On behalf of Dr. Junko NAKANISHI, the Project Leader of NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041), and
on behalf of colleagues in the Research Institute of Science for Safety and Sustainability within the National Institute of Advanced Industrial Science and Technology (AIST) of Japan,
on February 18, 2011, Takuya IGARASHI would like to submit the following comments
on your November 2010 Draft of "NIOSH Current Intelligence Bulletin - Occupational Exposure to Carbon Nanotubes and Nanofibers",
together with two PDF files of our Interim Report issued on October 16, 2009 for your immediate reference:

First of all, it is our regret that the CIB authors in NIOSH made the same misinterpretation as the authors of "Report of Project Six: Preliminary Outline of the Paper on Critical Issues on Risk Assessment", ENV/CHEM/NANO(2010)12 dated 1 July 2010, a document for the 7th Meeting of OECD/WPMN held on 7-9 July 2010, more specifically its Footnote 4 of Page 13. This footnote was to argue that "the proposed OEL of 0.21 mg/m^3 is 10 times higher than calculated based on the information provided", which was just a misunderstanding resulting from not considering the deposition fraction (DF) of CNT on the lungs, whose value was assumed to be 0.1 (10%). AS for "Calculation of deposition into lung", the questioned interim report for CNT [Nakanishi J (ed) 2009] did refer to the sister interim report for titanium dioxide (TiO_2) [Nakanishi J (ed) 2009b], as simply noting that "Based on the same method and parameters as in the TiO2 risk assessment document"*, where the equation DOSE = (C × RMV × T × DF)/BW was clearly given**.

*: See Line 23, Page 30 of "Nakanishi J (ed) [2009]. Risk Assessment of Manufactured Nanomaterials: Carbon Nanotubes (CNTs). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.

**: See Line 7, Page 26 of Nakanishi J (ed) [2009b]. Risk Assessment of Manufactured Nanomaterials: Titanium Dioxide (TiO_2). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.

In addition, we would prefer the way of making reference such as [Nakanishi (ed) 2009], instead of [Kobayashi et al. 2009] and instead of [Kobayaski et al. 2009] which is misspelled.

Below you will find a complete set of detailed comments.

<< **Detailed Comments** >>

Lines 5-7, Page 43, regarding NEDO/AIST and Kobayashi et al.

"proposed in a report by the Japanese New Energy and Industrial Technology Development Organization (NEDO) [Kobayashi et al. 2009]." **should read**

"proposed in a report by the National Institute of Advanced Industrial Science and Technology (AIST) of Japan [Nakanishi (ed) 2009], which was supported by the New Energy and Industrial Technology Development Organization (NEDO) of Japan."

Lines 9-10, Page 43, regarding calculation of the equivalent rat lung dose rate

"The equivalent rat lung dose rate was calculated to be 6.0 μg/kg/day [Kobayashi et al. 2009]." **should read** "The equivalent rat lung dose rate was calculated to be 6.0 μg/kg/day [Nakanishi (ed) 2009, Nakanishi (ed) 2009b]."

Explanation: The calculation in Section 4.2 of Nakanishi (ed) [2009] was based on the same method and parameters as in Section 3.3 of Nakanishi (ed) [2009b], particularly in Subsection titled "Conversion into the amount deposited on the lungs" in Page 26.

Line 10, Page 43, regarding an uncertainty factor

"an uncertainty factor of 2 for individual difference" **should read** "an uncertainty factor of 2 for extrapolation of exposure period".

Explanation: Re-check Lines 26-27, Page 30 of Nakanishi J (ed) [2009], which said "× UF concerning extrapolation of exposure period: 2".

Lines 14-17, Page 43, regarding the deposition fraction of CNT on the lungs

"From this information, NIOSH calculates that 3.0 μg/kg/day in a 70 kg worker would result in a total daily dose of 210 μg. Assuming that a worker inhales 10 m^3 of air in an 8-hr day [ICRP 1994], this total daily dose would be attained at an 8-hr TWA concentration of 0.021 mg/m^3 (i.e., 21 $\mu g/m^3$)." **should be deleted completely.**

Explanation: These two sentences are just of a misunderstanding resulting from not considering the deposition fraction (DF) of CNT on the lungs, whose value was assumed to be 0.1 (10%). AS for "Calculation of deposition into lung", the questioned interim report for CNT [Nakanishi J (ed) 2009] did refer to the sister interim report for titanium dioxide (TiO_2) [Nakanishi J (ed) 2009b], as simply noting that "Based on the same method and parameters as in the TiO2 risk assessment document"*, where the equation DOSE = (C × RMV × T × DF)/BW was clearly given**.

*: See Line 23, Page 30 of "Nakanishi J (ed) [2009]. Risk Assessment of Manufactured Nanomaterials: Carbon Nanotubes (CNTs). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.

**: See Line 7, Page 26 of Nakanishi J (ed) [2009b]. Risk Assessment of Manufactured Nanomaterials: Titanium Dioxide (TiO_2). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.

Lines 12-15, Page 44

"In Kobayashi et al. [2009], the normalization of lung dose from rat to human based on equivalent dose per unit body weight does not account for species-specific differences in inhalation rate, lung surface area, or particle size-specific lung deposition fractions."

should read

"In Nakanishi (ed) [2009], the normalization of lung dose from rat to human based on equivalent dose per unit body weight does not account for lung surface area or particle size-specific lung deposition fractions."

Explanation: The calculation in Section 4.2 of Nakanishi (ed) [2009] was based on the same method and parameters as in Section 3.3 of Nakanishi (ed) [2009b], particularly in Subsection titled "Conversion into the amount deposited on the lungs" in Page 26, where you will find, at least, sufficient consideration for species-specific differences in inhalation rate.

Line 8, Page 45, regarding Kobayashi et al.

"Kobayaski et al. 2009" **should read** "Nakanishi (ed) 2009"

Lines 11-15, Page 45, regarding the NIOSH's recalculation

"The currently proposed OELs for CNT range from 2.5 to 50 $\mu g/m^3$ (8-hr TWA concentration) [Nanocyl 2009; Kobayashi et al. 2009; Pauluhn 2010b], including the NIOSH REL of 7 $\mu g/m^3$. These CNT OELs are considerably lower than the current U.S. OELs for graphite or carbon black (approximately 2.5 to 5 mg/m^3), by a factor of 100 to 1000."

should read

"The currently proposed OELs for CNT range from 2.5 to 210 $\mu g/m^3$ (8-hr TWA concentration) [Nanocyl 2009; Pauluhn 2010b; Nakanishi (ed) 2009], including the NIOSH REL of 7 $\mu g/m^3$. These CNT OELs are considerably lower than the current U.S. OELs for graphite or carbon black (approximately 2.5 to 5 mg/m^3), by a factor of 10 to 1000."

Explanation: Use our original OEL of 210 $\mu g/m^3$.

Column 1, Row 3, Table4, Page 70, regarding Kobayashi et al.

"Kobayashi et al. 2009" **should read** "Nakanishi (ed) 2009".

Lines 7-9, Column 3, Row 3, Table4, Page 70, regarding deposition fraction on lungs

"Human lung deposition of MWCNT calculated from rat data and an" **should read**

"The deposition fraction of MWCNT on the lungs, whose value was assumed to be 0.1, and an"

Note, Table 4, Page 70, regarding the NIOSH's recalculation

This note should be deleted completely.

Explanation: NIOSH's recalculation is ten times lower than the OEL of 0.21 mg/m^3 reported by Nakanishi (ed) 2009. The recalculation is of just a misunderstanding resulting from not considering the deposition fraction (DF) of CNT on the lungs, whose value was assumed to be 0.1 (10%). AS for "Calculation of deposition into lung", the questioned interim report for CNT [Nakanishi J (ed) 2009] did refer to the sister interim report for titanium dioxide (TiO_2) [Nakanishi J (ed) 2009b], as simply noting that "Based on the same method and parameters as in the TiO2 risk assessment document"*, where the equation DOSE = (C × RMV × T × DF)/BW was clearly given**.

*: See Line 23, Page 30 of "Nakanishi J (ed) (2009). Risk Assessment of Manufactured Nanomaterials: Carbon Nanotubes (CNTs). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.

**: See Line 7, Page 26 of Nakanishi J (ed) (2009b). Risk Assessment of Manufactured Nanomaterials: Titanium Dioxide (TiO_2). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.

Lines 3-5, Page 83, regarding Kobayashi et al.

"Kobayaski N, Kishimoto A, Ogura I, Gamo M [2009]. Risk Assessment of Manufactured Nanomaterials: Carbon Nanotubes (CNTs). Interim report issued on October 16, 2009. Executive Summary. Ed. Nakanishi J."

should read

"Nakanishi J (ed) [2009]. Risk Assessment of Manufactured Nanomaterials: Carbon Nanotubes (CNTs). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.
[http://www.aist-riss.jp/main/modules/product/nano_rad.html]" and

Add the following new reference:

"Nakanishi J (ed) [2009b]. Risk Assessment of Manufactured Nanomaterials: Titanium Dioxide (TiO2). NEDO project "Research and Development of Nanoparticle Characterisation Methods" (P06041). Interim report issued on October 16, 2009.
[http://www.aist-riss.jp/main/modules/product/nano_rad.html]" .

--- End of our comments ---