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Interactive comment on "The shift of microbial population composition accompanying the injected water flowing in the water-flooding petroleum reservoirs" *by* P. Gao et al.

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This published paper on 'The shift of microbial population composition accompanying the injection water flowing in the water-flooding petroleum reservoirs' by Gao et al. certainly shows some descriptive information on the possible transport of microorganisms through oil reservoir subsurface sandstone materials. I have to say that the title does not fit with the data obtained because the samples did not include a non-intervention control to allow assessment of the indigenous population for a meaningful comparison. Without this critical sample and information, the transport of bacteria is a claim not supported by convincing data. In the text, the differences of detected pyrose-

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quences between injection water and production water were used as the key variables to delineate the transport (migration) of microorganisms, a major shortcoming with this approach is that some microorganisms will not survive the subsurface environmental conditions due to lack of oxygen, nutrients etc. the approach used in this research plan should be reconsidered. First of all, I am sorry to say that the quality of this manuscript writing is low and it is hard to read the text for accurate meaning and the precise information. The writing needs extensive efforts and time to revise to reach to a reasonable level of acceptance. Authors must work hard on this and serious because the results of the information can be compromised seriously when the statements cannot be comprehended well enough by reading. There is little or any disagreement now that oil reservoirs have indigenous population of microorganisms, but non-indigenous microorganisms are introduced into the reservoir systems when water flooding is introduced. It is always a big challenge to obtain the truly indigenous population of microorganisms in the reservoirs because of the difficulties involved in non-contamination sampling of the subsurface environment without any potential contamination. In a similar but different aspect, the physical characteristics of the subsurface materials, either heterogenous or homogenous as stated in this paper is also a term of personal choice here than substance because of their natural origin and heterogeneity no matter called heterogenous or homogenous. Heterogeneity is the true nature of such materials. Therefore, I have concern on the choice of 'homogeneity' and 'hererogeneity' simply based on the average permeability values because this value is an average numerical number, which cannot be used reliably for transportability of bacteria. Considering the differences in permeability between the two blocks, there should be no disagreement on bacteria can be transported in both subsurface systems, but the rate of transport may be different. If this is the case, what is the key scientific information that can be extracted from the selection of the 2 blocks in this investigation? If the injection of water had only started with this study, the collected water/oil samples can be of some meaning interpretation, but I do not think such is the case with this set of production wells. The 'approximately 30-45 days and 7-10 days, respectively' – I have no way of knowing what do they refer

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to by the sentence because no designation was offered. I may assume they are associated with the heterogenous and homogenous reservoirs, but such assumption should not be the responsibility of the readers and they must be clearly stated by the authors to avoid any misunderstanding. Sampling procedures were inadequately described and I am especially troubled by the statement '. . .by the field personnel of PetroChina.' because the quality of the samples may be compromised for one. In addition, how can the authors interpret the results when they are not involved in the in situ sampling to know the detail steps involved and the effects on the results obtained? Further on the sampling for concentration of bacterial cells, oil/water mixture should separate the oil from the mixture and then concentrate the cells from water phase or both oil and water phases. This detailed information show the understanding of the system you are dealing with and the quality of the cells you would be obtained. Are there any differences in terms of the composition and richness of microbial groups associated with the oil and water phases? Why was the oil phase not treated for extraction of DNA in the similar way as water phase? Actually, recent publication(s) has/have some information on this topic and you should also cited the work here. Were there any quality controls in the extraction of genomic DNA and PCR amplification? 'In the sandstone reservoir' – I do not agree with you to have such a statement and claim simply because there is no strictly control, which did nit have any water flooding to show the indigenous population and composition. The If the objectives of this study are on migration of microorganisms in subsurface sandstone, I do not think the experimental design can answer the questions effectively. This is a key point in Discussion, I have strong reservation in accepting this. The high though put used can be sensitive for detection of microorganisms in samples, but they do not answer the transportability of microorganisms without careful planning, selection of samples (including subsurface) and the analysis involved. How can you link the microbial groups detected and the possible physiological function in the oil reservoirs? What are the sources of Bcteroides in the production water samples? From the information of archaea detected, which kinds of methanogenic metabolism is responsible for CH4 production? The Conclusions is too

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lengthy and shortening is necessary to show the most significant information of this research if any. References should be updated more extensively to include the current published papers to enrich the information reported here.

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