

**MINUTES OF THE SIXTH MEETING OF
THE GRSP INFORMAL GROUP ON A POLE SIDE IMPACT GTR**

Held at the BMW Research and Innovation Center (FIZ)
Visitors Zone / Room 32, Knorrstrasse 147, 80788, Munich
20-21 June 2012

Attendees

Name	Organization
Robert Hogan (Chair)	Department of Infrastructure and Transport (Australia)
Thomas Belcher (Secretary)	Department of Infrastructure and Transport (Australia)
Mark Terrell	Department of Infrastructure and Transport (Australia)
Suzanne Tylko	Transport Canada
Tobias Langner	BASt
Hans Ammerlaan	RDW Netherlands
Maciek Szymanski	European Commission
Jim Hand	United Kingdom - Department for Transport
Jean-Phillipe Lepretre	UTAC France
EunDok Lee	KATRI
Thomas Löw	Audi AG
Ralf Limmer	Audi AG
Mirko Junge	VW Group Research
Philipp Wernicke	BMW Group
Markus Meister	BMW Group
Albert Irzinger	BMW Group
Ansgar Pott	OICA / Hyundai Motor Europe Technical Center
Christian Wegeleben	Daimler
Andre Haas	Daimler
Myriam Constant	PSA Peugeot Citroen
Irina Dausse	Renault
Peter Davis	SMMT
Karsten Hallbauer	Takata
James Abraham	Ford Motor Company
Martin Delin	Volvo
Akito Sakai	JASIC
Michael Fitzharris	Monash University Accident Research Centre (MUARC)
Online/Phone	
Mary Versailles	NHTSA, US Department of Transportation
Stephen Ridella	NHTSA, US Department of Transportation
Jack Jensen	General Motors

Audrey Petitjean	C.E.E.S.A.R
Lan Xu	Chrysler
Pascal Delannoy	UTAC France
Dale Holloway	Medical College of Wisconsin (MCW)
Narayan Yoganandan	Medical College of Wisconsin (MCW)

1. Welcome and Introductions

(Attendees as noted above)

Mr Hogan thanked Mr Wernicke for hosting the meeting.

2. Adoption of the Agenda

The agenda circulated by the chairman immediately prior to the meeting was adopted with some minor amendments to the running order (see [PSI-06-01](#)).

3. Minutes of the Fifth Meeting

The minutes from the fifth meeting held in London and circulated by the chairman prior to the meeting were agreed with a minor amendment ([PSI-06-02](#)).

4. Actions from the Fifth Meeting

Mr Hogan summarized the action list from the 5th meeting of the PSI GTR informal group, noting the work that had been done with respect to each action item.

5. MUARC Analysis

Dr Fitzharris presented an update of the MUARC analysis commissioned for the development of the pole side impact GTR by Australia ([PSI-06-03](#)).

Dr Fitzharris advised that head injuries were a very common cause of death for occupants of both M1 and N1 vehicles in pole side impact and other side impact crashes in Australia. Dr Fitzharris noted that when Australian coroners specify multiple injuries as the cause of death, the medical records for these cases generally include fatal head injury, but these had not been quantified and included in the analysis to date.

Dr Fitzharris also noted that severe head injuries make up a large proportion of injuries sustained in the pole and other side impact crashes and that people who suffer severe traumatic brain injuries have very high lifetime care costs. Known lifetime care costs for serious and severe head injuries have been factored into the benefit-cost analysis (AIS 3: \$3.7 million (Australian \$s), AIS 4+: \$4.8 million).

Dr Fitzharris presented cost data – incremental costs for M1 vehicles and full costs for N1 vehicles. Benefit:cost ratios were high for both vehicle categories, but more so for M1 vehicles.

Ms Tylko noted some cost reductions could be achieved through harmonization of the test procedure.

Ms Tylko asked how fatalities and head injuries due to ejections/rollovers had been treated in the analysis.

Dr Fitzharris advised that no benefits had been claimed for rollovers.

Mr Hogan added that Australia had originally intended to investigate potential rollover benefits, but that it had proven too difficult to quantify. Instead the analysis adopts a conservative position, similar to the FMVSS 214 pole side impact test regulatory impact analysis, by not claiming benefits from mitigation of injuries in rollover crashes.

ACTION: Australia to circulate final MUARC report to members of the informal group (when available).

Mr Hogan noted that the benefits presented by Mr Fitzharris were considerable. Although the analysis was largely based on Australia, substantial benefits were predicted for both pole side impact and other side impact crashes. A pole side impact GTR should therefore be attractive to a number of countries. Given, the benefits that could be achieved through implementation of the GTR, the group should work to resolve any outstanding technical issues and progress the GTR to AC3 as soon as possible.

6. Crash Tests

6.1. Joint Australian/Canadian Crash Test Program

Mr Belcher and Ms Tylko presented an updated summary of the joint Australian and Canadian pole side impact crash test research ([PSI-06-04](#)). This update focused on results of oblique and perpendicular pole side impact tests of Australian and Canadian market Fiat 500s.

It was noted that the Australian and Canadian market Fiat 500s were fitted with different airbag control modules, different side impact sensors (the Canadian model had a pressure sensor) and different side airbags. In particular, the Canadian market vehicle seat mounted thorax airbag was noted to provide more coverage of the WorldSID shoulder, upper arm and lower pelvis. The side airbags were observed to deploy earlier in the Canadian model. The side airbags in the Canadian model were of similar appearance to the side airbags shown in photos of US NCAP tested Fiat 500s. The main performance difference between the Australian and Canadian market vehicles was a substantially reduced thorax injury risk for the Canadian market vehicle. Repeated oblique pole side impact tests of the Canadian market Fiat 500 showed good repeatability.

Mr Hogan noted that the Australian market vehicle was a 5 star ANCAP rated vehicle and that it seemed likely that the North American vehicles had been engineered for different crash test requirements, which would include the FMVSS 214 pole test. Differences may therefore be at least in-part due to US pole side impact performance requirements.

Mr Limmer noted that the US Fiat 500 had also performed well in the IIHS side impact

test.

ACTION: Australia/Canada to do further analysis of Australian and Canadian market Fiat 500 pole side impact test results for next meeting.

6.2. French Program

Mr Lepretre presented a comparison of oblique and perpendicular pole side impact tests conducted on a French sedan using a WorldSID 50th male dummy ([PSI-06-05](#)).

ACTION: UTAC to provide Australia with detailed pole side impact test results for inclusion in preamble/technical report.

7. Safety Need

7.1. Update of country safety need data

Mr Hogan presented updated high level safety need data, including 2010 data for the United Kingdom ([PSI-06-06](#)).

Mr Hogan noted that Australian data was currently only available at a national level up until 2006, but that MUARC were working on national estimates for later years. In the absence of more recent Australian national data, Victorian state data (approximately one quarter of the Australian population) was included for 2009.

Mr Hogan noted that this high level safety need data would be included in the preamble of the GTR and should ideally be the most recent available. Australia would therefore be requesting updated (2010) high level safety need data from contracting parties.

ACTION: Australia to request/collect high level 2010 safety need data from contracting party members of the informal group.

7.2. Category 2 Vehicles (Australia)

Mr Belcher presented a summary of Australian Category 2 vehicle sales and safety need data ([PSI-06-07](#)).

The data showed that vans had very low pole side impact fatality and serious injury rates per registered vehicle relative to both passenger vehicles and utes/pickups. Vans also had a significantly lower overall side impact fatality rate per registered vehicle. Serious injuries (hospital admissions) from other (e.g. vehicle-to-vehicle) side impacts were higher for vans than utes/pick-ups, but the severity and body regions of these injuries was unknown.

ACTION: US to make presentation on safety need for Category 2 vehicles at next meeting.

8. WorldSID Update

Ms Versailles advised that the proposal to establish Special Resolution 2 for tests tools (including dummies) would be considered at Working Party 29 the following week.

8.1. ISO WorldSID 50th Task Group Update

Ms Tylko presented an ISO WorldSID 50th Task Group update ([PSI-06-08](#)).

Ms Tylko explained that material changes are required for a number of dummies, not just WorldSID. A replacement for the Ureol used for the WorldSID 50th head skull and pelvis iliac wings has been identified and is in production at Humanetics ATD. A suitable replacement has not yet been identified for the Hyperlast foam used in the pelvis flesh. All dummy families will require vinyl flesh changes in the next 2-4 years. It is the expectation of the ISO group that a suitable replacement material should not significantly change the dummy performance and the ISO task group will be coordinating a limited number of biofidelity tests to confirm this for each replacement material.

Ms Tylko explained that the upper front edge of the WorldSID 50th and 5th pelvis flesh can sometimes interfere with the lower abdominal rib when the dummy is in an upright seating position/posture. Several organisations have run pendulum and sled tests with and without WorldSID 50th pelvis flesh interference to investigate the influence interference could have on the magnitude and repeatability of the lower abdominal rib deflection responses. The no interference condition was created by cutting away some of the WorldSID 50th pelvis flesh. Results showed that this made less than 2-3mm difference to the deflections and there was no increase in repeatability for the modified cut away pelvis. The ISO task group is therefore recommending the WorldSID 50th pelvis not be changed.

Ms Tylko advised that pelvis tests on newer dummies typically produce results close to the edge of the corridor. The corridor will be modified so that the population of dummies produce results close to the middle of the corridor. It is not unusual to modify corridors to suit the dummy population. The current version of the dummy is build level E. Build level F will be available soon and will include the updated pelvis iliac/skull material. However, build level F will not include 2D-IRTRACC or a replacement material for Hyperlast foam. The current 2D-IRTRACC design has had some durability and data quality issues. A new 2D-IRTRACC exists, but needs to undergo durability testing first and will therefore not be included in build level F.

Mr Jensen advised that the ISO Task Group was not intending to develop a single rib certification test. Single rib certification tests have been investigated previously for other dummies, but can be problematic and would not necessarily make the dummy better. Data will be collected and used to narrow the WorldSID 50th pelvis certification corridors.

Ms Tylko explained that the ISO seating procedure for the WorldSID 50th male dummy is likely to take at least 12 months to progress through the ISO ballot process. It may be possible for the draft document to be circulated to members of the pole side impact GTR informal group.

Ms Versailles was concerned about referencing a standard that needs to be purchased in

the GTR. Ms Versailles explained that NHTSA must put documents referenced in FMVSS standards on file at the federal register and that these are accessible under freedom of information.

8.2. WorldSID 5th TEG Status Report

Ms Versailles presented a WorldSID 5th TEG Status update on behalf of the TEG chair Bruce Donnelly ([PSI-06-09](#)).

Ms Versailles explained that a major problem had been identified with the WorldSID 5th female pelvis design. The WorldSID 5th female iliac crest of the pelvis can contact the sacro-iliac load cell effectively acting as a lumbar load bridge.

Mr Jenson explained that there are two solutions being investigated. One is a re-design of the load cell and the other is a re-design of the WorldSID 5th female pelvis.

Ms Versailles noted that the WorldSID 5th female pelvis re-design process was likely to take at least 12 months and that little substantive work, including repeatability and reproducibility testing, biofidelity evaluations, certification specifications and injury criteria can be done for the WorldSID 5th female until the pelvis is re-designed.

9. GTR Issues

9.1. Injury Thresholds

Mr Holloway and Dr Yoganandan presented a preliminary analysis of shoulder injuries from the CIREN database ([PSI-06-10](#)).

Mr Limmer, Mr Löw and Dr Junge presented a summary of the physics of occupant thorax and shoulder loadings in pole side impact crashes ([PSI-06-11](#)).

Mr Limmer and Mr Löw explained that when a vehicle impacts a pole, the occupant/dummy is not hit by a moving pole/door. Instead it is a moving occupant/dummy that impacts the stationary pole/door. This means it is necessary to use the restraint system to absorb as much of the kinetic energy of the occupant as possible. There is not much space in which to slow down the occupant/dummy. The shoulder has even less space than the thorax and impacts before the thorax. A manufacturer can improve performance by firing the airbag as early as possible and using as much of the limited available space, to make airbags as big as possible and absorb as much energy as possible. Loading at a constant level and avoiding concentrated loads to sensitive body regions can also help. However in severe pole crashes some loading of the occupant is inevitable. It is therefore important to prioritise inevitable loads to body regions best able to handle them.

Dr Junge explained that AIS 2 shoulder injuries can be treated by relatively routine medical procedures and have a much lower risk of mortality than AIS3+ thorax injuries such as flail chest injuries.

Mr Limmer, Mr Löw and Dr Junge were concerned that the more injury sensitive thorax could be left at greater risk by requiring the shoulder loads to be lowered.

Mr Belcher noted that both the ISO and NHTSA biofidelity evaluations of the WorldSID 50th dummy had found the shoulder to be one of the most biofidelic body regions. Given these very good shoulder biofidelity ratings reported by both ISO and NHTSA, shoulder load would perhaps only be likely to be a problem for high shoulder load cases where the shoulder rib bottoms out and this provides a more rigid load path than a human shoulder otherwise might.

Mr Ammerlaan noted that the shoulder of a WorldSID 50th male dummy could possibly correspond to the upper thorax of a taller occupant.

Mr Limmer noted that the shoulders are wider than the upper thorax and the shoulder is therefore generally loaded earlier. Mr Limmer was also concerned that consumer evaluation programs could decide to award higher points to vehicles that achieve even lower shoulder loads than any shoulder limit the informal group may propose for a pole side impact GTR. He was concerned that in order to get the best possible star rating, manufacturers would be forced to target much lower shoulder loads. In some cases this may be achieved at the expense of the best possible thorax protection. His preference was for manufacturers to have the freedom to design an airbag that provides the best possible thorax protection. Mr Limmer did not want a situation to arise where manufacturers may be encouraged to use the airbag to dislocate the dummy shoulder in order to achieve low shoulder loads.

Ms Tylko noted that the upper thorax rib of the WorldSID 50th male dummy is not completely de-coupled/independent of the shoulder rib. This means it would be unusual to get a high shoulder rib deflection in combination with a low upper thorax rib deflection.

Mr Ridella presented a summary of NHTSA WorldSID 50th male dummy pole side impact test data ([PSI-06-12](#)).

Mr Ridella noted that only one of the 12 vehicles tested would have failed a 30% AIS 3+ thorax injury risk limit. This was also the only vehicle to exceed the 25% AIS 3+ thorax injury risk threshold value. A number of vehicles exceeded 25% AIS 2+ shoulder injury risk and many were approaching the 50% AIS 2+ shoulder injury risk threshold.

ACTION: OICA, in liaison with NHTSA and Australia, to investigate WorldSID 50th male dummy pole side impact test shoulder loadings and develop a shoulder criterion that would prevent excessive (i.e. non-biofidelic) shoulder loadings from being used to unrealistically enhance (i.e. in a non-biofidelic way) vehicle pole side impact GTR performance responses.

Mr Ridella noted that the sacro-iliac loads can be lower for vehicles that load the WorldSID 50th male shoulder more heavily. There may be pelvis injury reduction benefits associated with loading the shoulder. Given pelvis injuries are more of a concern, loading the shoulder may be preferable.

Mr Ridella was considering organising some tests to investigate the relationship between WorldSID 50th male sacro-iliac loads and pelvis injury risk, but was wondering if these should wait until after the replacement materials for the pelvis are finalized. Ms Tylko

advised that the ISO group would be likely to insist that the replacement materials chosen closely replicate the performance of the existing materials. It was therefore thought likely that these tests could proceed without need for delay due to upcoming material changes.

ACTION: NHTSA to provide list of NHTSA WorldSID 50th male pole side impact test numbers.

Mr Belcher presented a summary of WorldSID 50th percentile adult male rib responses from pole side impact tests previously conducted by Australia and Canada using RibEye ([PSI-06-13](#)).

It was noted that the differences between the theoretical IRTRACC deflection and the peak middle LED y-axis displacement (i.e. the WorldSID half thorax compression) were in most cases small, especially for the oblique pole tests.

However, it was also noted that in one test, the loading of the thorax/abdomen from behind by the seat mounted side airbag had caused substantial forward rotation of the ribs. As a result, the theoretical IRTRACC deflection in this test was considerably less than the peak middle RibEye LED y-axis deflection. However, the 3ms lower spine acceleration was well over 75g and this was the only test to produce a 3ms lower spine acceleration in excess of 75g. A 3ms lower spine acceleration limit may therefore detect some unusual loadings that an IRTRACC may not and reduce the possibility of non-biofidelic favourable loading of the dummy.

9.2. Test Speed

Noting discussion at the previous meeting of the informal group, Mr Hogan stated that he thought it would be unworkable to allow technical services and type approval authorities to determine the speed/speeds at which pole side impact tests are conducted for type approval. Mr Hogan noted the comments of Mr Pott and Mr Abraham on this issue from the previous meeting:

“Mr Pott was concerned any requirement for vehicles to meet a pole side impact GTR at any test speed up to and including 32 km/h could mean vehicle manufacturers would be required to do many different tests at different speeds in type approval markets.

Mr Pott and Mr Abraham noted that vehicle manufacturers can use appropriate tools including simulation models to satisfy themselves they comply with self-certification regulatory requirements.”

Mr Hogan suggested that drafting would proceed on the basis that the GTR will have an “up to and including 32 km/h” test speed requirement, with a note or reference to the preamble to be used to specify a single test speed for type approval.

9.3. Possible Exemptions

Mr Pott stated that the Australian category 2 vehicle safety need data supported the OICA proposal to exempt flat front delivery vans from the GTR.

Mr Pott provided an example of a narrow mini-truck that would be captured by the

current scope of the draft GTR. He noted that the driver seat was directly above the front axle, the seats were upright, there was very little space between the seats and the door and that the vehicle was of a type that might also be modified in a second stage of manufacture. Mr Pott also noted that there can be differences between adjustable driver seats and fixed passenger bench seats in mini-trucks and was concerned these mini-trucks may undergo a large rotation (due to the impact point being significantly forward of the vehicle centre of gravity) and damage test equipment if subjected to pole side impact tests.

It was agreed that these issues should be considered when applying a pole side impact GTR in national legislation.

ACTION: OICA to draft a detailed explanation for use in the preamble of the GTR of the issues and vehicle characteristics contracting parties should take into account when considering exemptions from the PSI GTR in national legislation.

Ms Versailles proposed two alternative clauses that could be used, at the option of contracting parties, to require Kei-cars to meet the pole side impact GTR up to and including 26 km/h.

Some concerns were raised about what this wording would mean for type approval authorities (especially if the provision was translated into a UN regulation). Mr Abraham noted that the UN Regulation on AEBS had established an approach which could be used so that type approval authorities could choose not to accept vehicles certified to 26 km/h.

ACTION: Australia to liaise with Japan on Kei-car 26 km/h test option wording developed by NHTSA.

10. Consideration of Draft GTR

Vehicle Preparation

Mr Pott noted that the “reference mass” term used in the draft GTR is not the same as the definition of “reference mass” used in UN R95. This contradiction could create difficulties when transposing the GTR text into a UN regulation.

Mr Belcher advised that the “reference mass” definition used in the draft GTR regulatory text is based on the test mass requirements of FMVSS 214 and the EuroNCAP pole test protocol. Mr Pott requested further information on the reasoning behind the vehicle test mass requirements of FMVSS 214. Ms Versaille undertook to provide some further information on this.

ACTION: NHTSA to advise how 136kg mass used to define test vehicle mass in FMVSS 214 was originally derived.

ACTION: Australia to check defined terms used in draft GTR do not contradict terms already used in UN R95. Australia to propose alternative terms where a contradiction of terms is identified.

Mr Hand suggested that improved pitch and roll angle definitions would help to simplify

the wording of the draft GTR vehicle attitude requirements.

ACTION: Australia to suggest improved pitch angle and roll angle definitions.

ACTION: Australia to use improved pitch angle and roll angle definitions to develop a simplified wording of vehicle attitude requirements in the draft GTR.

Mr Wegeleben suggested that appropriate illustrations would also simplify interpretation of the test attitude requirements.

ACTION: Australia to provide example figures/illustrations of how roll angle and pitch angle are measured.

Injury Criteria

BRIC:

Mr Ridella advised that NHTSA were not yet able to agree the injury criteria limit values for the GTR. Mr Ridella was comfortable with the injury risk curves available for the WorldSID 50th male dummy. However, NHTSA would also be conducting MDB tests with a WorldSID 50th male dummy over the coming months. Results would show how the injury risk predicted by the WorldSID 50th male compares to the injury risk predicted by ES-2re for MDB side impact tests of matching vehicle models.

ACTION: NHTSA to advise timing of NHTSA WorldSID 50th male mobile deformable barrier side impact tests.

Mr Ridella advised that NHTSA are planning a series of dummy head impact tests using both rotational accelerometers and angular rate sensors. The aim of these tests is to identify the measurement system that provides the cleanest data for the calculation of the Brain Injury Criterion (BRIC). NHTSA (Erik Takhounts) were also intending to present a paper on BRIC at the Stapp Conference in November 2012. Mr Ridella also explained that there was a case in CIREN where an occupant's head had interacted with a side head curtain airbag and the occupant had experienced no head injuries other than a deep brain injury. This injury could have been caused by rotational head acceleration. There may be cases where the HIC would be low, but deep brain injuries still occur. NHTSA are doing a lot of work on developing the BRIC.

Mr Wernicke asked if NHTSA would be having discussions with ISO WG6 about BRIC. Mr Wernicke was concerned manufacturers do not have enough information on BRIC, including how to calculate it, for it to be included in the GTR at this stage.

Mr Ridella agreed that it was important to seek feedback from the biomechanics community before incorporating BRIC into the GTR.

Mr Hogan asked whether BRIC would be ready for phase 1 of the GTR or whether it would be more appropriate to consider BRIC in phase 2 of the GTR.

It was agreed to leave BRIC in square brackets for the time being. Unless there were significant advances by the next meeting, the fallback position would be removal of the

BRIC text altogether and the consideration of BRIC in phase 2 of the GTR.

Viscous Criterion:

Mr Ridella advised that he was aware of some VC surrogate animal model data that may be able to be used to improve reliability of VC injury risk curves.

Ms Petitjean was happy to consider this data and perhaps have a Webex meeting to discuss further.

ACTION: NHTSA to investigate possibilities for improvement in the robustness of the VC injury risk curves through use of additional research data. NHTSA will look at available surrogate animal model research data for next meeting.

Impact Location and Vehicle Diagrams

Ms Tylko suggested that the figures used in the draft GTR to define the impact reference line could be enhanced by incorporating the dummy head including an indication of the head centre of gravity. It was noted that some test facilities have incorrectly aligned the pole with the dummy head when conducting oblique pole tests. The figure would illustrate (from above) how the pole must be aligned with the true dummy head centre of gravity and not a head centre of gravity marker on the side of the dummy head.

ACTION: Australia to incorporate an inset head centre of gravity illustration in Figure 4-1 and Figure 4-2 of Annex 4 of the draft GTR.

Mr Terrell suggested that the vehicle images be replaced with equivalent vector line art illustrations.

ACTION: Australia to replace detailed vehicle image in Annex 4 and Annex 5 of the draft GTR with an equivalent line art illustration of vehicle.

ACTION: Australia to circulate updated draft GTR to informal group members.

11.Future Work and Timetable

Mr Hogan advised that Australia's preference was that the pole side impact GTR be approved by AC3 by June 2013. However, unless there was a special GRSP scheduled, this would require submission of a formal proposal to GRSP by 14 September 2012, which was unlikely.

Ms Versailles advised that the text of the WorldSID Annex of the proposed new Special Resolution 2 is going to be at least 6 months behind the pole side impact GTR regulatory text. However, Ms Versailles was of the view that this may not a significant issue as a GTR cannot be applied immediately anyway.

Mr Hogan stated that Australia would keep working to the shortest possible timetable and would work with NHTSA outside the meeting to develop the timetable.

12.Other Business

Mr Wernicke asked if the pole side impact GTR group would continue with 1D-IRTRACC in the GTR.

Mr Hogan stated that the WorldSID rib deflection measurement system is a matter for the WorldSID group. Unless the WorldSID group develops a workable proposal for a measurement system other than 1D-IRTRACC, Australia would continue to draft a GTR which uses 1D-IRTRACC.

13.Next Meetings

Mr Hogan suggested that the informal group would be likely to need at least two more meetings to finalise a GTR. Mr Hogan asked if there would be any interest in holding one of these meetings in Australia. Most participants indicated that they were not confident of obtaining approval to travel to Australia for an informal group meeting.

Mr Wernicke suggested that it may be appropriate to have another meeting in the US.

Mr Hogan agreed that the US or perhaps Canada were the most likely options for the next joint meeting of the WorldSID and pole side impact GTR groups.

Mr Hogan undertook to discuss meeting options further with the chair of the WorldSID group before finalising the date and location of the next meeting.

ACTION: Chair to advise date and location of next meeting.

SUMMARY OF ACTIONS

1. Australia to circulate final MUARC report to members of the informal group (when available).
2. Australia/Canada to do further analysis of Australian and Canadian market Fiat 500 pole side impact test results for next meeting.
3. UTAC to provide Australia with detailed pole side impact test results for inclusion in preamble/technical report.
4. Australia to request/collect high level 2010 safety need data from contracting party members of informal group.
5. US to make presentation on Category 2 vehicle safety need at next meeting.
6. NHTSA to review proposal for ± 25 mm impact alignment tolerance and advise if acceptable.
7. NHTSA to review purpose wording (paragraph 1) in draft GTR and suggest revised wording if necessary.
8. NHTSA to consider proposed use of Special Resolution 1 unladen mass definition for the purpose of defining the test vehicle mass, test vehicle attitude, fuel ballast etc throughout the draft GTR.
9. Australia/NHTSA to investigate incremental benefits that may be obtained by lowering the AIS 3+ injury risk used to set the thorax rib deflection limit in the GTR.
10. NHTSA to provide further input on injury criteria and thresholds (following further testing in July).
11. NHTSA to investigate possibilities for improvement in the robustness of the VC injury risk curves through use of additional research data. NHTSA will look at available surrogate animal model research data for next meeting.
12. OICA, in liaison with NHTSA and Australia, to investigate WorldSID 50 th male dummy pole side impact test shoulder loadings and develop a shoulder criterion that would prevent excessive (i.e. non-biofidelic) shoulder loadings from being used to unrealistically enhance (i.e. in a non-biofidelic way) vehicle pole side impact GTR performance responses.
13. OICA to draft a detailed explanation for use in the preamble of the GTR of the issues and vehicle characteristics contracting parties should take into account when considering exemptions from the PSI GTR in national legislation.
14. Australia to liaise with Japan on Kei-car 26 km/h test option wording developed by NHTSA.
15. NHTSA to advise why the transmissions of manual and automatic vehicles are required to be placed in different gears (i.e. second vs. neutral gear) in FMVSS 214.
16. NHTSA to advise how 136kg mass used to define test vehicle mass in FMVSS 214 was originally derived.
17. NHTSA to provide list of NHTSA WorldSID 50 th male pole side impact test numbers (CLOSED).
18. NHTSA to advise timing of NHTSA WorldSID 50 th male mobile deformable barrier side impact tests.
19. Australia to check defined terms used in draft GTR do not contradict terms already used in UN R95. Australia to propose alternative terms where a contradiction of terms is identified (CLOSED).
20. Australia to suggest improved pitch angle and roll angle definitions (CLOSED).
21. Australia to use improved pitch angle and roll angle definitions to develop a simplified wording of vehicle attitude requirements in the draft GTR (CLOSED).

22. Australia to provide example figures/illustrations of how roll angle and pitch angle are measured (CLOSED).
23. Australia to incorporate an inset head centre of gravity illustration in Figure 4-1 and Figure 4-2 of Annex 4 of the draft GTR (CLOSED).
24. Australia to replace detailed vehicle image in Annex 4 and Annex 5 of the draft GTR with an equivalent line art illustration of vehicle (CLOSED).
25. Australia to circulate updated draft GTR to informal group members.