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**Drinking water related hygienic assessment
of the use
of the well regenerant**

AIXTRACTOR 2.0®

relevant authorities' regulations or requirements, because the product must not be admitted to the sewage system or surface waters without any further ado.

5 Assessment of AIXTRACTOR 2.0® with respect to drinking water related hygienic quality as being recognised as safe

In the course of the drinking water related assessment of chemical well regenerants the most essential and basic requirement to be met is that residues of the **substances applied** or potential reaction products must **not be detectable in drinking water** upon the completion of the treatment of the well and at the restart of drinking water procurement. This requirement applies independently of the toxicological rating of the substances used. Further to that the application of **AIXTRACTOR 2.0®** must not result in a disadvantageous alteration to groundwater quality. In this context the minimization directive found in § 2(3) of the German "*Drinking Water Regulations*" (TrinkwV) has to be taken into consideration according to which the "*concentration of chemical substances contaminating the drinking water or affecting the quality of the drinking water should be kept at such a minimum as this is possible in compliance with the state of the art at reasonable expenses with the situation in the individual case being taken into consideration*". This requirement is also supported by analogous provisions in section 4.2.3 of the DVGW leaflet W 130 [2].

To give evidence of the complete removal of the agent from the well treated, the annulus and the surrounding aquifer it is required that appropriate measurements of the initial and final states are performed upon the completion of the works. Examinations considered reasonable are dealt with in **section 6**.

If measurements give evidence of the complete removal of the agent and the competent performance of the work according to the state of the art [2] is guaranteed, there are no doubts as to the use of **AIXTRACTOR 2.0®** for the regeneration of wells with respect to the drinking water hygiene.

In contrast to the original product AIXTRACTOR® the new product **AIXTRACTOR 2.0®** does **not** contain **any organic substances** which might be exploited by micro-organisms. Therefore this product does not support the inclination to germination of the aquifer. In addition the dithionite has a slightly microbiocide effect.

6 Requirements to be met by evidence of drinking water related hygienic quality as being recognised as safe

As to the assessment of the drinking water related hygienic quality of **AIXTRACTOR 2.0®** as being recognised as safe individual cases may require evidence that the substances used for the regeneration of the well are no longer detectable upon the completed treatment of the well and groundwater quality has not been affected disadvantageously. Apart from that it is to be examined preventively if untreated water has been affected by bacteria and/or if inclination to germination has been increased.

Firstly, simple physico-chemical parameters have to be used to check and document the success of the flushing operation by measurements on-site. This also requires that – for reasons of comparison – the background data of the parameters must be determined by a measurement before the beginning of the regeneration.

1. **Electrical conductivity** must be at its original value again and also remain there after the completion of the flushing operation. Since all substances contained in **AIXTRACTOR 2.0®** exist in the form of sodium salts, electrical conductivity is a first reliable indicator for the success of the flushing operation.
2. As sodium dithionite is a strong reducing agent, its complete removal should be checked additionally by measuring the **redox potential** and/or by quick tests to give evidence of the **absence of reducing substances** (e.g. colour test sticks, obtainable from **Cleanwells®**).

Secondly – as a preventive precaution – microbiological examinations should be performed upon the completion of the flushing operations and before the reactivation of the well for the procurement of drinking water to give evidence that the content of bacteria has not increased and the water is microbiologically stable. Such examinations are usually part of the conditions by the German authorities within the scope of the water regulations related approval of the measure in compliance with § 7 WHG [1]:

3. Bacteriological analyses according to the parameters in annexes 1 and 5 of the TrinkwV [5] (KZ 20°C, KZ 36°C, *E. coli*, coliforms) on three consecutive days. If three consecutive analyses confirm the meeting of the limit or standard values of the TrinkwV [5], the competent authority should grant its approval for the reactivation of the well for the procurement of drinking water.

7 Conclusion

Summarizingly we can state that there are no doubts as to the use of **AIXTRACTOR 2.0®** for the regeneration of producing wells with respect to the drinking water related hygienic requirements; however, it must be ensured that the following conditions are met:

- Well regeneration by means of **AIXTRACTOR 2.0®** must be approved by the competent lower water authority according to § 7 of the German "*Water Resources Act*" (WHG) [1].
- Well regeneration must be performed by technical staff in compliance with the state of the art. Requirements found in leaflet W 130 published by DVGW must be met [2].
- The undoubted drinking water related hygienic quality in case of an application of **AIXTRACTOR 2.0®** can be deemed existing if the **substances applied** or potential **reaction products** are fully removed by satisfactory pumping out, which means that they **cannot be detected in the respective drinking water**. In analogy this applies to secondary effects which might originate from the substances. In this context reference should be made to the minimization directive in § 2(3) of the German "*Drinking Water Regulations*" (TrinkwV) [6].
- Measurements of chemical and/or physico-chemical parameters (electrical conductivity, redox potential, quick testing of reducing substances) which are easy to perform are used to detect the complete removal of the substances applied.
- In addition evidence should be given by microbiological examinations before the reactivation of the well for the procurement of drinking water that the content of bacteria has not increased and that the water is still microbiologically stable.
- The disposal of the water used (flushing water) which is charged with the regenerant must be ensured in an environmentally friendly way and in compliance with the authorities' regulations.

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