CASE STUDY

SILICA REMOVAL

Industry – Paper production

Location	Ngodwana, South Africa
Client	Confidential
Year	2020
Application	Water Treatment
Contaminants	Silica
Solution	Hydramix

Synopsis

During the process to produce demineralized water an effluent stream is produced from the anion waste tank. This effluent contains Sodium, which is valuable for re-use purposes, it also contains high levels of Silica which is undesirable. The purpose of the proposed Hydramix solution is to selectively remove the Silica while retaining majority of the Sodium. The sodium rich water can then be re-used in another process.

Experimental work

The Hydramix electro-coagulation system was used to treat the effluent. Figure 2 shows the raw sample before treatment, the precipitation that occurs during the treatment and then a comparison of the raw and post treated samples. Samples were treated at different electrical dosing.

Figure 1: Raw sample, during treatment, post treatment comparison.

Results

Figure 2:Precipitation formation during treatment.

Table 1: Results of the treated water.

RESULTS				
Sample	pH	Silica as SiO2 [mg/l]	Na [mg/l]	% Silica removal
RAW	12.6	1996	13146	0
1	12.6	1384	14382	31
2	12.6	1029	13557	48
3	12.6	389	9844	81
4	12.6	209	13278	90

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Table 2: Lab results for the treated water (1 of 2).

WATERLAB (Pty) Ltd

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AMENDED CERTIFICATE OF ANALYSES

GENERAL WATER QUALITY PARAMETERS

Date received: 2020-08-21 Date completed:
Project number: 1000 Report number: 93795-A Order number:

Client name: African Horizon Technologies Contact person: Mr. J. Steyn
Address: Postnet Suite 394, Private Bag X10, Elarduspark, 0047 e-mail: jsteyn@ahtech.co.za
Telephone: 012 940 8474 Facsimile: 086 616 4207 Mobile: 082 781 9870

Analyses in mg/ℓ (Unless specified otherwise)		Method Identification	Sample Identification			
			Raw	Sample 1	Sample 2	Sample 3
Sample Number			102361	102362	102363	102364
Date/Time Sampled			N/A	N/A	N/A	N/A
pH - Value @ 25 °C	A	WLAB065	12.6	12.6	12.6	12.6
Silica as SiO_2	N	WLAB046	1996	1384	1029	389
Sodium as Na	A	WLAB015	13146	14382	13557	9844

***Lab results are not indicative of what the system does, only the reduction from the bench test, as an illustration as per a client request.**

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Table3: Lab results for the treated water (2 of 2).

WATERLAB (Pty) Ltd

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Analyses in mg/ℓ (Unless specified otherwise)		Method Identification	Sample
			Sample 4
Sample Number			102365
Date/Time Sampled			N/A
pH - Value @ 25 °C	A	WLAB065	12.6
Silica as SiO_2	N	WLAB046	209
Sodium as Na	A	WLAB015	13278

***Lab results are not indicative of what the system does, only the reduction from the bench test, as an illustration as per a client request.**

Conclusion

The results show that 1996 mg/l Silica was present in the raw sample and 13146 mg/l Sodium was present. The Silica content was lowered to 209 mg/l using the Hydramix system, the Sodium content remained unchanged.

From the results on the previous page, it is clear according to the results that the Hydramix system was able to effectively remove 90% of the Silica that was present in the effluent stream while retaining the Sodium as requested by the client.