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Regarding measures to address misconduct in sample testing within final vehicle inspections in Japan

The Company has announced “Regarding measures to address misconduct in sample testing within final vehicle inspections in Japan” as attached release.

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Regarding measures to address misconduct in sample testing within final vehicle inspections in Japan

YOKOHAMA, Japan (Sep. 26, 2018) —Nissan Motor Co., Ltd. today submitted a detailed investigation report to the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT) on misconduct in sample testing within the final vehicle inspection process (*kanken*) at plants in Japan.

On July 9, Nissan reported the following two areas of misconduct in exhaust emissions and fuel economy sample testing discovered as a result of voluntary internal checks: 1) deviations from the test environment; 2) rewriting of measurement values.

The report was submitted today in line with MLIT's direction to do so after establishing dedicated teams to conduct a full and comprehensive investigation of new facts and considering appropriate countermeasures following confirmation of any other potential nonconformities in the *kanken* process.

In addition to conducting a series of independent investigations, Nissan retained the Japanese law firm Nishimura and Asahi to carry out a third-party investigation of facts and causes and report to Nissan. Based on the findings and countermeasure proposals in the Nishimura and Asahi report and in consideration of the results of Nissan's own voluntary special audit, Nissan compiled and submitted to MLIT a report that comprises Nissan's understanding of the facts, along with its countermeasures.

An overview of Nissan's report, the company's understanding and countermeasures follows.

Results of investigation into improper sample testing procedures within final vehicle inspections in Japan

- 1) Overview of fuel economy and exhaust gas emissions sample testing
As first disclosed by Nissan on July 9, during sample tests conducted under the requirements of the domestic vehicle type certification system in Japan, improper procedures such as rewriting of measurement values, deviation from

prescribed test environments and rewriting of test environment data were identified at all Nissan and affiliate vehicle production plants in Japan, except Nissan Motor Kyushu. (For specific instances of the misconduct, please see the attachment below.)

By the end of August, Nissan completed measurements of the GT-R with an increased sample size and confirmed the catalog values are guaranteed. Thereby, as of the end of August Nissan has confirmed that all vehicle types conform to safety standards and that the average exhaust emissions for each vehicle type guarantees their catalog specification.

As a result of thorough voluntary investigation, Nissan confirmed instances of misconduct in exhaust emissions and fuel economy occurred during sample testing in a total of 1,205 vehicles, up from the 1,171 vehicles the company initially announced on July 9. (This discrepancy was in part due to data duplication, invalid data and miscalculation.)

2) Vehicle precision measurements

A number of verbal accounts described certain improper procedures related to vehicle precision measurements (sample tests for vehicle structure, equipment and performance outside of fuel economy and exhaust gas emissions tests). According to these accounts, these practices included non-implementation of certain test items, rewriting of data, and deviation from prescribed testing environments.

Nissan has conducted extensive reevaluation and confirmed conformity with all applicable Japanese safety standards or test specifications.

Instances of misconduct are summarized as below.

i. Non-implementation of brake fluid warning light function test

At Oppama Plant, Nissan Shatai Shonan and Nissan Shatai Kyoto, only one inspector per plant was assigned to drain brake fluid from the reservoir tank, which proved to be difficult in the absence of a second inspector. The sample testing specification requires inspectors to

confirm that a warning light is illuminated when the brake fluid level goes below the minimum line. All vehicles are separately tested for brake fluid warning light bulb function and sample tests for brake fluid levels have showed no issues, which confirms the proper operation and illumination of the brake fluid warning light.

ii. Partial non-implementation of test items

a) External vehicle noise

Cross-checking of vehicle transportation records and inspection reports showed external noise tests were not conducted in some cases for vehicles produced at Nissan Shatai Kyoto. Nissan has measured multiple vehicles currently in production in the plant for external noise under the required conditions, and the results confirmed all measurement values satisfy Japanese safety standards for regular noise and acceleration noise.

b) Maximum stable inclination angle

Investigation at Nissan Shatai Kyoto confirmed that the plant did not make some vehicles available for sample testing. Nissan has measured multiple vehicles currently in production for maximum stable inclination angles based on the test specifications, and confirmed all measurement values satisfy Japanese safety standards.

iii. Rewriting of measurement values

a) Toe-in, camber and caster

At Oppama Plant and Nissan Shatai Kyushu it was confirmed that some toe-in measurement values were rewritten to meet the range defined by test specifications (-1.0 mm to 1.0 mm) after initial measurements were outside the said range, and if sideslip measurement values were confirmed to meet test specifications. It was also confirmed that camber measurement were rewritten at Nissan Shatai Kyushu, and caster measurement values were rewritten at Nissan Shatai Kyoto to meet test specifications when initial values did not meet the said specifications.

After it was found that the toe-in measurement values had not reflected the values adjusted to the schematics for each model at the plants in question, these plants reflected the adjustment values in the alignment tester. After that, the toe-in values of several vehicles measured at the plants in the prescribed test method were no longer outside the range.

Toe-in measurements are not included in Japan's safety regulations. The sideslip measurements are only regulated among items surrounding the wheel alignment. All vehicles are tested for sideslip, and Nissan has confirmed all conform to the sideslip test specifications and safety regulations. Nissan also confirmed conformity in camber and caster measurements.

b) Vehicle headlamp aim

According to verbal accounts at Nissan Shatai Shonan and Nissan Shatai Kyoto, vehicle headlamp aim was readjusted to meet specifications after initial measurements deviated from test specifications, with the post-adjustment measurements recorded as the final test results.

As a result of a confirmation at the plants, there have been no such deviations discovered since March 2016 when the test specifications were revised. All vehicles are currently tested for headlamp aim. Nissan measured vehicle headlamp aim for several vehicles in the prescribed test method at the plants in question and confirmed that all vehicles conform to the test specifications.

c) Vehicle width

According to verbal accounts at Oppama Plant, Nissan Shatai Shonan and Nissan Shatai Kyoto, measurement values for vehicle width, one of the main catalog values, had been rewritten to meet test specifications, provided the initial measurements were confirmed to meet Japanese laws and regulations.

Nissan has confirmed that the widths were within the regulatory

values, which are greater than the test specifications, even when measurements deviated from the internal test specifications. Nissan also conducted width measurements for several vehicles in the prescribed test method and confirmed that all vehicles conform to the test specifications.

d) Horn volume

According to verbal accounts at Nissan Shatai Shonan, measurement values for horn volume had been rewritten to meet test specifications after initial measurements deviated from said specifications by roughly 1 dB, provided the initial measurements were confirmed to meet Japanese safety standards.

Nissan has confirmed that horn volume is within the regulatory values, which are greater than the test specifications, even when measurements deviated from the internal test specifications. Nissan also conducted horn volume measurements for several vehicles in the prescribed test method and confirmed that all vehicles conform to the test specifications.

e) Steering wheel maximum rotation

It was confirmed that measurement values for steering wheel maximum rotation had been rewritten at Nissan Shatai Kyoto to meet test specifications after initial measurements deviated from the said specifications. In relation to the test above, steering wheel maximum rotation is directly related to steering angle, which is separately tested for all vehicles within the final vehicle inspection.

f) Brake pedal travel and parking brake lever travel

It was confirmed that at Oppama Plant, multiple standard values in test specifications, including brake pedal travel, had been incorrectly defined. Brake pedal travel values were rewritten to meet the range defined by test specifications after initial measurements were outside said range.

Erroneous test specifications for brake pedal travel have been

corrected. Transcribed test specification figures in test logs have also been corrected. As a result of measurement tests for several models in the prescribed test method, Nissan confirmed that all vehicles conform to the test specifications.

Nissan also corrected the test specifications for parking brake lever travel transcribed in test logs and conducted precision measurement tests for several vehicles to confirm that they all conform to internal test specifications.

iv. Rewriting of test condition data and deviations from prescribed test environment conditions

a) External vehicle noise

It was confirmed that external vehicle noise tests at Oppama Plant and Nissan Shatai Kyushu were carried out in conditions in which wind speeds exceeded 5 m/s (the limit specified by operational manuals), with wind speed values of less than 5 m/s recorded in test logs. Also, according to verbal accounts at Nissan Shatai Shonan, external vehicle noise tests that should have been conducted on dry roads were conducted in light rain and the conditions were recorded as "cloudy" in test logs. Nissan conducted the prescribed measurement test for several vehicles at the plants to confirm that all vehicles conform to safety regulations for noise levels during both acceleration and normal driving.

b) Vehicle weight

According to verbal accounts at Nissan Shatai Kyoto, vehicle weight was measured without a full tank of gasoline as defined by test specifications when internal quality checks (not for sample tests), although the measurement tests for normal sample testing were properly conducted. Nissan conducted the prescribed measurement test for several vehicles at the plants to confirm that all vehicles conform to test specifications.

3. Background and causes

Based on the report, Nissan understands the following to be the potential causes of the misconduct discovered at vehicle production plants.

1) Reduced respect for standard operating procedure among inspectors:

- When inspectors rewrote test result data and conducted tests in an improper manner, they were generally aware of the fact that their actions were in violation of the company's operational manuals and the requirements of the sample testing procedures.
- Despite the fact that sample testing needs to be conducted in accordance with specified procedures, and the fact that sample testing results form the basis of statistical analysis by the company, inspectors conducting tests in an improper manner did not fully understand the importance or purpose of these tasks.

2) Absence of *gemba* management:

- *Kocho* (personnel chiefly responsible for managing and overseeing final inspections), had no experience, lacked sample testing knowledge and did not gain supervisory experience. They left everything to *gemba* inspectors, making work observation ineffective. *Gemba* management by the *kocho* was in name only.
- Following the retirement or reassignment (without replacement) of a number of technicians formerly responsible for taking action if inadmissible test results were recorded, tasks such as making evaluations and coordinating with those responsible for product designs fell to the inspectors themselves. As a result, inspectors tried to avoid these extra actions when inadmissible test results were recorded.

3) Insufficient *kanken* training:

- Limited opportunities to receive sufficient education on the importance of sample testing and the underlying approach and rationale.

Example 1: Some inspectors rewrote data not knowing that Xbar-R control lines are meant to be changed, or that when diluted air measurements show negative values, these are customarily treated as zero.

Example 2: Some inspectors justified deviations, such as trace errors,

because the measurements themselves conformed to test standards and safety standards; they would not have considered these actions justifiable if they correctly understood the importance and purpose of sample testing.

Example 3: Some inspectors did not understand that proper adherence to Nissan's *kanken* procedures is essential, and that statistics-based judgment relies on correct data from each sample.

- Training was primarily conducted on-the-job, but was ineffective; the *kocho* lacked knowledge/experience, and senior personnel taught improper procedures to junior personnel.

4) Insufficient number of *kanken* inspectors:

- The number of inspectors was not necessarily sufficient for the amount of work.
- The required number of inspectors for sample testing was predicated on zero inadmissible test results being recorded. As a result, inadmissible test results created unexpected work for inspectors.
- Some vehicle production plants lacked the staff to adequately train new personnel, and could not provide proper training.

5) Insufficient equipment:

- Defects in fuel economy and exhaust gas emission testing equipment at some plants prevented conditions from meeting test requirements.
- Each vehicle production plant lacked required testing equipment, causing the plants to share such equipment, which made it difficult for them to establish proper testing conditions.

6) Management of vehicle plants

Focus on improving productivity and meeting targets resulted in neglect of key factors required for robust maintenance and development of vehicle production plants, leading to headcount allocation premised on no inadmissible test results being recorded, and to a lack of plant engineers, a lack of personnel to train newcomers, and a lack of managers with appropriate knowledge and experience.

7) Management-level personnel at plants:

- Forward-looking HR development was insufficient, leading to insufficient training and allocation of personnel who could manage the *gemba* effectively; inspectors were not sufficiently trained, leading to immobility and a job environment in which misconduct could easily occur.
- Plant managers did not communicate enough with *gemba* personnel responsible for sample testing, and did not understand the realities of the *gemba* (similar to issues identified following last year's vehicle inspection issues); barriers also existed between *gemba* personnel and *kocho/kakaricho*.
- *Kocho/kakaricho* management was not effective, and communication with the *gemba* staff was inefficient; as a result, risks at the *gemba* were not understood.

8) Insufficient compliance at Nissan:

The following were not in practice and a compliance system was not sufficiently established.

- Management demonstrates a strong stance on compliance, providing regular education and training so that employees correctly understand the meaning and purpose of their jobs.
- Processes to allow *gemba* managers to correctly understand issues and share them with management.
- Correct understanding of operational risks and a management structure based on those risks.

9) Unreasonable test specifications:

- Certain unreasonable test specifications led to misconduct (e.g. toe-in alignment).
- Due to the decrease in the number of sample test technicians, no feedback related to the suitability of test specifications was given to R&D when the test specifications were set or after the start of production.

10) Reduced respect for the *kanken*

- Due to prioritization of the need to meet production and shipment plans, the importance of the *kanken* was not sufficiently recognized at plants.
- Misconduct was indirectly caused by concerns about potential shipping delays resulting from re-inspections, and the additional workload put on

the production process for root-cause investigations.

4. Countermeasures

After the discovery of misconduct within the *kanken* in September 2017, Nissan put in place 53 countermeasures, with the list extended to 58 to address newly discovered misconduct. The majority of these countermeasures were focused on the tester line or around final inspection on the tester line, and therefore Nissan cannot state that the countermeasures properly prevented nonconformities in other areas of the *kanken*.

Compliance enhancement, investigation and improvement at plants in Japan is ongoing. Nissan recognizes that systems to remove obstacles and create transparent *gemba* activities that truly enable and encourage employees to speak up need to be established, and will develop countermeasures designed for sample testing and reconfirm the initiatives initiated last year.

Countermeasures for sample testing misconduct

1) Top-priority measures

- Sample testing processes to be supervised by supervisors and managers
- Change the final inspectors who perform sample tests; increase the number of inspectors
- Revise the sample testing emissions measuring device software to disenable rewriting of data
- Revise unclear standards for emissions measurement in sample testing

2) Sample testing organization

- Revise the sample testing organization
- Enhance the development of sample testing supervisors, managers and engineers

3) Sample testing operations

- Enhance observation of work
- Reconfirm and maintain operational manuals for sample testing

4) Maintenance of sample testing equipment and facilities

- Automatically void any data that deviates from the emissions measurement sample testing conditions
 - Establish proper preservation and management of emissions measurement results, sample test environment conditions and driving data
 - Optimize emissions measurement equipment and properly maintain sample testing environments
 - Consider automation of measurement within sample testing
- 5) Personnel management of final inspectors who carry out sample testing
- Formulate development plan for final inspectors who carry out sample testing
 - Revise the personnel management standards for sample testing
 - Increase the number of final inspectors who carry out sample testing
- 6) Monitoring and auditing
- Formulate a monitoring plan and revise the standards for sample testing
 - Enhance auditing of sample testing processes
- 7) Education and registration of final inspectors who carry out sample testing
- Define technical proficiency for sample testing (three-level standard of expertise)
 - Revise and consider supplementing educational content regarding regulations and company rules for final inspector registration
- 8) Employee education on related regulations and company rules
- Correct understanding of the *kanken*
 - Develop a customer-focused mindset
- 9) Enhancement of compliance
- Conduct spot inspections at plants
 - Conduct general inspections of rules for inside plants
 - Carry out education to specifically raise the compliance mindset within production
 - Raise the awareness of compliance on the *gemba*
- 10) Comprehension of the realities of the *gemba*
- Establish a structure that enables raised issues to be followed up on
 - Enhance *gemba* forums for discussion of issues
 - Enhance quality assurance general managers' and managers' comprehension of

the *gemba*

11) Approach to plant management

Revise process for managing investment and costs for compliance, safety, environment and others

12) Structure for countermeasure implementation and review

- Create a structure within which the Chief Competitive Officer has overarching responsibility for implementation and related executives are placed in charge of execution and oversight
- Report to the Executive Committee on a monthly basis
- Report regularly to the Internal Control Committee
- Submit progress reports to MLIT

Conclusion

Following the investigations into the factors and background that have caused misconduct in sample testing, Nissan's view is that the root of the issue is the same as last year's *kanken* issues. As a company –executives, managers to plant supervisors – Nissan had extremely low awareness of the gravity of violating *kanken* standards and rules. Nissan recognizes that the nature of the issue is the same, and that as a company Nissan must thoroughly reinforce the understanding of the importance of *kanken*, reduce the distance between the *gemba* and managers (supervisors in this particular case), and ensure that managers have a sufficient grasp of the *gemba*.

Nissan believes that a style of management that causes organizational fatigue is not sustainable. Nissan does not pursue such a style of management, even though healthy striving for improvement and achievement is encouraged. As a manufacturer, however, ceaseless effort to reduce costs is essential, and therefore the discovered issues should not be directly linked with such effort. On the other hand, if Nissan's focus on cost effectiveness indeed caused factors such as the lack of *gemba* management and sample testing personnel as the third-party investigation report states, Nissan must recognize that priorities were misjudged and the company lacked an understanding of what was happening in the *gemba* since the beginning of this issue. If the issues are due to a lack of situational understanding, Nissan recognizes that management must lead the effort to understand the realities and align that with

employees.

The Japan Manufacturing & SCM Operation Division, established in April this year following last year's *kanken* issues, has been implementing and promoting measures for compliance issues under the Japan Monozukuri Reform initiative. Under the initiative, the group is also leading an effort to enhance public trust through process improvements and revamping of facilities to revitalize the *gemba* of Japan's *monozukuri* and further motivate employees, thereby ensuring steady delivery of cars that are of high quality, are safe, and that provide peace of mind. This initiative also covers countermeasures and required investment, including in human resources.

Nissan will continue to carry out comprehensive checks of frameworks, organizations and processes related to regulatory compliance, within functions not limited to those directly involved in manufacturing. Strict adherence to compliance is a top priority for Nissan's management, and if issues are discovered, appropriate measures will be taken. Nissan is committed to promoting and enforcing compliance and awareness thereof in all operational areas.

Through steadfast implementation of these initiatives, Nissan will work diligently to regain the trust of its valued customers and stakeholders in Japan.

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Attachment: Instances of misconduct related to fuel economy and exhaust emission gas sample tests identified through verbal accounts

i. Rewriting of data

- Rewriting exhaust gas emissions measurement values to meet test specifications (or catalog values) when said measurement values deviated only slightly from specifications, and when measurement fluctuations were minimal.
- Rewriting measurement values when said values were relatively higher than existing data saved on the server.
- Rewriting results to fall within control line ranges when measurements in X-bar charts deviated from internally established control standards and action, such as retesting, were required.
- Rewriting diluted air measurement values with positive numbers when negative values were recorded (whereas such values would simply be counted as zero according to standard operating procedures); rewriting abnormal diluted air measurement values.
- Rewriting CH₄ (methane) values from diluted air measurement tests when CH₄ levels were not logically consistent with THC (total hydrocarbon) levels during exhaust gas emissions testing.
- Inputting data manually (based on past results) when the automatic calculation process did not complete due to system errors.
- Rewriting exhaust emission gas measurement values to fall within control line ranges in Xbar-R, when submission of data to MLIT & ISO was requested during auditing.

ii. Rewriting of fuel economy and exhaust gas emissions test environment condition measurements; deviations from prescribed test environment conditions

- Rewriting dry-bulb and/or wet-bulb temperatures to bring K factor values within standards (K factor corrects nitrogen oxide [NO_x] reading discrepancies resulting from humidity).
- Rewriting temperature/humidity values when the said values deviated from conditions of 25 degrees ±5 degrees and 30% to 75% relative humidity, as specified under Japan's JC08 test cycle.
- Basing measurement device calibration results on all substances except CO₂ when orders of CO₂ used for calibration of testing devices were behind schedule.

In such instances, recorded CO₂ measurement values were overwritten and replaced with past test results, due to the possibility that said CO₂ measurements could be inaccurate.

- Trace error: Japan's JC08 test cycle specifies that measurements from sample testing are inadmissible if tests are conducted outside permitted levels for either more than 1.0 second at any single given point or more than 2.0 seconds cumulatively during the full 20 minute testing process. Despite this, in some instances, testing results were treated as valid and no retesting was conducted, despite said deviations from JC08 testing tolerances.