

Damage of PVC casing by self-rotating nozzle system

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Abstract

In the South Kanto gas fields, where natural gas dissolved in water is produced, polyvinyl chloride (PVC) casing is used for both production and reinjection wells. In the fields, water-jet (WJ) is used to clean inner wall of casing to refresh the potential of wells, but recently it was found that sometimes it makes damages for casing. Therefore, we have to know how the WJ system used in cleaning operation makes damages for PVC casing. They use two types of self-rotating side nozzle (R31 and R47) with combination of one type of backward fixed nozzle.

In this study, I performed experiments for all types of the nozzle system with and without nozzle feed in several conditions. In the side nozzle system with no nozzle feed, serious damage occurred for casing when the nozzle system is in contact with inner wall of casing. I defined a new parameter “effective cutting distance”, which means the distance from the exit of the nozzle to the damaged front when jetting is performed with enough time, to show the relation between ambient pressure and the effective cutting distance. On the contrary, in side nozzle with nozzle feed, there is no damage in any experimental condition. However, in the backward nozzle with no nozzle feed, damages occurred but less seriously than that of the side nozzle. In the backward nozzle with nozzle feed, damages occurred only for a very small stand-off distance.

In this study, I showed the influence of the WJ nozzle system on the damage of PVC casing in several conditions. As a result, I suggest that a centralizer that can set the nozzle system apart from the inner wall of casing should be used to prevent damages of casing in any conditions.