

Appendix 13.17-B Initial Bench Testing Report for Flocculant - Stormtec



2021-08-31

Telkwa Coal/Allegiance Coal
Suite 1410-409
Granville Street,
Vancouver, BC

RE: BENCH SCALE TESTING: PRELIMINARY TSS SAMPLING WITH & WITHOUT CHEMICAL ADDITION FOR OVERBURDEN MATERIAL.v2

Ref: 21467433 Telkwa Coal PSD

Dear Mr. Farmer,

Thank you for the opportunity to complete bench scale testing for Telkwa/Allegiance Coal. Here is a revised version of a previously submitted document which demonstrates the various testing which occurred on overburden and topsoil samples sent to Stormtec from Telkwa Coal.

Total Suspended Solids (TSS) was examined with natural settlement and settlement with chemical addition. The testing was carried out in two phases:

1. Scoping
2. Optimization

This report is based on optimization, with reference to the original scoping work which was conducted.

Should you have any questions or concerns with regards to this report, please don't hesitate to contact me. Thank you.

Regards,

Eoghan O'Neill

Eoghan O'Neill, B. Eng. | Project Manager

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Test-work Procedure

Stormtec received 35 pails of overburden soil material from Allegiance Coal, related to the Telkwa Coal mine in Northern British Columbia (BC). Of those 35 soil samples, 5 soils were tested based on **21467433 Telkwa Coal PSD**. The 21467433 Telkwa Coal PSD is a document provided by Allegiance Coal which illustrates the particle size distribution of the various soil samples. Stormtec reviewed this document and tested the best, worst, and average case scenario. As the samples sent to Stormtec were soil samples, there was no data to base testing of a soil to water ratio. Therefore, Stormtec trialed various approaches to narrow the window.

1. Scoping:

Stormtec applied the percentage of the fine particles as the selection criteria. The maximum, the minimum and the average percentage of the fine particles for all samples was determined. Samples with the maximum value (#21-39S with 71.2%) and minimum value (#21-50S with 21%) were selected as two samples with the highest and lowest potential for producing TSS in relation to site water run-off.

The calculated average of fine particles was 47.9%, therefore sample 21-48S with 47.7% was used as the representative of the average soil sample. To expand the number of samples and broaden the range of observation, samples for an intermediate high and an intermediate low was recorded. These samples are represented as 21-52S with 56.8% (intermediate high) and 21-44S with 37.1% (intermediate low).

1.1. Settling without Chemical Addition

The feed water for settling tests were prepared by adding 500ml of tap water to 200g of a soil sample, in a one (1) liter beaker and using manual mixing to agitate the slurry (soil & water sample). After five minutes of the settling period and measuring the pH of each slurry, 100 ml of the overflow (total water remaining above settled particles) was transferred from the beaker to a 100 ml graduated cylinder.

The solution in the graduated cylinder was allowed to settle overnight (approx. 24 hours) to evaluate the possibility of gravitational settling without adding chemicals. As illustrated in Figure 1, sample #21-50S (minimum) and sample #21-52S (intermediate high) generated a clear overflow, while the three other samples did not generate a clear overflow. It was concluded that adding settling aids for all potential conditions is necessary.



Figure 1: Settlement without Chemical Addition

TABLE 1: SETTLEMENT WITHOUT CHEMICAL ADDITION

SAMPLE NUMBER	Sample ID	% Fines	Overnight Settlement Time	Overflow without C2 Addition	NTU	pH Post Settling
2	21-39S	71.2	20 hrs.	>100		8.00
6	21-44S	37.1	20 hrs.	>100		8.08
9	21-48S	47.7	20 hrs.	>100		7.86
11	21-50S	21.0	20 hrs.	>100		6.84
13	21-52S	56.8	20 hrs.	>100		7.43

*Note: C2 is in reference to Stormtec's Chitosan.

Table 1 summarizes the measured parameters of the overflow solutions from the test without using settling aids. The overflow solutions were left and observed after a 24-hour timeframe.

1.2. Settling with Natural Polymer

After observing unsuccessful results from the settling test without using chemicals, it was decided to evaluate the impact of natural polymer on the settling process.

One hundred millimeters (100 ml) of overflow from each slurry was transferred to a 140 ml beaker and 1ml/L of Stormtec-C2 solution, a natural polymer-based on chitosan, was added to each beaker. The mixture was mixed manually for 30 seconds and then the solution passed through 20 μ and 10 μ and in some cases 0.45 μ . The turbidity of filtered water was measured after each iteration. Figure 2 illustrates the quality of generated overflow after adding natural polymer.



Figure 2: Settlement with Chemical Addition & Filtration



Despite the significant improvement in the quality of the overflow after using natural settling aids, the turbidity measurement unveiled that adding chemicals without using mechanical separation (i.e., sand or multimedia filtration) will not produce dischargeable overflow.

1.3 Settling with Synthetic Polymer

The quality of generated overflow from sample #21-39S was not suitable for environmental discharge and furthermore after using 20 μ and 10 μ filters, it was deemed impractical due to the amount of generated back pressure on the filtration system.

Increasing the dosage of the natural polymer (Stormtec-C2 Chitosan) and combining with the use of a coagulant (DB45 VHM) did not improve the quality of overflow or sludge for this sample. It was therefore decided to use a synthetic anionic flocculent (905 VHM) in combination with a coagulant. Figure 3 shows the quality of the overflow from sample #21-39S after using an anionic flocculent (right) and the quality of the same overflow sample after using natural polymer (left).

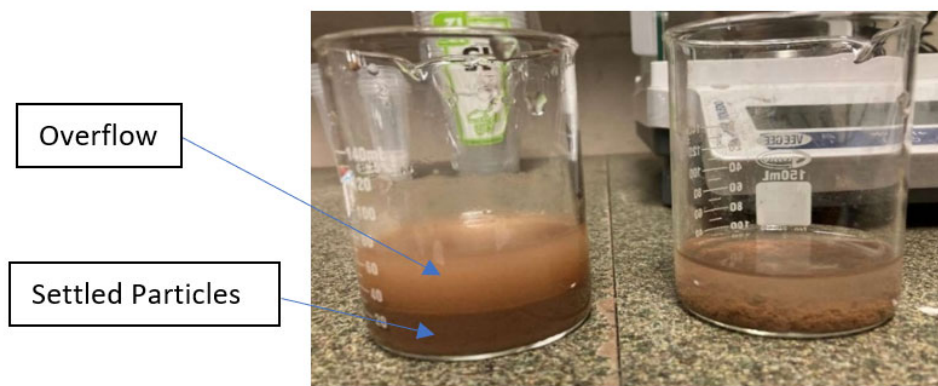


Figure 3: Overflow Quality after adding Natural Polymers (left of photo) and Anionic Flocculent (right of photo)

Although the quality of overflow generated by anionic polymer was the best-achieved quality of sample #21-39S, the water was not suitable for the direct discharge and additional mechanical polishing would be required before discharging the water, with NTU levels below 100. Stormtec believed that flocculent and coagulant dosage optimization tests were needed to be completed before finalizing the suitable treatment method for this sample.

2. Optimization

Three samples were taken on July 9th to allow for settling between July 9th to July 21st, 2021 (approximately 2 weeks). The samples used were the best, worst, and average case scenarios from the Scoping work. Sample results were derived from 20g of soil to 1000ml of water. NTU results which was based on the maximum retention time in the Tenas Control Pond for dealing with contact water (without chemical addition):

Results after 14 days of natural settling (no chemical addition):

- 21-39S: NTU = 14.90
- 21-48S: NTU = 6.01
- 21-50S: NTU = 42.20

Once the results of natural settling over two weeks was concluded, Stormtec moved to trial another anionic coagulant (BHR-P50) and flocculant (Stormfloc A1). Stormtec added 50ppm of coagulant and 100ppm of flocculant to each of the three samples in question. Samples were observed after 7 days of settling with chemical addition. The results are based on:

- 20g of soil to 1000ml (1ltr) of water

Sampling was created on July 28th, and on August 5th, the results were analyzed for NTU:

Results after 7 Days:

- 21-50S = 6.36NTU
- 21-48S = 21.2NTU
- 21-39S = 39.0NTU
- IEG-15 Topsoil = 4.56NTU

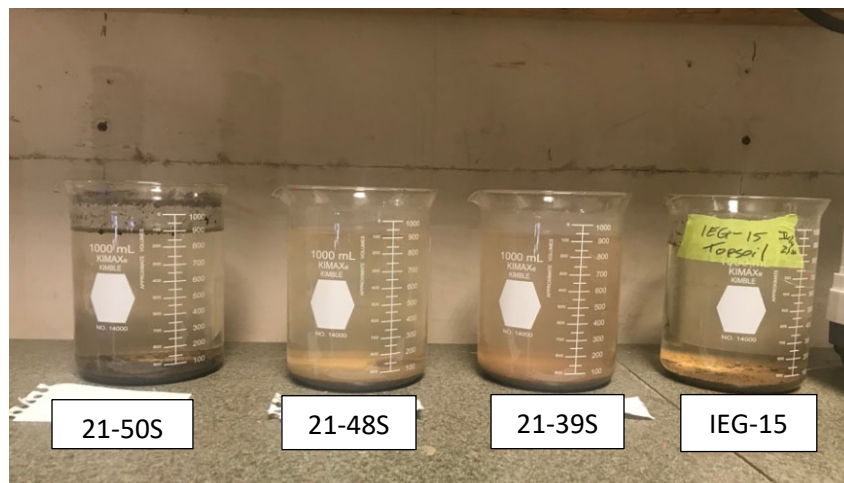


Figure 4: Samples from L-R demonstrate the settlement over 7 days with 50ppm of coagulant and 100ppm of flocculant.

These are positive results over 7 days however, after discussion with Allegiance Coal, Stormtec decided to optimize the results even further based on observations after 24 hours.

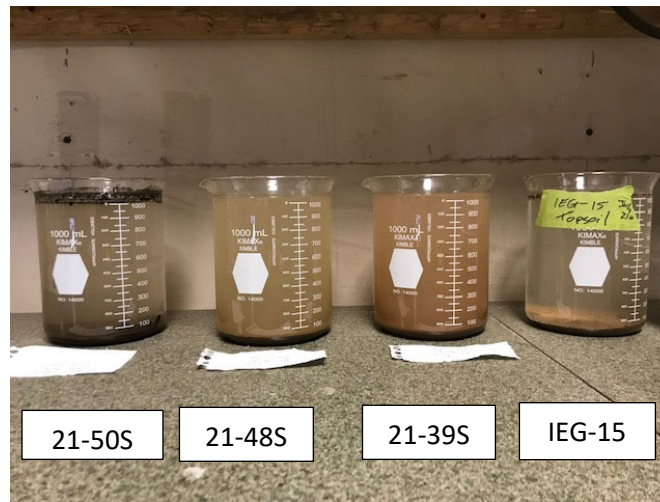


Figure 5: 24-hours of settling time with 50ppm of coagulant and 100ppm of flocculant

Stormtec concluded that 50ppm of coagulant (BHR-P50) and 100ppm of flocculant (Stormfloc A1) was not enough to dose, in order to show positive results after 24 hours. It was therefore decided to move to a 100ppm of coagulant with a 100ppm of flocculant dose rate.

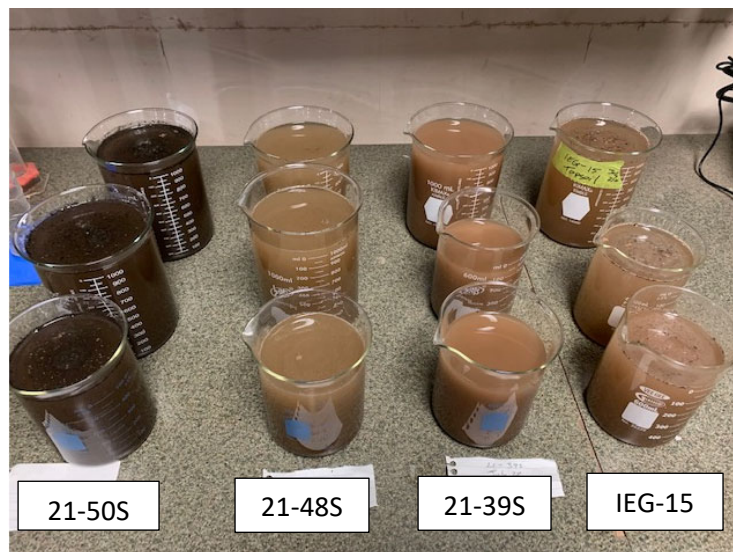


Figure 6: Four (4) samples, twelve samples in total with various dosing quantities of coagulant & flocculant. Each sample had 20g of soil to 1000ml of water.

- Test 1: Back row (L-R) = 100ppm of coagulant, 100ppm of flocculant
- Test 2: Middle row (L-R) = 100ppm of coagulant, 200ppm of flocculant
- Test 3: Front row (L-R) = 100ppm of coagulant, 300ppm of flocculant

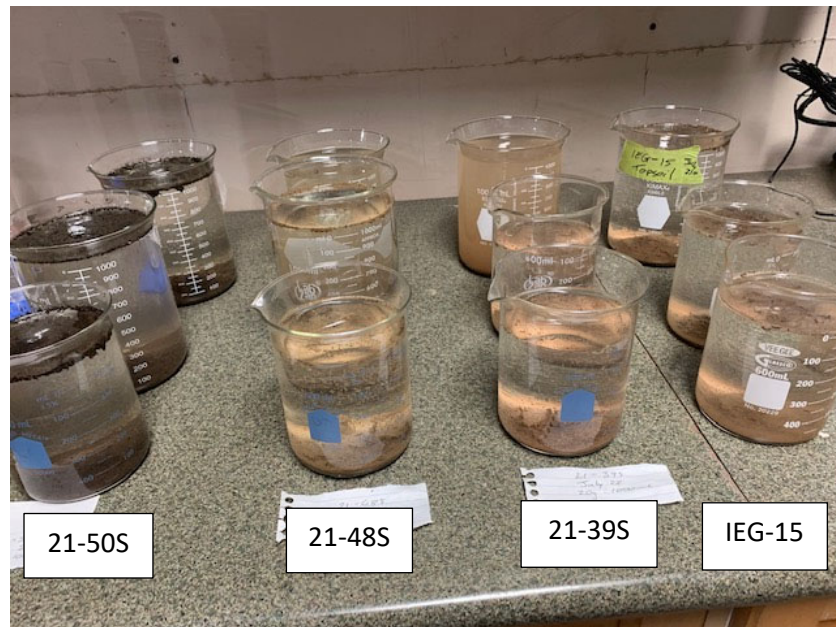


Figure 7: Results after 24 hours

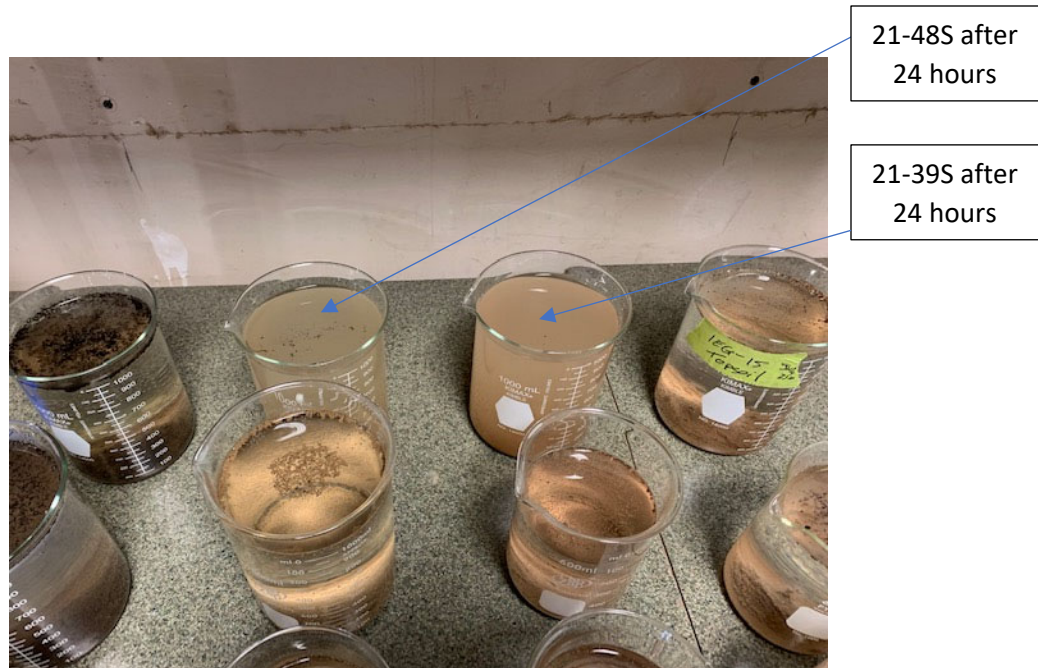


Figure 8: 21-48S and 21-39S showing high NTU readings (above 50NTU) after 24 hours

- 21-50S
 - Sample 1 = 4.31NTU (back row)
 - Sample 2 = 11.1NTU (middle row)
 - Sample 3 = 7.82NTU (front row)
- 21-48S
 - Sample 1 = 70.7NTU (back row)



- Sample 2 = 4.19NTU (middle row)
 - Sample 3 = 4.95NTU (front row)
- 21-39S
 - Sample 1 = 88.6NTU (back row)
 - Sample 2 = 4.00NTU (middle row)
 - Sample 3 = 2.42NTU (front row)
- Topsoil IEG-15
 - Sample 1 = 3.66NTU (back row)
 - Sample 2 = 2.91NTU (middle row)
 - Sample 3 = 2.36NTU (front row)

3. Conclusion:

Stormtec narrowed the scope and sampling procedure from thirty-five (35) soil samples down to three (3) overburden samples and one (1) soil sample. These samples were based on best case, worst case, and average case scenarios from **21467433 Telkwa Coal PSD** particle size distribution. Stormtec concluded, based on test work carried out, that:

1. Natural settling over 14 days can result in positive results with no chemical addition.
2. Addition of Chitosan did not show positive results with regards to separating the fine particles and allowing settlement of material from the water.
3. Anionic Coagulant and Anionic Flocculant proved successful with expediting the settlement process and ensuring a more rapid reaction to particle settlement.
4. Over 7 days of particle settlement, positive results were shown with the addition of 50ppm of coagulant and 100ppm of flocculant.
5. To increase the settlement time from 7 days to 24 hours, 100ppm of coagulant (BHR-P50) and 100ppm of flocculant (Stormfloc A1) presented positive results, showing to be the most optimum option for expediting the settlement process and ensuring a more rapid reaction to particle settlement.
6. Toxicity levels for both BHR-P50 and Stormfloc A1 has been tested, for further information please review SDS sheets in appendix 2
7. The work demonstrates that the proposed Tenas Control Pond should be able to naturally settle most materials present at the Project's site. Furthermore, the test work identified a very effective dosage rate and settlement aids to improve on this natural rate if during operation phase it is observed that NTU is getting too high.

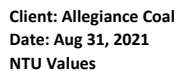
Note: Breakdown of results can be seen in Appendix 1 attached.

Note: Names of coagulant and flocculant with optimum results can be seen in Appendix 2 attached.

****Due to the nature of samples and direction with regards to testing, Stormtec does not take any responsibility for results in the field and dosing rates necessary for water control and treatment during the construction and/or operations at Telkwa Coal. This report is based on lab testing and results may vary in the field.**

Appendix 1

(Table of Results)

[illegible]

Appendix 2

(Safety Data Sheets)



SAFETY DATA SHEET

Stormfloc A1

SDS DATE: 05/12/16

revision date: 04/06/20

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Trade Name : Stormfloc A1
Material Uses : Water Treatment (Aqueous Solution of Anionic Polyacrylamide)
Supplier/Manufacturer : Stormtec Filtration Inc.
 876 Derwent Way
 Delta, BC V3M 5R1
Emergency Phone : 604-523-6608
Information Phone : 604-523-6608

SECTION 2: HAZARDS IDENTIFICATION**2.1. Classification of the substance or mixture****Classification (GHS-CA)**

Not classified

2.2. GHS Label elements, including precautionary statements**GHS-CA labeling**

No labeling applicable

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-CA)

No data available.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<u>Ingredient:</u>	<u>CAS No.</u>	<u>% by weight</u>
No Hazardous ingredients		

Section 3 Notes: There are no ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Full text of hazard classes and H-statements: see section 16

SECTION 4: FIRST AID MEASURES

Eye Contact : Flush at once with plenty of water for at least 15 minutes. Remove contacts if easy to do so. Contact a physician if symptoms occur.
Skin Contact : Immediately flush skin with plenty of water. Remove contaminated clothing and shoes.
Ingestion : If last quantities of the material are swallowed, contact a physician at once. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention
 Not expected to present a significant hazard under anticipated conditions of normal use.



Stormfloc A1

SECTION 5: FIRE-FIGHTING MEASURES

Flammability of the product	: Not applicable.
Flash points (Test Method)	: Not applicable.
Flammable Limits in Air (% by volume)	Lower: Not applicable. Upper: Not applicable.
Products of Combustion	: Not applicable.
Extinguishing Media	: Water, water spray, foam, dry powder, or CO ₂ .
Special Firefighting Procedures	: Spills produce extremely slippery surfaces.
Unusual Fire and Explosion Hazards:	None known.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions	: Use appropriate personal protective equipment.
Methods for Cleaning Up	: Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials.

SECTION 7: HANDLING AND STORAGE

Handling	: Keep container closed. Do not contact eyes or skin. Do not take internally.
Storage conditions	: Keep only in the original container in a cool, well-ventilated place. Keep container closed when not in use.
Incompatible products:	Strong bases. Strong acids.
Incompatible materials:	Sources of ignition. Direct sunlight

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	: No additional information available.
Personal Protection	
Eyes	: Chemical goggles or safety glasses.
Skin	: Other protective clothing depending on degree of exposure. Lab coat recommended to prevent skin contact.
Respiratory	: Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Hands	: Wear protective gloves.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance	: Viscous, clear, colorless liquid, no odor
Solubility	: Soluble in water

SECTION 10: STABILITY AND REACTIVITY

Stability and reactivity	: Stable under normal conditions
Conditions or instability	: None known.
Incompatible materials	: Strong acids. Strong bases.
Hazardous Decomposition	: Fume. Carbon monoxide. Carbon dioxide.

SECTION 11: TOXICOLOGICAL INFORMATION

This product does not contain OSHA regulated hazardous components.

Acute toxicity (oral)	Not classified
Acute toxicity (dermal)	Not classified
Acute toxicity (inhalation)	Not classified
Skin corrosion/irritation	Not classified
Serious eye damage/irritation	Not classified
Respiratory or skin sensitization	Not classified
Germ cell mutagenicity	Not classified
Carcinogenicity	Not classified
Reproductive toxicity	Not classified
STOT-single exposure	Not classified
STOT-repeated exposure	Not classified
Aspiration hazard	Not classified
Potential Adverse human health effects and symptoms	Based on available data; the classification criteria are not met.

SECTION 12: ECOLOGICAL INFORMATION

This material is not classified as dangerous for the environment.

Fish Test Results

Acute Toxicity freshwater (OECD 203) 96hr Bluegill Sunfish 72,000 mg/L LC50*

*LC50 calculated based on the LC50 value obtained for the dry anionic polyacrylamide, the main constituent of APD-665P.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method : Comply with all federal, state, and local regulations. Consult state and local authorities for restrictions and disposal of chemical waste. If approved, may be diluted and drained to a municipal sewer or waste treatment plant. Rinse empty container thoroughly with water before discarding.

SECTION 14: TRANSPORT INFORMATION

Regulatory Information	UN Number	Proper Shipping Name	Class	Packing Group	Additional Information
United States		Not Regulated			
IATA		Not Regulated			
IMDG		Not Regulated			

SECTION 15: REGULATORY INFORMATION

U.S. Federal Regulations : All components are listed or exempt from TSCA Chemical Inventory.

SECTION 16: OTHER INFORMATION

Label Requirements : WARNING! May cause eye irritation prolong contact may cause irritation to skin.

Hazardous Material

Health	0
Fire Hazard	1
Reactivity	0
Personal Protection	B

Hazard Ratings

4 = Extreme

3 = Serious

2 = Moderate

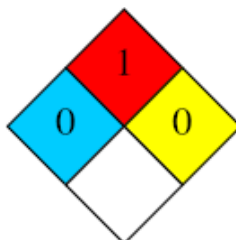
1 = Slight

0 = Minimal

***See section 8 for more detailed information on personal protection**

National Fire Protection Association (U.S.A.)

:

**References**

: Available on request

Disclaimer

All information, recommendations, and suggestions appearing herein concerning this compound are based upon data obtained from the raw material manufacturers and/or recognized technical sources; however, Stormtec Filtration makes no warranty, representation, or guarantee as to the accuracy, sufficiency or completeness of the material set forth herein. It is the user's responsibility to determine the safety, toxicity and suitability of his own use, handling and disposal of the product. Since actual use by others is beyond our control, Stormtec Filtration makes no warranty, express or implied, as to the effects of such use, the results to be obtained or the safety and toxicity of the product. The data in this MSDS relate only to the specific product designated herein and do not relate to use in combination with any other material or in any process.



HaloKlear BHR-P50

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

Date of issue: 04/13/2017

Revision date: 09/16/2019

Supersedes: 02/05/2018

Version: 2.0

SECTION 1: Identification

1.1. Product identifier

Product form : Mixtures
Product name : HaloKlear BHR-P50
Product code : 301420

1.2. Recommended use and restrictions on use

Recommended use : Flocculant

1.3. Supplier

Manufacturer

Dober Chemical Corp.
543 Forest Road
18202 Hazle Township, PA - USA
T 630-410-7300 - F 630-410-7444
regulatory@dober.com - www.dober.com

1.4. Emergency telephone number

Emergency number : 1-800-255-3924 / 1-813-248-0585
ChemTel

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

Classification (GHS CA)

Met. Corr. 1 H290
Eye Dam. 1 H318

Full text of hazard classes and H-statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS CA labeling

Hazard pictograms (GHS CA) :



GHS05

Signal word (GHS CA) :

Danger

Hazard statements (GHS CA) :

H290 - May be corrosive to metals
H318 - Causes serious eye damage

Precautionary statements (GHS CA) :

P234 - Keep only in original container.
P280 - Wear protective gloves, protective clothing, eye protection, face protection.
P305+P351+P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 - Immediately call a doctor.
P390 - Absorb spillage to prevent material-damage.
P406 - Store in corrosive resistant container with a resistant inner liner.

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS CA)

16.5% of the mixture consists of ingredient(s) of unknown acute toxicity (Dermal)
16.5% of the mixture consists of ingredient(s) of unknown acute toxicity (Inhalation (Dust/Mist))

SECTION 3: Composition/Information on ingredients

3.1. Substances

Not applicable

3.2. Mixtures

HaloKlear BHR-P50

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

Name	Chemical name / Synonyms	Product identifier	%	Classification (GHS CA)
Aluminum chloride hydroxide sulfate	Aluminium chloride hydroxide sulfate / Aluminium chloride hydroxide sulphate / Basic aluminum chloride sulfate / Aluminum hydroxychlorosulfate	(CAS-No.) 39290-78-3	10 - 30	Met. Corr. 1, H290 Eye Dam. 1, H318

Full text of hazard classes and H-statements : see section 16

SECTION 4: First-aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove person to fresh air and keep comfortable for breathing.
First-aid measures after skin contact : Wash skin with plenty of water.
First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician immediately.
First-aid measures after ingestion : Call a poison center/doctor/physician if you feel unwell.

4.2. Most important symptoms and effects (acute and delayed)

Symptoms/effects after eye contact : Serious damage to eyes.

4.3. Immediate medical attention and special treatment, if necessary

Other medical advice or treatment : Treat symptomatically.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media

Suitable extinguishing media : Water spray. Dry powder. Foam. Carbon dioxide.

5.2. Unsuitable extinguishing media

No additional information available

5.3. Specific hazards arising from the hazardous product

No additional information available

5.4. Special protective equipment and precautions for fire-fighters

Protection during firefighting : Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

No additional information available

6.2. Methods and materials for containment and cleaning up

Methods for cleaning up : Take up liquid spill into absorbent material.
Other information : Dispose of materials or solid residues at an authorized site.

6.3. Reference to other sections

For further information refer to section 8: "Exposure controls/personal protection"

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Precautions for safe handling : Ensure good ventilation of the work station. Avoid contact with skin and eyes. Wear personal protective equipment.
Hygiene measures : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions : Store in corrosive resistant container with a resistant inner liner. Keep only in original container. Store in a well-ventilated place. Keep cool.
Incompatible materials : Metals.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

No additional information available

HaloKlear BHR-P50

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

8.2. Appropriate engineering controls

Appropriate engineering controls : Ensure good ventilation of the work station.

8.3. Individual protection measures/Personal protective equipment

Hand protection:

Protective gloves

Eye protection:

Chemical goggles or safety glasses

Skin and body protection:

Wear suitable protective clothing

Respiratory protection:

Use a properly fitted, particulate filter respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: No data available
Color	: Yellow to amber
Odor	: odorless
Odor threshold	: No data available
pH	: 3 - 3.5
Relative evaporation rate (butyl acetate=1)	: No data available
Relative evaporation rate (ether=1)	: No data available
Melting point	: Not applicable
Freezing point	: No data available
Boiling point	: No data available
Flash point	: No data available
Auto-ignition temperature	: No data available
Decomposition temperature	: No data available
Flammability (solid, gas)	: Not applicable
Vapor pressure	: No data available
Vapor pressure at 50 °C	: No data available
Relative density	: No data available
Solubility	: Water: Soluble
Log Pow	: No data available
Viscosity, kinematic	: No data available
Explosion limits	: No data available

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

Reactivity	: The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: No dangerous reactions known under normal conditions of use.
Conditions to avoid	: None under recommended storage and handling conditions (see section 7).
Incompatible materials	: metals.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral)	: Not classified
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified

HaloKlear BHR-P50

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

Unknown acute toxicity (GHS CA)	16.5% of the mixture consists of ingredient(s) of unknown acute toxicity (Dermal) 16.5% of the mixture consists of ingredient(s) of unknown acute toxicity (Inhalation (Dust/Mist))
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Aluminum chloride hydroxide sulfate (39290-78-3)

LD50 oral rat	> 5000 mg/kg
Skin corrosion/irritation	: Not classified pH: 3 - 3.5
Serious eye damage/irritation	: Causes serious eye damage. pH: 3 - 3.5
Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Not classified
Reproductive toxicity	: Not classified
STOT-single exposure	: Not classified
STOT-repeated exposure	: Not classified
Aspiration hazard	: Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : The product is not considered harmful to aquatic organisms or to cause long-term adverse effects in the environment.

HaloKlear BHR-P50

LC50 fish 1	3222 ppm Rainbow Trout; 96 hour
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12.2. Persistence and degradability

No additional information available

12.3. Bioaccumulative potential

Aluminum chloride hydroxide sulfate (39290-78-3)

Log Pow	< 3
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12.4. Mobility in soil

Aluminum chloride hydroxide sulfate (39290-78-3)

Log Pow	< 3
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12.5. Other adverse effects

GWPmix comment : No known effects from this product.
Other information : No other effects known.

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions.
Ecology - waste materials : None known.

SECTION 14: Transport information

14.1. Basic shipping description

In accordance with TDG

Transportation of Dangerous Goods

UN-No. (TDG) : UN3264
Packing group : III - Minor Danger
TDG Primary Hazard Classes : 8 - Class 8 - Corrosives
Transport document description : UN3264 CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Chloride Hydroxide Sulfate), 8, III
Proper Shipping Name (Transportation of Dangerous Goods) : CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Chloride Hydroxide Sulfate)

HaloKlear BHR-P50

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

Hazard labels (TDG) : 8 - Corrosive substances



TDG Special Provisions : 16 - (1) The technical name of at least one of the most dangerous substances that predominantly contributes to the hazard or hazards posed by the dangerous goods must be shown, in parentheses, on the shipping document following the shipping name in accordance with clause 3.5(1)(c)(ii)(A) of Part 3 (Documentation). The technical name must also be shown, in parentheses, on a small means of containment or on a tag following the shipping name in accordance with subsections 4.11(2) and (3) of Part 4 (Dangerous Goods Safety Marks). (2) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a shipping document or on a small means of containment when Canadian law for domestic transport or an international convention for international transport prohibits the disclosure of the technical name: (a) UN1544, ALKALOID SALTS, SOLID, N.O.S. or ALKALOIDS, SOLID, N.O.S.; (b) UN1851, MEDICINE, LIQUID, TOXIC, N.O.S.; (c) UN3140, ALKALOID SALTS, LIQUID, N.O.S. or ALKALOIDS, LIQUID, N.O.S.; (d) UN3248, MEDICINE, LIQUID, FLAMMABLE, TOXIC, N.O.S. or (e) UN3249, MEDICINE, SOLID, TOXIC, N.O.S. An example in Canada is the "Food and Drugs Act". (3) Despite subsection (1), the technical name for the following dangerous goods is not required to be shown on a small means of containment: (a) UN2814, INFECTIOUS SUBSTANCE, AFFECTING HUMANS; or (b) UN2900, INFECTIOUS SUBSTANCE, AFFECTING ANIMALS. SOR/2014-306

Explosive Limit and Limited Quantity Index : 5 L

Excepted quantities (TDG) : E1

Passenger Carrying Road Vehicle or Passenger Carrying Railway Vehicle Index : 5 L

14.2. Transport information/DOT

Department of Transport

DOT NA No : Non Regulated when packaged in materials that will not react dangerously with or be degraded by the material.

Transport document description : Non Regulated

Contains Statement Field Selection (DOT) :

Dangerous for the environment : No

Other information : No supplementary information available.

14.3. Air and sea transport

IMDG

UN-No. (IMDG) : 3264

Proper Shipping Name (IMDG) : CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Chloride Hydroxide Sulfate)

Transport document description (IMDG) : UN 3264 CORROSIVE LIQUID, ACIDIC, INORGANIC, N.O.S. (Aluminum Chloride Hydroxide Sulfate), 8, III

Class (IMDG) : 8 - Corrosive substances

Packing group (IMDG) : III - substances presenting low danger

MFAG-No : 154

Ship Safety Act : Corrosive substances

Port Regulation Law : Corrosive substances

IATA

UN-No. (IATA) : 3264

Proper Shipping Name (IATA) : Corrosive liquid, acidic, inorganic, n.o.s. (Aluminum Chloride Hydroxide Sulfate)

Transport document description (IATA) : UN 3264 Corrosive liquid, acidic, inorganic, n.o.s. (Aluminum Chloride Hydroxide Sulfate), 8, III

Class (IATA) : 8 - Corrosives

Packing group (IATA) : III - Minor Danger

Civil Aeronautics Law : Corrosive substances

HaloKlear BHR-P50

Safety Data Sheet

according to the Hazardous Products Regulation (February 11, 2015)

SECTION 15: Regulatory information

15.1. National regulations

HaloKlear BHR-P50

Canada DSL & NDSL Flags	All substances contained in this product are listed on the Canadian Domestic Substance List (DSL) or are not required to be listed.
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Aluminum chloride hydroxide sulfate (39290-78-3)

Listed on the Canadian DSL (Domestic Substances List)

15.2. International regulations

Aluminum chloride hydroxide sulfate (39290-78-3)

Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)
Listed on the Korean ECL (Existing Chemicals List)
Listed on the United States TSCA (Toxic Substances Control Act) inventory

SECTION 16: Other information

SDS Major/Minor : None
Date of issue : 04/13/2017
Revision date : 09/16/2019
Supersedes : 02/05/2018

Indication of changes:

Modified. Composition/Information on ingredients.

Other information : None.

Full text of H-phrases:

Eye Dam. 1	Serious eye damage/eye irritation Category 1
Met. Corr. 1	Corrosive to metals Category 1
H290	May be corrosive to metals
H318	Causes serious eye damage

Abbreviations and acronyms:

ATE	Acute Toxicity Estimate
BCF	Bioconcentration factor
EC50	Median effective concentration
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
LC50	Median lethal concentration
LD50	Median lethal dose

SDS Canada Dober

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