**Title:** Bioremediation of groundwater contaminated by petroleum hydrocarbons applied at a hydrocarbon-contaminated site in Belgrade (Serbia).

**Author:** BULATOVIĆ et al.

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**Response to the Editor:** The authors thank the Editor for constructive suggestions in order to improve our manuscript. We have accepted all the suggestions and more detailed answers are given below. All changes are also highlighted directly in the manuscript.

**Reviewer A (RA in the manuscript with comments)**

**PH1:** Title: Since the authors already state that the location of their study was thermo-energetic plant this should be stated also in the title (if possible).

**Response:** Unfortunately, we cannot accept this suggestion. The Reviewer B is also recommended a change of title, and we accepted his second proposal: **Bioremediation of groundwater contaminated with petroleum hydrocarbons, applied at a site in Belgrade (Serbia).**

**PH2:** Abstract: Please add some important numbers/result in the abstract such as a reduction in TPH, increase in a number of microorganisms after bioaugmentation, the total amount of petroleum hydrocarbon collected on filtration/adsorption columns, the total amount of TPH degraded by in situ bioremediation (at least estimation based on all results and field data). This is important because, with these data presented in the abstract, future readers will be more interested in the study.

**Response:** In the abstract, we added the reduction of the TPH in percentages.

**PH3:** As all research articles have to start with a hypothesis, the authors should emphasize (at the end of introduction part) what was their hypothesis and what they wanted to analyzed/prove/check/confirm.

**Response:** In the end of the Introduction part we have already gave aim of our research: This paper aims to provide insight into the mechanisms and bioremediation requirements, as well as results of the application of enhanced *in situ* groundwater bioremediation on the industrial level at a hydrocarbon-contaminated site in Belgrade (Serbia).

**PH4:** Whenever used “in situ”, please use Italica through the manuscript (for example in lines: 48, 103, 135, 148, 150, 180, 187, 248 and 325).

**Response:** Thanks for detected error. We corrected that.

**PH5:** Line 143: The authors say that “The results confirmed presence of a diesel and the heavy fuel oil in the investigated groundwaters.” however, this should be supported with appropriate chromatogram or references to some previous analysis.

**Response:** We supported these sentence with corresponding reference (J. Avdalović, S. Miletić, M. Ilić, J. Milić, T. Šolević Knudsen, A. Djurić, D. Nešković, M. Vrvić, Zaštita Materijala, 57 (2016) 389 (in Serbian) (<https://doi.org/10.5937/ZasMat1603389A>).

**PH6:** Line 145: please delete 00 from 105.00 m3.

**Response:** Thanks for suggestion, it’s deleted.

**PH7:** In figure 4, if possible please add a location for two Radial Collector wells of the Belgrade water supply system (RC-26 and RC-27). Also if possible mark all 13 piezometers from which the samples were collected and emphasize the ones from which samples for the study were collected.

**Response:** On Fig.4. we have mark all piezometers, and we have added Radial Collector well RC-26 only, because Radial Collector well RC-27 it is about 350 m downstream away from the investigated site, as explained in the manuscript.

**PH8:** In the line 183, please add/describe composition of filtration/adsorption columns.

**Response:** Unfortunately, we are unable to provide more information because of contractual obligations and intellectual property protection.

**PH9:** Although in the line 278 (Results and discussion) it is written that “The filtration/adsorption/bioreactor columns were filled with natural inorganic hydrophobic adsorbents”, the content (which natural inorganic hydrophobic adsorbents were used) should be provided in Experimental part.

**Response:** Unfortunately, we are unable to provide more information because of contractual obligations and intellectual property protection.

**PH10:** My suggestion is also to include (if possible) one table with the following results of analysis of groundwater from wells: pH, TDS, temperature, conductivity, water level, oxygen, TOC, (also N and P, so that biostimulation can be optimized), TPH (fractions of hydrocarbons), turbidity, color, smell, anions, cations..., for all piezometers or at least for P5, P6 and P7. Finally, knowing the concentration of TPH and area of polluted water the authors could also estimate the total amount of spilled diesel and heavy fuel oil. The methods should be described in the Experimental part and the results (Table) should be provided at the beginning of the Results and discussion part.

**Response:** We added table with some physicochemical and chemical quality parameters for underground water samples. The table is at the beginning of the Results and discussion part, and the methods have been described in the Experimental part. Total amount of contaminant was estimated at 8097 kg or about 8 t of petroleum products, and we added these data in the Results and discussion part.

**PH11:** Line 196: it is much better to rewrite the sentence “The growth conditions for microorganisms were optimized relative to the conditions of the location from which they were isolated”, because most probably the temperature of the groundwater wasn’t 28 °C and “120 rpm in shaker” can be obtained in the shaker, but not in the environment.

**Response:** We accept this suggestion and we rewrite this sentence.

**PH12:** Line 212: Is it “10 piezometers” or like it is written in the line 141, “13 piezometers”?

**Response:** Thanks for detected error. It is 10 piezometers, and we corrected that.

**PH13:** Line 250: “in the vicinity of the thermo-energetic plant in Belgrade” or “in the thermo-energetic plant in Belgrade”?

**Response:** The correct answer is “in the vicinity of the thermo-energetic plant in Belgrade”, because our research was done in the vicinity of the thermal power plant, not in it.

**PH14:** Line 259: Please define the composition of the nutrients used for biostimulation.

**Response:** Unfortunately, we are unable to give a precise composition about the nutrients used in biostimulation due to contractual obligations and intellectual property protection.

**PH15:** Line 263: Please describe how many times the bioaugmentation was conducted, volume, the concentration of microorganisms. If available, please add data about the composition (microbiological analysis) of the microbial consortium used.

**Response:** Unfortunately, we are unable to give more details because it is a technology protected by intellectual property.

**PH16:** Line 268: It would be useful if a constructed network is presented on the figure.

**Response:** We are unable to presented constructed network on the figure because it is also part of intellectual property that should not be published.

**PH17:** Line 282: Please describe how the hydrocarbons collected on the “filtration/adsorption/bioreactor columns” were treated afterward or if the complete biodegradation occurred in these bioreactors.

**Response:** Thanks for advice. We have added these sentence as explanation: In these columns, the concentration of TPH was monitored daily and due to the intense microbial activity within the columns, TPH concentrations were drastically decreased over bioremediation process.

**PH18:** Line 291: “These microorganisms were grown in laboratory conditions, and finally added into the aquifer through the injection well.” In the experimental part (line 198) it is written that the microbial population was multiplied in a bioreactor with a working volume of 800 dm3. Was this in the lab or field conditions?

**Response:** Zymogenous microorganisms was multiplied in a bioreactor, in the field conditions, and after that were applied in bioremediation by injecting biomass into filtration/adsorption/bioreactor columns.

**PH19:** Line 296: “The process was managed and controlled with the appropriate strong pumps.” please add type and manufacturer of the pumps. Finally, it would be useful if a gas chromatogram before and after bioremediation is provided.

**Response:** Actually the process was managed and controlled with the appropriate submersible pumps. The average flow rate was 0.5 dm3 / s per injection well, and we have change that in manuscript. We are unable to give precisely information about pumps because it is also part of intellectual property that should not be published. Chromatograms are given in Fig.6.

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**Fig.6. Chromatograms before (P-5a, P-6a and P7a) and after (P-5b, P-6b and P7b) bioremediation process.**

**PH20:** References: Since some references are in the Serbian language I believe that this should be emphasized with “(in Serbian)” after the reference. For example references: 3, 20, 21, 22 and 26. Also for references which hyperlinks are not DOI numbers please add the date in brackets when you visited the webpage. For example (visited November 15, 2019) for references: 5, 8, 10, 20, 25, 26 and 28).

**Response:** Thanks for suggestion. We did exactly as you suggested.

**Reviewer B (RB in the manuscript with comments)**

**PH1:** I suggest changing the title of the manuscript to: Bioremediation of groundwater contaminated with petroleum hydrocarbons, applied at a site near a thermo-energetic plant in Belgrade (Serbia), or Bioremediation of groundwater contaminated with petroleum hydrocarbons, applied at a site in Belgrade (Serbia).

**Response:** We accept this suggestion and we change title in: **Bioremediation of groundwater contaminated with petroleum hydrocarbons, applied at a site in Belgrade (Serbia)**

**PH2:** In the section Results and discussion, lines 222-225, is written: “Microbiological analyses of these groundwater samples demonstrated that the bioremediation potential (expressed as percentage of hydrocarbon degraders relative to the total number of microorganisms) was approximately 5 % or higher, which indicated an acceptable condition for microbiological remediation.”

**Response:** Thanks for suggestion. We corrected the sentence in: Microbiological analyses of these groundwater samples demonstrated that the bioremediation potential, expressed as percentage of hydrocarbon degraders relative to the total number of microorganisms, was approximately 5 % or higher, which indicated an acceptable condition for microbiological remediation.