthrie confirmed that the occurrences in this program were very consistent with past testing and that

while there are numerous studies that correlated emissions with fuel properties, this study was designed to address the legislation that was passed.

Vergara mentioned that when the staff report is completed, it shall summarize the mandate to address AB679 while presenting an overview of the literature already present.

Tunnell mentioned that he thought there were currently two trains of thought; the first being the need to show consistency so they are aware of possible outlying data points that may arise and the importance of each. The second point is to ensure there is enough information to reference back to when looking over the current data.

Roger proposed the idea of generating the predictive model that analyzes the various properties to obtain a NO_x result and create a plot that can overlay real data onto it to see if there is a true correlation or where the data between model and reality deviate. He stated that the data supports the historical analysis but would like a way to prove or disprove the conclusion to the report readers. Vergara agreed, saying ARB will give it some thought and that Durbin and Guthrie can discuss it further offline.

Gault also asked if it was possible to show the number of data points in the presentation because of the data variability and properly informing the people to assist their understanding while not having to review the entire report. Vergara expressed appreciation of the ideas presented to clarifying the presentation data.

Durbin explained that there are six data points. The bar graph represents the average of those six tests and the error bar is generated from the standard deviation of that data. Lastly, the testing order is completely random to exclude most biases.

Durbin then presented the PM results on slide 9. The scale is quite small to read the differences but the differences are definitive. For the cruise cycle, no trend was present. However, there is speculation that it may be related to engine stability but that cannot be confirmed.

Durbin presented the resulting differences and the statistical p values for PM on slide 10. There is only a small difference in PM. Statistics were significant for the Cummins engine, the 91 engine was still being tested, and the MBE 4000 already had extremely low levels of PM because of the DPF.

Gault echoed comments from earlier that real values should be presented in the data tables. Gault's reasoning is that the difference appears to be rather large in the MBE 4000 but the statistics are completely insignificant which should be stated. Tunnell asked for an elaboration of precision. Durbin said it had been awhile and could not confirm whether the results were measurable or not.

Kimura thought it would be helpful when releasing the MOU or data to also provide a chart showing sensitivity of equipment. This would provide people with an idea of the results spectrum. Durbin stated that it was clearer when showing the figure for the MBE

4000 but did not dismiss the idea of adding in actual values as both have worth. Mitchell interjected that the 2007 MBE 4000 was barely measurable to start because of the DPF filter is in the system.

Returning to slide 9, the PM measurements were almost not seen and the error bars were quite small. Guthrie added that some of the values could be negative at times. Gault stated that it happens often, but Durbin assured everyone that the system is capable of measuring the small values and is in compliance with the 2007 engine regulations.

Durbin presented the THC results for the 2006 Cummins on slide 11. The test results for both engine cycles showed neither having a trend as all three fuels had low values in comparison to the regulation standard.

Tom Fulks joined the meeting at 10:57am.

Kimura wanted clarification on the term low end. Durbin responded that the emissions were well below the regulation standard and that the error bars were tight.

Durbin presented the DDC 60 THC results on slide 12. Durbin noted the expected stair case trend going from CARB to Fed B fuel. Slide 13 provided the statistical and difference results for all engines. Durbin noted that neither the MBE4000 nor the Cummins experienced significant trends in the results. Durbin noted that the THC measurements were very close to accurate measurable levels. Significant statistical differences were only present in the older 1991 engine.

Cornforth stated he was not use to using THC results as those presented in slides 11 and 12 but was curious why the newer engines had emission levels that were three times as high. Durbin stated he would review the data and check the units but that it may have been an error as the presentation was developed the night before.

Durbin presented the CO results for the Cummins engine on slide 14. Emission levels showed an increasing trend from CARB to the Fed B fuel and that these values were statistically significant and would be presented in the upcoming slide. Tunnell asked how low the CO standards were below the data. Durbin responded that the standard limit was at 19 and therefore the data was significantly lower. Durbin presented the CO results for the 1991 DDC 60 on slide 15. Once again, the CARB fuel had the lowest emissions while Fed B had the highest.

Durbin presented the statistical analysis for the three engines on slide 16. For all engines, the p values were significant, even for the MBE 4000, which showed significant decreases. Fed A was not present. The reductions for the Cummins engine was in the five to twenty percent difference range. All cases were significant.

Gault stated this was another case when real values would be helpful and presented the assumption that emission levels improve with newer engines. Durbin confirmed the assumption and stated he would add in real values (**Action Item**).

Durbin presented the CO2 Cummins results on slide 17. Durbin noted there was an apparent upward trend but hard to see on the small scale. Durbin presented the statistical data for the CO2 results on slide 18. He noted that the small 1 to 2 percent change is significant but relates back to the fuel density, as denser fuels contain more carbon.

Durbin presented the brake specific fuel consumption for the Cummins engine on slide 19. Durbin mentioned that data units were in gal/bhp-hr but that he could change gallons to pounds so a more apparent trend could be observed. The current units show Fed B having lower fuel consumption because of fuel density.

Durbin presented the BSFC statistics for the three engines on slide 20. There did not appear to be a statistical difference between the CARB and Fed A fuels. However, on the FTP cycle Fed B was statistically significant.

Tunnell asked for clarification on the work done while Gault asked when the unit conversion occurs, how the results would change. Durbin responded that the results would flatten out or trend in the same direction as CO2. Vergara opened up the meeting for further discussion on the engine results before proceeding to the chassis test.

Tom Fulks from Robert Bosch Corporation commented that while he was a member of the public, it was difficult to find the meeting location even after checking online. He questioned what work was being conducted on light duty (LD) vehicles, as NOx calibration is very important with the pending LEV standards. He wanted to know if fuels would be measured with after treatment systems or would it be strictly engine out emissions. He had concerns with the LEV3 and NOx if fuel changes were to be made based on this study. Guthrie responded that the Panel was trying to obtain a 2010 for the chassis test, which would have after treatment. However, the scope of the study was focused on heavy-duty (HD) vehicles and was not intended to include LD engines. Fulks once again brought up how the fuel at the end of the process would have an impact on the LD vehicles and that LD diesel manufactures were already scrambling to meet design requirements.

Vergara affirmed that LD is not within the scope of the study because it was designed primarily for HD engines and vehicles. Fulks stated that the formula of the fuel is important. He missed the earlier part of the meeting and asked if there was a difference in NOx between CARB and Fed diesel. Durbin answered the Fed fuels are about five to ten percent higher in NOx. Fulks stated that the NOx difference is a big deal.

Guthrie stated that there is a California certification fuel and so LD engines can be certified with the CA cert fuel. Gault stated over the phone that on the HD side, everyone certifies using Fed fuel. Guthrie believes that is true. Vergara stated that if

the Panel has a compelling need to get a clear idea as to how the process works, LEV staff would be contacted and more information would be presented at the next meeting. Fulks responded that the fuel mixture could have an impact and that it would be great if emissions testing could be conducted on LD engines with and without SCR.

Durbin presented the status of the chassis dyno testing on slide 21. Construction is currently being completed and commissioning should be finished by mid March. Durbin stated that it has been a long process but they do not expect any complications to arise. Gault asked about the commissioning process to ensure valid results. Durbin replied that it has not been discussed with the manufacturer but he will follow up and return with more detailed information. Gault commented that the first job at a new facility is not a good option.

Durbin continued to describe the vehicles that would be obtained. There would be ten test vehicles in total with three vehicles from CE-CERT that were used in conjunction with the biodiesel program and seven additional vehicles that would possibly be acquired through the Los Angeles Ports who indicated use of their contacts. Tunnell asked if the fleets would be port trucks or trucks that have to deliver to the ports. Durbin responded that it would be trucks that operated outside of the ports.

Kimura asked about the process and what would be used to evaluate the vehicles chosen for testing. He asked if guidelines were going to be created. Durbin stated that he currently did not have an evaluation process but that it would be a good idea.

Durbin provided the updated test plan which was available on the ARB website (slide 22). The test plan was modified from the previous year when it was initially approved. The most notable change was the number of test days because of the delays and the need to adjust to time constraints. Test weights for the vehicles were also supplied because of the proper loading needed for the chassis test.

Durbin presented the test matrix on slide 23. Durbin stated that all tests would be done on the 50-cruise cycle. The cycle was selected initially because it might be more representative. Also, initial discussions indicated that the number of replicates needed should be greater than that used for the engine testing. The matrix is randomized and features a total of 12 tests, each fuel being tested four times in triplicate. Each vehicle would be tested over a three-day time frame to ensure testing is completed. Durbin reviewed the biodiesel test fuel matrix to develop a statistically accurate representation that would account for significant variables. The statistician approved of the design matrix as each fuel would be tested on each day increasing the robustness of the test with variability in the fuel order and time of day.

Gault asked about the test cycle that was chosen since FTP was statistically significant more often than not as compared to the cruise cycle. Durbin confirmed that FTP would be a better choice. Durbin then clarified that FTP cannot be run on chassis tests and that there is currently no chassis test certification cycle but other cycles such as UDDS could be discussed.

The Panel continued on to slide 23. Panel members discussed the test matrix and sequence of fuels. The afternoon and morning schedules of the three test days were provided in the matrix. The Fed A fuel always follows the CARB diesel fuel. After the Fed A, the Fed B fuel would be tested. It was noted that the sequence might add bias to the testing. Durbin stated he believes the sequence can be shuffled slightly by putting the fuels in different order in order to avoid bias. He suggested taking the two CARB fuel in the middle of day two and switching the sequence as follows:

Test Day	Morning Schedule (assumes 6 replicates)	Afternoon Schedule (assumes 6 replicates)
Day 2	BBB AAA	AAA CCC
Day 3	CCC BBB	BBB CCC

In the matrix provided on slide 23, A, B, and C denotes the Fed A, Fed B, and CARB diesel fuels, respectively.

Durbin continued his thoughts stating that the proposed change to the sequence is not favorable because fuel A would not be tested on the third day. He made an alternative suggestion. Between the end of the second and beginning of the third day, switch A and B fed fuels between days two and three. Day two would end with B and day three would end in C. On day three, the sequence would be BBB AAA AAA CCC. The CARB fuel would be tested at the beginning and end but the fuels would not follow the same pattern. The Panel continued to discuss the matrix and proposed changes to the order and schedule. Due to confusion, Durbin clarified the proposed fuel sequences. Durbin proposed keeping day one and the morning of day two the same. In the afternoon of day two, change A to B. The proposed sequence for the afternoon of day two would be CCC BBB instead of CCC AAA. With this sequence, it was noted that there would be distortion because fuel B would always be tested at the beginning and end and A would always be in the middle. This would therefore not be a good option. Guthrie commented that the only solution would be to add more fuel changes. Durbin stated that if day two were switched with day three, there would be more fuel changes. Guthrie suggested changing day two only. Starting and ending with C is preferred. He suggested changing day two to give more randomness. He asked Gault if that would be okay. Gault asked for clarification as to what was being changed. Guthrie clarified that the sequence for day two would be CCC BBB AAA CCC. There would be a lot of fuel changes. Durbin stated that he does not want to be constrained to restrict the number of fuel changes. He noted that maybe the proposed sequence could be done. Durbin asked the Panel if they want to make a proposal today. Tunnell asked to clarify the proposal again. Durbin answered CCC BBB AAA CCC. Economides stated he was happy with that for day two because it gives them the ability to see C after A and B after C. The bias is therefore removed.

Okamoto asked what would happen if a test is invalidated. Durbin answered that testing would roll over if necessary. If testing needed to stop, testing would typically roll over to the next day or next part of the day. This would affect the schedule and may affect the morning to afternoon split. There is a break from morning to afternoon on the

schedule. A phone participant asked how many fuel changes may be handled and suggested setting up the test matrix to minimize the number of fuel changes.

Durbin mentioned the biodiesel program and regeneration issues they need to consider. The 2007 engines require regeneration and so testing will also need to include regeneration. Durbin stated that if they look to add regeneration as well as additional fuel changes, there may be complications as a whole.

Tunnell stated the need for more time to revise the matrix since testing is scheduled to begin mid-March. Guthrie said he could email the Panel with the proposal and justification. He asked if they could vote via email. Vergara answered no. Durbin stated they would need to have another meeting in the beginning of March.

Kimura asked Durbin how to address regeneration. He asked if there was a way to factor it in the matrix. Vergara stated the need to work with Durbin on the matrix. Tunnell noted the need to make sure that the matrix is realistic. They need to know what the schedule would allow. Vergara confirmed that an alternative proposal would be sent out. The next meeting can be restricted to discuss the test matrix only. The Panel can call in and vote over the phone. Vergara continued saying that staff needs to work with Durbin. Durbin asked if the meeting would need to be at a publicly accessible location. Vergara answered yes and stated that the meeting notice must be sent out at least ten days before the meeting. Tunnell commented that they would not be able to resolve the issue today. Vergara stated that there would need to be a quick turnaround in order to schedule a meeting to take a vote on an alternative proposal. Schrap commented that the meeting or conference call would need to be in the first week of March. Durbin agreed they would not want a vote to be taken after March 5, 2010. Vergara prompted the group to continue with the rest of the presentation and move on from the test matrix. He stated again that an alternative proposal would be sent out and requested Durbin to provide the Panel with benefits or justification of the alternative proposal (**Action Item**).

Durbin continued with the presentation. Durbin presented the dynamometer vehicle matrix on slide 24. The matrix consists of 10 vehicles covering a broad base of the current population. There should be at least one vehicle from each engine certification category while still placing an emphasis on the newer engines that would be incorporated into future fleets. The matrix currently contains three vehicles that are crossovers between the diesel and biodiesel programs. Retrofits are included in two of the categories. A 2010 engine is currently in the matrix but if the engine is unattainable a 2007 engine would take its place.

Fulks asked if an LD diesel with an SCR was loaned and if testing could be conducted on it. Durbin said he would be able to do the testing but was unsure how it would apply to the legislation. Kimura questioned the value of generating one LD data point without comparison points.

Tunnell mentioned getting trucks from the port and whether the Panel would care about the location. He was curious of the in-use vehicles and the thoughts the Panel would

have regarding duty cycle if the vehicles came directly from the port as they would have duty cycles that are only a small portion of the state population. Another issue was if truck mileage would be a factor to ensure each vehicle was truly representative. Gault stated that the challenge would be locating viable vehicles prior to 2002. Finding something that fits the matrix would be the greater concern than the duty cycle and the miles on the truck.

Durbin stated they have on-going work with trucks that work in and around the ports of Los Angeles. Schrap noted that there is the Clean Trucks incentive program but asked again what type of constrictions would need to be in place. Durbin clarified for Tunnell and Schrap that the trucks would be carriers that work through the ports but would not necessarily be port trucks.

Tunnell asked that Durbin provide Schrap and himself with a notice on the time schedule, when the truck would be needed, and the reimbursement fee for use. Durbin responded that the trucks would be needed for a one to two weeks and would only be reimbursed for \$1,200- \$1,300. Tunnell said he would be happy to get the notice out and see what results both Schrap and himself could get, but it would need to be a quick turnaround.

Durbin asked the Panel if the matrix as a whole was a good distribution in terms of age and retrofits. Schrap had no complaints and believed it to be a good representation with the OEM and aftermarket retrofits included. Tunnell questioned what would occur if the 1991-93 truck could not be located. Durbin felt that it would be wise to create a proposal on how to modify the test plan and possibly make it a floating contingency plan. Vergara agreed it to be a wise idea so the Panel would not have to meet each time a change was necessary.

Gault suggested that if a 1991-93 vehicle could not be found that an extra vehicle be added to the 1998-2002 range to reserve the equal distribution in vehicle population. Durbin did not object to the idea but deferred to the trucking representatives for their comments. Schrap believed the more data the better and that there might be some 1991-93 trucks around the state but that 1998-01 would be more attainable. Guthrie added that if the category was changed from 1991-93 to just 1993 or earlier that would double the population to chose from for that category. Gault stated one restriction that should be in place for the older engines is ensuring that they are not rebuilt or replacement engines. Economides questioned whether they were looking at vehicle age or engine age. Durbin answered that engine age was the important factor. Cornforth added that upon receipt of an engine, testing would need to be conducted to ensure that the engines meet the categorized emission levels and that they avoid having an engine that is a high emitter. Durbin affirmed and believed there might be a possibility of that occurring if not checked. Gault added that ideally the engines should have followed the minimum maintenance schedule required by the engine manufacturer before they are included in the test program.

Guthrie suggested as another alternative to look at two engines from the 1994-97 range. Kimura responded that the Panel should see what was available first before deciding upon major changes to the test matrix.

Tunnell stated that they would send out the notice and see what response they receive, but that it may be useless to recruit older trucks since all vehicles will eventually meet 2007 and 2010 standards. Durbin said he would look into the recruitment of the vehicles and draft contingencies for the test plan and will send it out by the last week of February for review and discussion (**Action Item**).

Kimura noted that there should be selection guidance and how the process of selecting vehicles will be incorporated into the protocol. Vergara suggested that the test plan include a hierarchy of preferred criteria.

Schrap wanted clarification that the \$1200 – 1300 was per vehicle and not for the entire test group, which Durbin confirmed.

Vergara reminded the group of the time since it was past noon and that they should wrap up the meeting soon.

Durbin presented the test weights of the proposed vehicles on slide 25. Gault stated they should try to put together a matrix similar to the fuel selection with ideal choices and fall back options. Durbin agreed that was appropriate. Kimura wanted to know the thought process on how the biodiesel weights were chosen since they did not have the same weights. He asked if it would be wise to have similar loads for the comparison of fleets. Durbin agreed that the test weights would be fairly similar and that there were slightly lower weights for two of the vehicles but had forgotten the logistics behind the reason. Okamoto reminded Durbin that the loads were chosen based on having the trucks operate using the same power for the load. Kimura stated there might be limitations and that using variable loads might be necessary. Durbin confirmed that it might be a constraint. Kimura followed up stating that it would be important to outline the capacity on the request, as there are limits.

Before the end of the meeting, Vergara asked the Panel to vote for the official approval of the September meeting minutes. He explained to Schrap that minor edits from Durbin were made. Voted 5-0. Three members of the Panel abstained from voting. Minutes approved by majority vote.

Vergara concluded the meeting, restating that they will try to turn everything around quickly. He said that ARB staff would contact them by February so they could reconvene in the first week of March.

Meeting adjourned at 12:15 PM.