



# Encontro Técnico **AESABESP**

Congresso Nacional  
de Saneamento e  
Meio Ambiente

## *Tecnologia Sustentável para Saneamento*

CLEARFLOW GROUP  
Nomes dos demais Autores  
Instituição ou endereço para contato

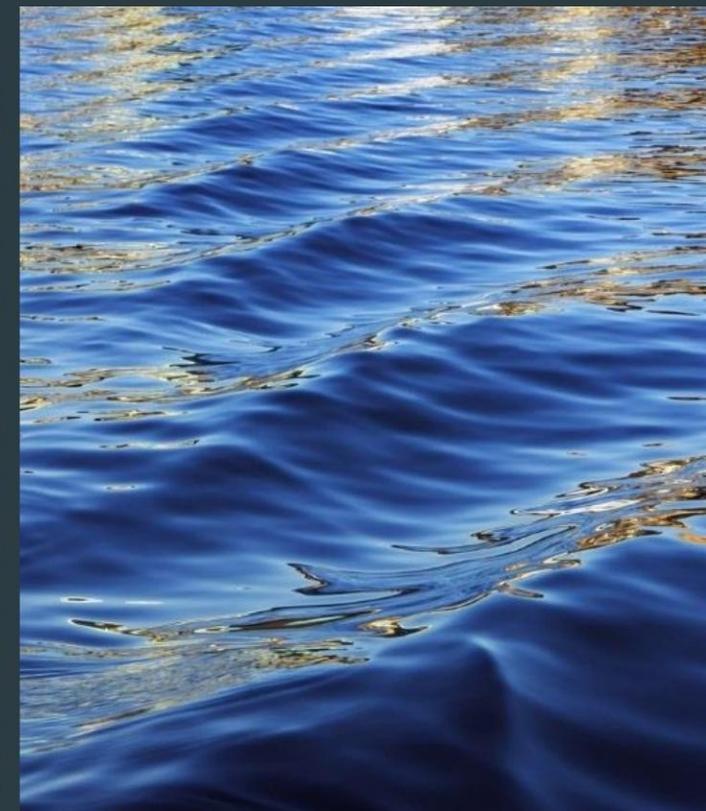




# Clearflow

## Tecnologia Sustentável para Saneamento

*Protegendo e preservando  
Bacias hidrográficas hoje para um ambiente mais verde  
Amanhã*



## O que o Clearflow faz

• A empresa começou em 2005 como Clearflow Consulting Inc. e desde então evoluiu para Clearflow Group Inc. a partir de 2016.

A Clearflow é especializada na fabricação de tecnologia de tratamento de água e de sólidos que inclui floculantes em gel patenteados , exclusiva da Clearflow.

Os “Floculante em Gel” foram projetados para remover sólidos suspensos, metais e fósforo para atender os requisitos regulatórios, protegendo o meio ambiente, os peixes e o ecossistema circundante.

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# Gel Clearflow Floculante e Polimento de água



# Floculantes em gel Clearflow uma inovação única



- Amigo do ambiente, amigo dos peixes.
- Autodosagem – não requer monitoramento.
- Tratamento passivo – sem necessidade de energia ou combustível.
- Facilmente instalado em áreas remotas.
- CAPEX baixo e OPEX competitivo
- Atua entre range de 3 pH e 12 pH.
- Reduz sedimentos, metais, vários níveis de nutrientes, orgânicos, e níveis de hidrocarbonetos leves.



GEL BLOCK

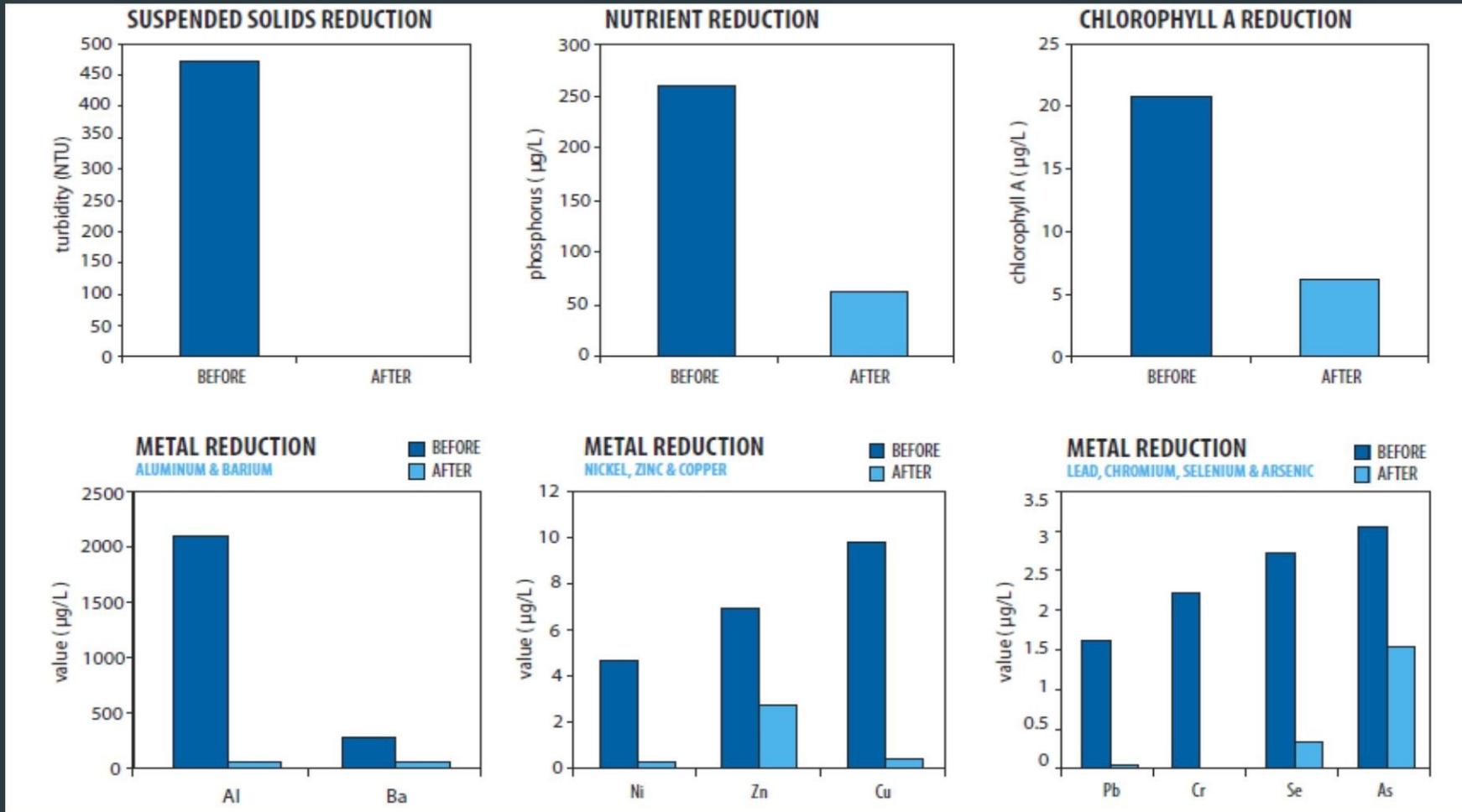


TSS REDUCTION

# Aplicações

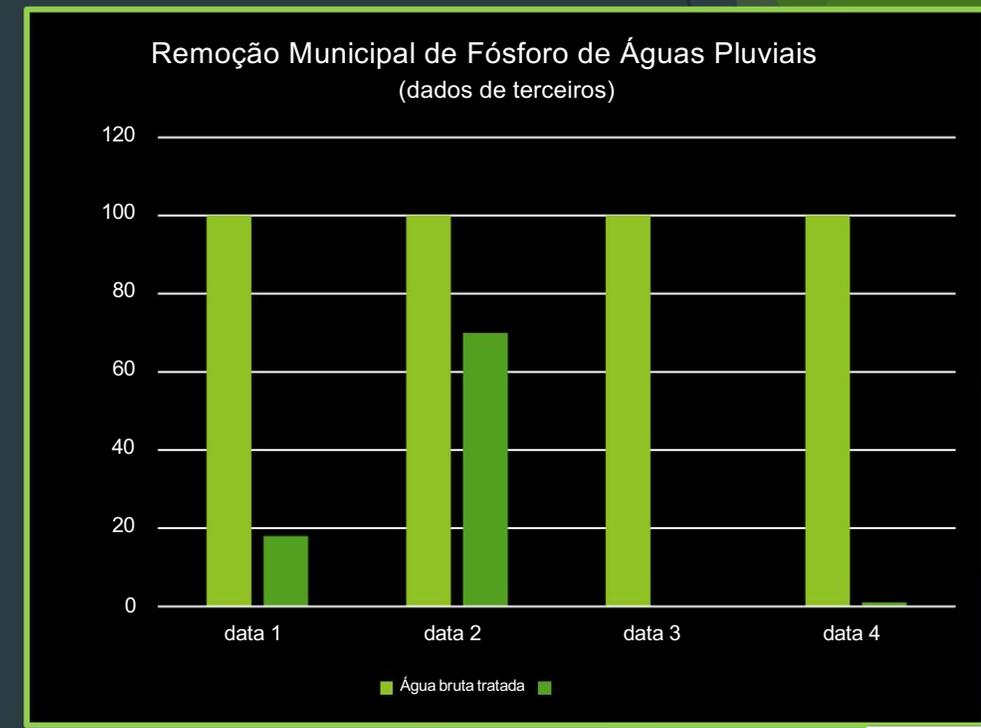
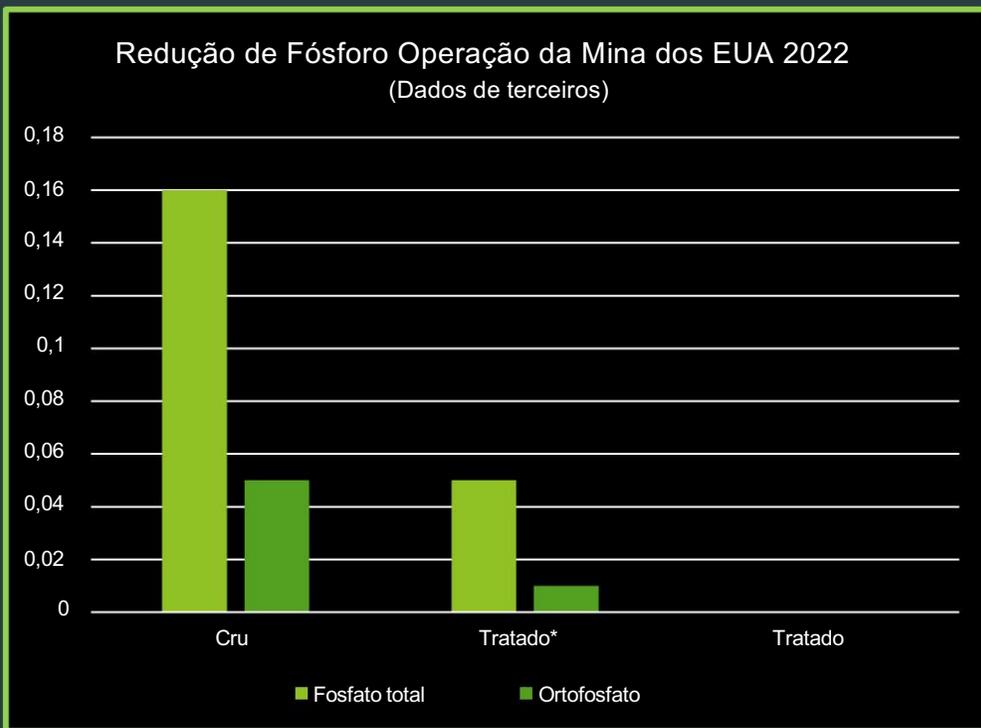


# Qualidade da Água Melhorada



# Qualidade da Água Melhorada

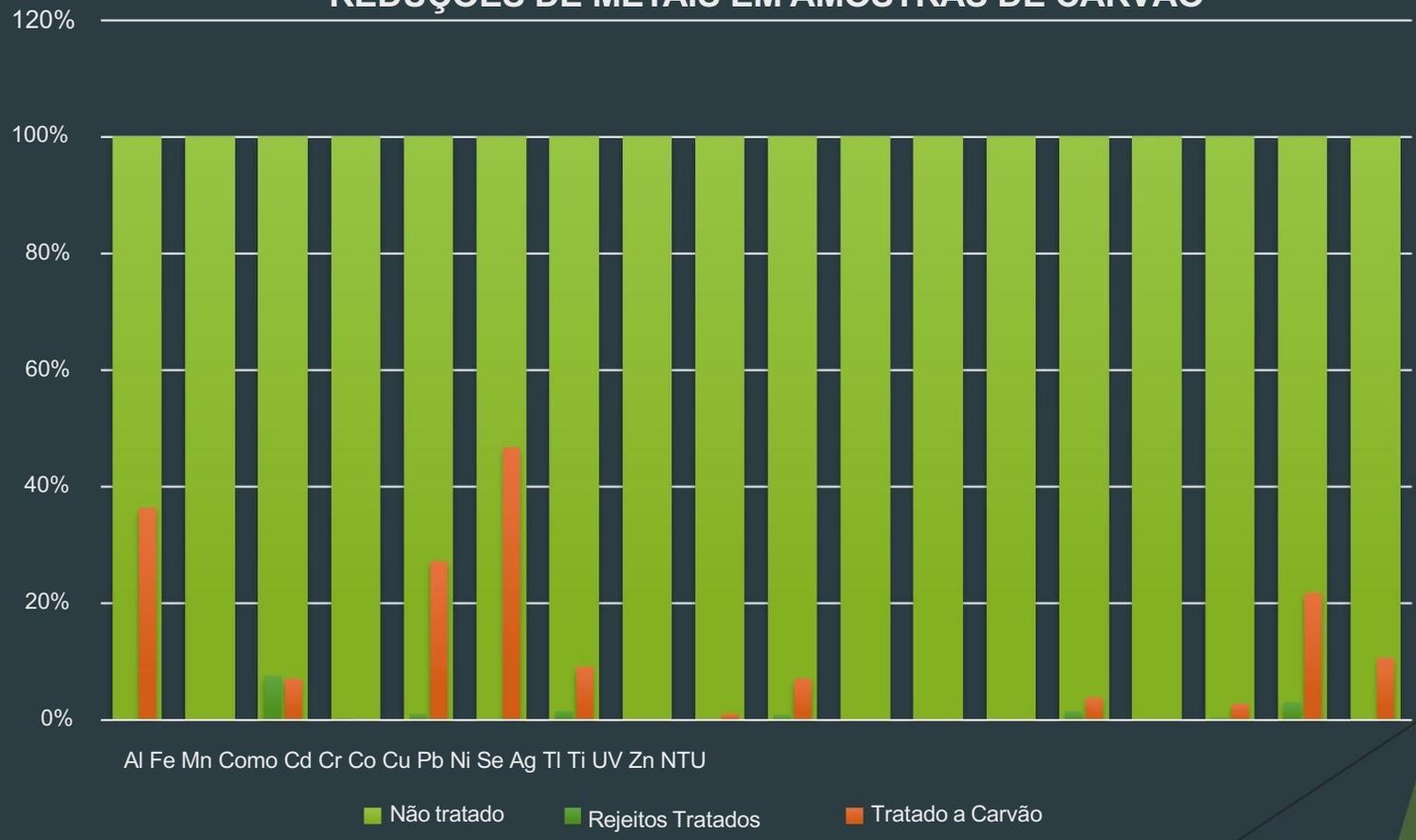
## Fósforo Redução



Todos os dados fornecidos por Laboratórios Certificados de Terceiros

# Gel Floculante Redução de Metais

## REDUÇÕES DE METAIS EM AMOSTRAS DE CARVÃO



## Tapetes de coleta de lodo

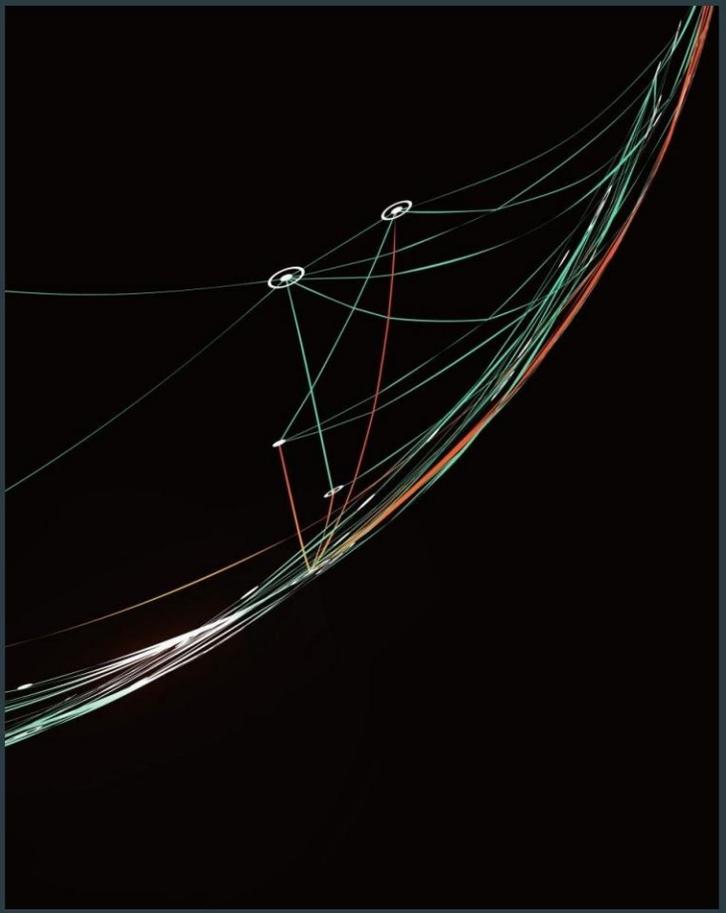
• Silt Mat captura mais de 40 kg de sedimentos por tapete. •

Comprovado em campo para reduzir os níveis de sólidos suspensos a jusante • Silt Mat é um tapete totalmente biodegradável que captura e evita a ressuspensão de sedimentos.

• As esteiras podem ser colocadas em canais naturais ou artificiais, valas ou diretamente em terra para reter sedimentos em suspensão.

• Silt Mats são utilizados para gerenciar lançamento de sedimentos para os cursos d'água.





# Novo Inovações por Ambiental Proteção

# SEGURO Comprovado para Organismos Aquáticos

Maxxam Analytics  
48hr *Daphnia magna* Bioassay Report  
(Acute Aquatic Toxicity Test) Project: B0C0794-Z00921

Client Name: ClearFlow Consulting Ltd  
Location: Sherwood Park, AB

Sample Data:

Sample Description: Water Lynx CFPL 360 (New Brand name-Water Lynx 360)  
Visual Description: white gel  
Sampling Location: Clear Flow  
Sampling Method: Chemical Product  
Volume Obtained: 200 g  
Sampled By: JM

Sample Date: 10 12 10 Time: n/g  
Date Received: 10 12 10 Time: 1530  
Bioassay Date: 10 12 18 Time: 1000  
Report Date: 11 03 31  
Deviations from Method: none  
Comments: Report re-issued March 2011 at client request to update product name from sample ID originally provided.

Bioassay Results:  
CETIS Statistical Program

LC50 @ 48 Hours: >1500 mg/L  
Method: n/a  
95 % Confidence Interval: n/a

EC50 @ 48 Hours: 125 mg/L  
Method: Spearman-Kärber  
95 % Confidence Interval: 80.6<125.0<193.8 mg/L

Note: Results relate only to the item tested.

Legend:  
LC50/EC50 indicates concentration of sample, in percent, which kills or affects 50% of test organisms.

Maxxam Analytics  
96hr Rainbow Trout Bioassay Report  
(Acute Aquatic Toxicity Test) Project: B0C0794-Z00921

Client Name: ClearFlow Consulting Inc  
Location: Sherwood Park, AB

Sample Data:

Sample Description: Water Lynx CFPL 360 (New Brand name-Water Lynx 360)  
Sampling Location: ClearFlow  
Sampling Method: Chemical Product  
Volume obtained: 200g  
Sampled By: JM

Sample Date: 10 12 10 Time: n/g  
Date Received: 10 12 10 Time: 1530  
Bioassay Date: 10 12 18 Time: 1200  
Report Date: 11 03 31  
Deviations from method: none-chemical test per EPS 1/RM/9  
Comments: Report re-issued March 2011 at client request to update product name from sample ID originally provided.

Bioassay Results:  
CETIS Statistical Program

LC50 @ 96 Hours: 147.5 mg/L  
Method: Probit  
95 % Confidence Interval: 70.4<147.5<203.7 mg/L

EC50 @ 96 Hours: 140.3 mg/L  
Method: Spearman-Kärber  
95 % Confidence Interval: 104.1<140.3<189.1 mg/L

Note: The results relate only to the item tested.

Results of Phenol Reference Bioassay:

LC50 @ 96 Hours: 11.64 mg/L  
95 % Confidence Interval: 10.98<11.64<12.35 mg/L  
Method: Spearman-Kärber  
95 % Confidence Interval: 8.48<10.64<13.35  
Method: Schewhart Warning Limit  
Historical Mean ± 2SD: 10.64±2.52  
Date of Reference Bioassay: 10 12 10

The reference toxicant is conducted under the same conditions as the definitive testing.

Data & QA/QC  
Reviewed By: Jay Abbott, Bioassay Supervisor

Legend:  
LC50/EC50 indicates concentration of sample, in percent, which kills or affects 50% of test organisms.

LC50 @ 48 Hours : >1500 mg/L  
Method : n/a  
95 % Confidence Interval : n/a

EC50 @ 48 Hours : 125 mg/L  
Method : Spearman-Kärber  
95 % Confidence Interval : 80.6<125.0<193.8 mg/L

LC50 @ 96 Hours : 147.5 mg/L  
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95 % Confidence Interval : 70.4<147.5<203.7 mg/L

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## CATIONIC DETECTION FIELD KIT 3 mg/L

[www.clearflowgroup.com](http://www.clearflowgroup.com)

### Total Suspended Solids (TSS)

Industrial operations such as mining, road building and aggregate washing result in high concentrations of suspended particles.

### Cationic Toxicity to Fish

The use of chemical coagulation and subsequent flocculation is a common treatment to improve the efficacy of TSS removal prior to discharge into the environment. However, these cationic flocculating agents, can be toxic to fish, even at very low concentrations (0.3 – 0.5 mg/L). Noted effects include gill adherence and subsequent epithelial damage.

### Cationic Detection Kit

The Cationic Detection Field kit is engineered to quickly test on-site treated process water waste streams for residual Cationic polymers. Industries and operations adhering to regulatory standards regarding aquatic health would utilize this technology to ensure treated water is suitable for environmental release.

### Toxicity Mitigation Agent (MA)

The potential toxicity of treated flocculated water can be mitigated by applying Clearflow's proprietary mitigation agent CN-369

### Aquatic Protection

The application of the neutralizer agent and the verification of toxicity mitigation was engineered to protect aquatic life. This advanced technology was verified fish safe by the University of Alberta, and co-funded by the National Research Council Canada through the Industrial Research Assistance Program (IRAP).



#### FEATURES:

- Evaluated by 3<sup>rd</sup> party research institute, U of A.
- Detection capability to 3 mg/L.
- "Fish Safe" measurement device.
- Simplified test for measuring residual cationic polymer.
- Tool to mitigate liability and regulatory fines.
- Environmental safety check.
- Easily calibrated for on-site use.
- Canadian Technology.
- Patent protected.



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## CATIONIC NEUTRALIZER CN-369

[www.clearflowgroup.com](http://www.clearflowgroup.com)

### Anionic vs. Cationic Polymers

Industry and Environmental Regulatory bodies have determined that anionic polymers are safer than cationic polymers for aquatic life. While Clearflow Group Inc. manufactures a safe to fish anionic polymer, Clearflow also proactively engaged research and development of an environmentally safe application of cationic polymers by introducing a fish safe cationic neutralizer in 2017. The Clearflow Cationic Neutralizer is an effective product to neutralize the toxicity of cationic polymers, creating a safe treatment application for sensitive aquatic organisms.

### Suitable Applications

Applications for Clearflow Cationic Neutralizer include mining or industrial process water waste streams, where the goal or regulation is to operate with safe water release to the natural environment. Any mining operation using cationic flocculant to reduce total suspended solids (TSS) aligns with the application Clearflow's Cationic Neutralizer technology.

### Fish Safe Verified

Aquatic protection is fundamentally what the neutralizer liquid is engineered for. This advanced technology was verified fish safe by the University of Alberta, and co-funded by the National Research Council Canada through the Industrial Research Assistance Program (IRAP).



Effects of CC and MA exposure on gill morphology

### Clearflow Group's CN-369

- Scientifically proven to ameliorate (neutralize) Cationic Polymers making them safe for environmental release.
- "Fish Safe" – CN 369 can actually reverse oxidative stress effects to fish cationic polymer exposure.
- Reducing potential liability and regulatory fines for the end-user client.
- Safe for the environment
- Easily calculated for appropriate dosing of the Cationic Polymer.
- Available in liquid, granular and gel block format.
- A Canadian technology product.
- Patent Protected



In stream self-dosing passive application.



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# Projeto atual do Syncrude 2021

• Syncrude estava tendo problemas de TSS na água de um grande poço de armazenamento recém-construído

• Para garantir que eles possam cumprir requisitos Clearflow foi trazido para fornecer uma solução para remover o TSS e outros contaminantes associados para permitir uma liberação segura

• Devido ao grande volume de água, a água precisava ser tratada em até 1000gpm

• Reator de tubos PR1000 patenteado da Clearflow contendo o Gel Floculante foi trazido para limpar a água da lagoa e blocos de Gel Floculante são usados nas valas para controlar os sedimentos que entram na lagoa

• Os dados anexados mostram reduções maiores que 99%

Syncrude Sample Results; May 13, 2021

ClearFlow REFERENCE NUMBER	DATE	LOCATION		PURPOSE	PRODUCT	TURBIDITY (NTU)		pH	MIX TIME (sec)	COMMENTS
		Region	Site			start	end			
21-05-0025	13-May-21	AB	Syncrude 7-09 Sump	Clarification	GFB 494	17.79		7.54	60	fluffy flocs
					GFB 484	-			60	minimal reaction
					GFB 474	10.51			60	fluffy flocs
					GFB 394	45.5			60	large flocs
					GFB 398	-			60	small flocs
					GFB 360	-			60	minimal reaction
					GFB 665	218	67		60	large flocs
					GFB 494 then GFB 398	11.88			60 & 30	minimal reaction
					GFB 494 then GFB 360	18.06			60 & 30	minimal reaction
					GFB 484 then GFB 398	74.6			60 & 30	medium-large flocs
					GFB 484 then GFB 360	45.1			60 & 30	medium-large flocs
					GFB 474 then GFB 398	1.35			60 & 30	large flocs
					GFB 474 then GFB 360	0.84			60 & 30	large flocs

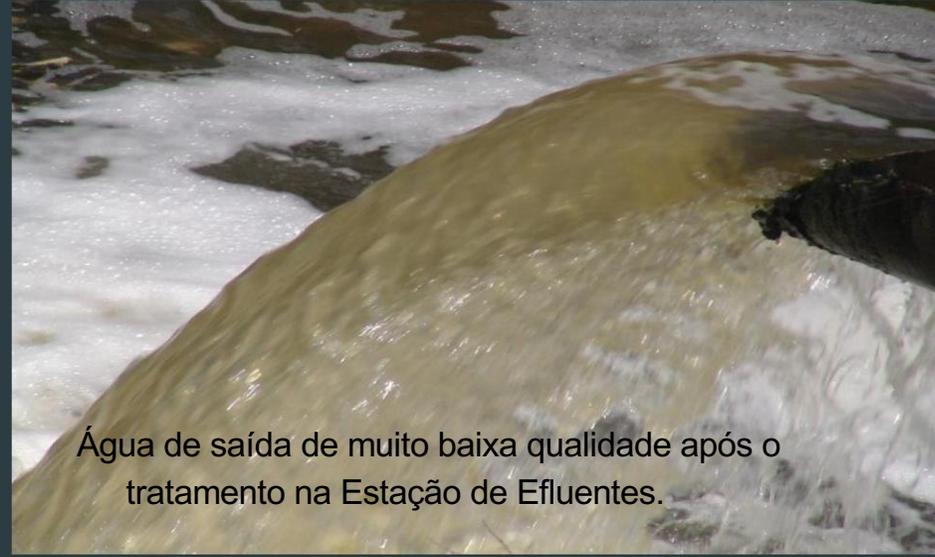


# Rio Nablus, Oriente Médio

11.000 m<sup>3</sup>/dia (10.795 toneladas/dia)



Qualidade das águas residuais muito fraca, esgoto bruto e alta carga de cálcio.



Água de saída de muito baixa qualidade após o tratamento na Estação de Efluentes.



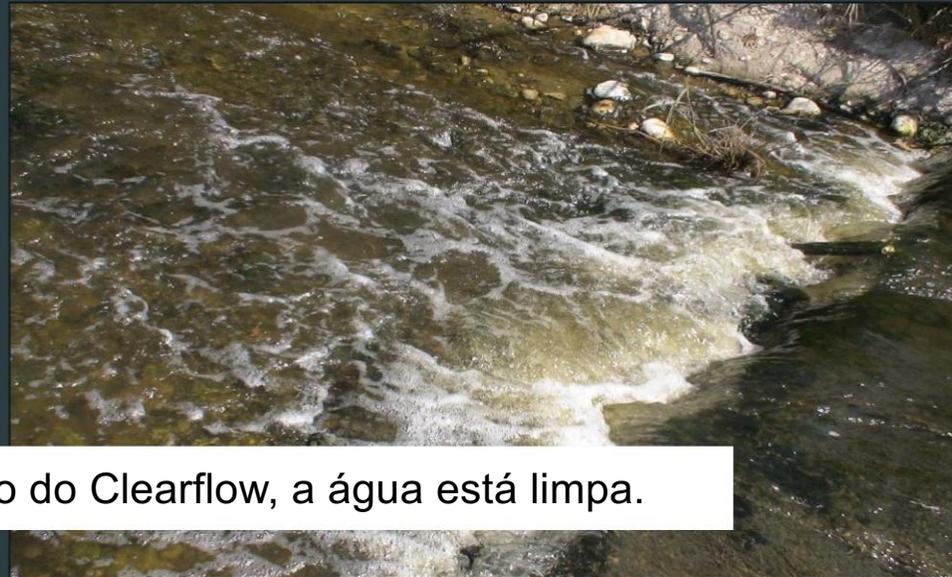
Algas bastante visíveis sem sedimentação.



Gel Flocculante e Treated Fabric™ instalado em 14 de julho

# Clearflow limpa sedimentos do rio Nablus

, Médio Oriente



17 de julho : 3 dias após a instalação do Clearflow, a água está limpa.



Sedimentação ocorrendo sobre algas.



Clareza da água 100m a jusante.



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