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Evaluation of the Leviathan offshore platform environmental studies in the Eastern Mediterranean Sea

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One of the largest last decade discoveries of hydrocarbons in the Eastern Mediterranean Sea is the Leviathan field, which constitutes a large-scale energy program of the State of Israel. Gas and condensate from the Leviathan well are transferred via pipeline to an offshore platform located ~10 km from the Israeli shoreline, and from there via a pipeline to the coastal Leviathan energy installation. The local communities are concerned from the pollution implications that might occur in case of spillage and/or any malfunction in regular operation.

The present work includes review of previous environmental studies regarding the Leviathan energy project 2007-2011, new extended simulations 2015-2018 for condensate, diesel and grey water leaks and resultant evaporation simulations caused by possible condensate spillage from the offshore platform and the pipe rupture.

In the framework of the current study concerning the Leviathan offshore platform, a robust statistics is obtained by **5844** spill simulation runs for condensate and diesel against**12** runs as mentioned in the previous studies, while for the pipe rupture a robust statistics was made with **104** runs for condensate and diesel compared to**12** runs as performed previously.

The previous spillage scenarios from the offshore platform had underestimated by almost order of magnitude the content per design itself (1000bbls vs. ~6000bbls) and documentation of permits. Similarly, the pipe rupture spillage scenarios underestimated by almost half order of magnitude (1200bbls vs. ~3000bbls). Therefore, the current simulations predicted larger spillage quantities, compared to the aforementioned previous simulations.

The main conclusions driven from the 10km counter simulations for the offshore platform spillage show the following: First oil arrival at the Israeli coast from the offshore platform is predicted to be within 8 hours after start of spillage event in winter, and within 11 hours in summer.The first impacted area is predicted to be the coastline between Zichron-Ya'akov/Dor and Atlit. In winter on average, it is predicted that 17% of the spillage is beached, while in summer, twice as higher, i.e. up to 35%. Deposition of spilled condensate in the Hadera desalination plant is estimated to be the highest among the 5 desalination plants examined.

Similarly, the main conclusions driven from the 1km pipe rupture spillage counter show that the

first impact on the Israel is predicted to be within 5-6 hours after start of spillage in winter, and within 3-4 hours in summer, with the worst case scenario occurring within half an hour after start of the spillage. The coastline of Zichron-Ya'akov is found to be an epicenter of the highest condensate deposition up to 15 tons/km, regardless the season. Due to the proximity of the pipe rupture to the shore, it is predicted that 38-40% of the condensate washed up the shore nearby, without any significant seasonal or monthly variability. The condensate spillage from the pipe rupture located 1 km from the shoreline will affect mostly the Atlit, Ma'agan-Michael and Caesarea National parks' and the Hadera desalination plant coastlines.