Environment Pollution and Climate Change

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Introduction

In 2012, the oil and gas wells in the United States generated 21.2 billion barrels of produced water (PW) [1]. The PW is the aqueous liquid phase of the mixture of oil and/or gas drilled from producing wells, which contains a number of contaminants, typically BTEX (benzene, toluene, ethyl benzene, xylenes). The Water-to-Oil Ratio (WOR) in the mixture is about three on average globally, significantly varying over the lifetime of a field, increasing from a small portion to more than ten. The composition of the PW is complex and site-specific and a function of the geological formation, the oil and water chemistry, rock/fluid interactions, the type of production, and required additives for oil-production-related activities [2]. The PW has become the most waste stream from oil and gas industry. Ninety-seven percent of the PW is generated by the onshore wells and only three percent by offshore platforms. The oil and gas wells in the State of Texas contribute to more than one third of the total PW in the United States. Meanwhile, a considerable amount of waste has been co-produced during drilling, mainly excavated material or cuttings from the borehole and added drilling fluids.

Both of PW and drilling waste (DW) are comprised of serval thousand compounds, the improper treatment of which poses a threat to public health and environment. The major toxicants include monocyclic aromatic hydrocarbons, polycyclic aromatic hydrocarbons (PATH), and related heterocyclic aromatic compounds. Dispersed oil, aromatic hydrocarbons and alkylphenols (AP), heavy metals, and naturally occurring radioactive material (NORM) raise major environmental concerns in the public [3]. Some of the toxicants are acutely toxic, some are carcinogenic, and others are endocrine-disruptor [4-7] for microorganisms as well as human beings in the ecosystem system.

Enormous technologies have been developed to address the adverse environmental impacts of the PW and DW by improving treatment process and technologies for disposal and reuse purposes.

techniques to reduce DW production. Directional drilling, synthetic-based muds (SBMs), and pneumatic drilling are typically developed to reduce cuttings and frilling uid production, particularly suitable for an environmentally sensitive area. Directional drilling uses steerable or directional down whole tools that allow the driller to direct the wellbore in any angle to reach the target [14]. In this way, a reservoir could be completed by a single horizontal well, instead of three conventional vertical wells. e associated waste with the single well is much less than the ones with the three well. One of the directional and horizontal drillings, is drilled across an oil and gas formation with any wellbore that exceeds 80 degrees, which produces up to 20 times more than that of its vertical counterpart. e SBM is less toxic and more biodegradable mud, compared to traditional oil-based muds (OBMs), which helps drillers in stabilizing water sensitive shales and provides lubricity for coring operations and minimized reservoir damages. e cuttings coated with the SBMs could be buried and discharged to the sea or remediated by a biological process, such as biostimulation and bioaugmentation. Fan

Conclusion

Substantial PW as well as DW streams pose a threat to public health and environment, the complex and toxic chemical substances of which play a signi cant role in the challenges in waste reduction by volume and detoxi cation process. e challenges in the removal or recovery of iodide, bromide, dissolved hydrocarbon, radionuclide, and barite, reuse DW, desalination, and reducing PW production, were remarked. Meanwhile, the challenges also provide opportunities to relieve resource shortage, including freshwater, iodide trace elements, radionuclides and construction materials.

References

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