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## Greg Lewicki And Associates, PLLC

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January 13, 2014

Michael Cunningham  
Division of Reclamation, Mining and Safety  
1313 Sherman Street Room 215  
Denver, CO 80203

**RECEIVED**

JAN 16 2014 ✓

DIVISION OF RECLAMATION  
MINING AND SAFETY

**Gloria Z Mine (Permit M-1984-094)**  
**Technical Revision 2**

Mr. Cunningham,

Please accept the following corrections to the Technical Revision No. 2 for the Gloria Z Mine.

1. Please specify how much Hyperfloc AF307 will be stored at the mine site at any given time.

*A maximum of ten gallons will be stored on site.*

2. Please specify where the Hyperfloc AF307 will be stored at the mine site.

*The Hyperfloc will be stored in a metal trough at the sluice.*

3. Please specify how the Operator will clean up any spills of the flocculent.

*The containment area will hold 110% of the maximum volume of Hyperfloc.*

4. The Applicant has stated that Hyperfloc AF307 is biodegradable. However, the Material Safety Data Sheet states that the flocculent is not readily biodegradable. Please clarify this discrepancy and provide an explanation of the designation 'not readily biodegradable'.

*The narrative has been corrected to indicate that Hyperfloc AF307 is not readily biodegradable. Not readily biodegradable chemicals are not readily biodegradable within the 28 days, but over prolonged exposure periods, with adapted organisms and lower concentrations of the chemical, will exhibit levels of degradation similar to those, which are readily biodegradable.*

Sincerely,

A handwritten signature in black ink that reads "Greg Lewicki". The script is fluid and cursive, with the first letters of each word being capitalized and prominent.

Greg Lewicki, P.E.  
Greg Lewicki and Associates

CC: Mike Pfister



## Greg Lewicki And Associates

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Phone: (303) 346-5196 Fax (303)-346-6934  
E-Mail: [greg@lewicki.biz](mailto:greg@lewicki.biz)

October 25, 2013

Tom Kaldenbach  
Colorado Division of Minerals and Geology  
1313 Sherman Street 2<sup>nd</sup> Floor  
Denver, CO 80203

Dear Tom:

Enclosed is a technical revision to the Gloria Z Pit of Sanborn Sand and Gravel dba/Golden Cross Aggregate. (Permit M-1984-094). This revision pertains to the need to use a flocculent chemical for the gold operation to settle out suspended clays in the recycle water. There still will be no discharge from the site. All pages are added as an addendum to the permit.

Sincerely,

Greg Lewicki, P. E.  
Greg Lewicki and Associates

cc: Mike Pfister  
cc: Gerry Miller

**Gloria Z Pit  
M-1984-094**

**Addendum to Allow Use of Flocculent Chemical  
October 21, 2013**

1. Background Data

Currently, the permittee (Sanborn Sand and Gravel dba/Golden Cross Aggregate) is using Gerry Miller as the operator for the gold operation. The gold operation is using 1000 gallons per minute of water from the approved point of diversion in the mining pit to pump to the sluice operation as shown on the Mine Plan Map, Map C-2. Here the water is used to wash the gravel and remove the gold particles. The gold operator has tried to settle the water in a series of ponds to remove the suspended solids after washing but it will be more efficient to use a flocculent for this purpose. Although there have not been any water discharges from the site, the gold operator has decided that this flocculent is the most efficient way to settle the suspended solids. The following pages describe the flocculent, which is an anionic dry flocculent Hyperfloc AF307 produced by Hychem, Inc. of California. This chemical is not harmful to fish or other animals and is bio-degradable as shown in the attached Material Data Safety Sheets. It is much safer than many other chemicals used for flocculating dirty waters today. The City of Denver is using it in its drinking water plants.

2. System Design

Water from the mine pit is pumped to the sluice. The discharge from the sluice enters the existing Plant Settling Pond where most of the -1/2" material will settle out immediately due to its size. This pond is large and recycle pumps are located on the northern edge of the pond, which will pump the clean water back to the sluice. A 20 to 40 gallon tank (polyurethane or steel) will be used to contain the chemical prior to introduction in the sluice discharge. The first tank will be used for mixing the dry chemical with water at the ratio of 0.08 to 0.2 lbs per ton of dirty water by weight. This range was determined from previous laboratory tests conducted by the Tons per Hour Company on the actual dirty water at the exit of Gold Pond 1 at the Alma Placer just upstream from this site.

Based on this range, the likely use of the 1000 gal/minute x 1 cu.ft./7.48 gal = 133 cubic feet/minute x 64 lbs/cu.ft (dirty water density) = 8,554 lbs/minute dirty water flow or 4.27 tons per minute. Using the ratio of 0.1 lbs chemical per ton of dirty water by weight, this will require 0.427 lbs/minute of flocculent chemical. See enclosed data from Hychem and Tons Per Hour.

This material will be added by a small feeder to the first tank, which will also have a

mixer. This mixed solution will then feed a 100 gallon tank, which will be used for aging. The optimum time for aging is one hour. This concentrated solution will then be fed in a small flexible pipe of approximately 2" to 3" diameter to the outlet of the sluice. The settling time provided by Plant Settling Pond will allow all solids to settle out and the pond will have clean water pumped back to the sluice box. There will be no chemical left in the water after the water is re-pumped back to the sluice. Due to the bio-degradable nature of the chemical, no required lining is needed to ensure that the off-site environment is protected. The chemical is not toxic to animals in dry or wet form. Also, the Plant Settling Pond is now lined with considerable silt (up to 4 feet) from the existing operation.

### 3. Pond Cleanout

Using the laboratory test result of 3.4% solids in the dirty water, this means that, for a total flow of 133 cubic feet/minute, the solids are 4.53 cubic feet per minute. Assuming that the settled solids have 40% water by weight, this means that 6.3 cubic feet/minute of "muck" will build up in the Plant Settling Pond. Much of this material will be allowed to build up in the Pond for reclamation. When necessary, Some of the material will be mucked out and placed in the southern bank of the Plant Infiltration Pond for reclamation. Prior to final placement, water will drain rapidly from the muck as it is placed on the bank along the Plant Settling Pond.

### 3. Pond Lining

Due to the fact that the Plant Settling Pond is lined by approximately 2 to 4 feet thickness of fines from past operation of the sluice, no new lining is needed.

It is again noted that additional safety factors will further ensure that the chemical poses no risk to waters downstream. This is that the chemical Superfloc AF-307 is safe, as supported by the MSDS sheets enclosed as well as the information provided by HyChem.

Shown below is the e-mail from Tons Per Hour showing the results of the laboratory tests of the dirty water from the sluice at the Alma Placer in 2006.

**greg@lewicki.biz**

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**From:** "Charles Schulte" <lphcolorado@msn.com>  
**To:** <greg@lewicki.biz>  
**Sent:** Thursday, July 20, 2006 5:04 PM  
**Attach:** TPH Quote 1.pdf; TPH Quote 2.pdf; floc sys pic 1.jpg; floc sys pic 2.jpg  
**Subject:** Dry Floc System for Alma Sleuth Mine

Greg,

I was good talking to you on the phone yesterday. After we talked, I spoke with Jerry Miller and gave him pricing information on the TPH Dry Flocculent Blending and Metering System for Alma Sleuth Mine. Our price quote is based on the information that I received from Jerry and Zane as summarized below.

- They are moving about 80 yards of material an hour.
- The owner estimates there flow at about 3000 gpm.
- They screen out 1/2" and above. Most of the heavies drop out drop out in the first 50 ft or so after weirs.
- This is followed by 3 small settling ponds then a larger fresh water pond where water from the river is pumped into to replenish and water for washing is pumped out of.
- They want the mud to drop out in the settling ponds after the natural heavies drop out with clean water flowing back into their fresh water pond.

After our meeting I picked up a sample of their slurry. Following is the analysis of that sample.

PH ; 7.71  
Dry solids SpG : 2.75  
Slurry SpG : 1.0227  
% solids : 3.4527

It took 1 ml of 0.1 % AF-307 to settle 4.75 inches/Min with a crystal clear overflow. This dosage converts to 0.1416 pounds/T ( 71 ppm) for clarifier process and 211 ppm for Belt Press dewatering. No coagulant was needed for the clarification

Based on the above information, two quotes are attached. The first is for the TPH Automated Dry Flocculant System and the second is for the Dry System Plus a Self Contained Stainless Steel Building. I am also including two Hychem Documents pertaining to the Dry Flocculant AF-307. The first being the Technical Data Sheet and the second being the Material Safety Data Sheet. Finally I am attaching several pictures of a TPH Dry Flocculant System that is very similar to system being proposed for Alma.

If you have any questions please do not hesitate to contact me.

Best regards,

Charlie Schulte  
Tons Per Hour

## ANIONIC DRY FLOCCULANT

### DESCRIPTION

HYPERFLOC® AF 307 is a high charge, very high molecular weight anionic polyacrylamide flocculant supplied as a granular powder. It is effective over the pH range of 6 -12.

### TYPICAL PROPERTIES

Appearance	White granular powder
Bulk Density	45 – 50 lbs/ft <sup>3</sup>
Viscosity* (0.5% Solution)	1700–1900 cps
pH of 0.5% Solution at 25°C	7.0 ± 1.0

\*Brookfield LVT, 30 rpm at 25°C in deionized water

### APPLICATIONS

HYPERFLOC® AF 307 is used in a broad range of solid-liquid separation processes in water and waste treatment and mineral processing applications for settling, thickening and dewatering. It can be used alone or in conjunction with alum or ferric salts, polyaluminum chloride, polyamines and polyDADMACs.

Depending on the application, the following dosage levels are recommended:

#### Water & Waste Treatment:

Settling/Clarification	0.2 to 20 ppm
Thickening/Dewatering	0.5 to 10 lbs/ton

#### Minerals Processing:

Settling/Thickening	0.005 to 0.1 lbs/ton
Dewatering	0.1 to 2 lbs/ton

### PREPARATION & FEEDING

Solutions of HYPERFLOC® AF 307 are prepared by dissolving the powder in water below 140°F (60°C) using either an eductor funnel or through an automatic polymer feed unit to produce a solution of 0.5% concentration. Aging for 30 - 60 minutes is recommended, followed by in-line dilution to 0.1% or less. Avoid excessive mixing as this can lead to polymer degradation. Use of gear or positive displacement pumps is recommended.

### STORAGE & HANDLING

HYPERFLOC® AF 307 should be stored under cool and dry conditions. Shelf life is 12 months. Spills are slippery when wet. Spills should be scooped up with an absorbent material and then washed down with a bleach solution. Storage of solutions in stainless steel, plastic or epoxy lined tanks is recommended. Iron, aluminum or copper are to be avoided in both storage and feed equipment.

Toxicity is low, but normal precautionary clothing should be worn when handling this material. For additional information, see relevant Material Safety Data Sheet.

### SHIPPING

HYPERFLOC® AF 307 is shipped in multi-walled poly lined paper bags, 50 pounds net weight; in bulk bags, 1500 pounds net weight; or in bulk.



**MATERIAL SAFETY  
DATA SHEET**

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**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

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**Product:** HYPERFLOC® AF 307

**Supplier:** HYCHEM, INC.  
10014 N. Dale Mabry Highway, Suite 213  
Tampa, FL 33618

**Current Revision Date:** 8/18/03

**Last Revision Date:** 5/18/00

**Emergency Telephone Numbers:** (800) 327-2998 - Hychem, Inc. (weekdays)  
(800) 424-9300 - Chemtrec (24 Hours)

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**2. COMPOSITION/INFORMATION ON INGREDIENTS**

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**Chemical Family:** Anionic acrylamide copolymer powder.

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**3. HAZARDOUS IDENTIFICATION**

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Aqueous solutions or powders that become wet render surfaces extremely slippery

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**4. FIRST AID MEASURES**

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**Inhalation:** Move to fresh air.

**Skin Contact:** Wash with water and soap as a precaution. In case of skin irritation, consult a physician.

**Eye Contact:** Rinse thoroughly with plenty of water. In case of persistent eye irritation, consult a physician.

**Ingestion:** The product is not considered toxic based on studies on laboratory animals.

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The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.



Product Name: HYPERFLOC® AF 307

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## 5. FIRE-FIGHTING MEASURES

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- Suitable Extinguishing Media:** Water, water spray, foam, dry powder, carbon dioxide (CO<sub>2</sub>).
- Special Fire-Fighting Precautions:** Aqueous solutions or powders that become wet render surfaces extremely slippery.
- Special Protective Equipment for Firefighters:** No special protective equipment required.

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## 6. ACCIDENTAL RELEASE MEASURES

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- Personal Precautions:** No special precautions required.
- Environmental Precautions:** Do not contaminate water.
- Methods for Cleaning Up:** Do not flush with water. Clean up promptly by scoop or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

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## 7. HANDLING AND STORAGE

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- Handling:** Avoid contact with skin and eyes. Do not breathe dust. Natural ventilation is adequate in absence of dusts.
- Storage:** Keep in a dry, cool place (0 - 35°C).

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## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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- Engineering Controls:** Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

### Personal Protection Equipment

- **Respiratory Protection:** Dust safety masks are recommended where concentration of total dust is more than 10 mg/m<sup>3</sup>.
- **Hand Protection:** Rubber gloves
- **Eye Protection:** Safety glasses with side shields. Do not wear contact lenses.
- **Skin and Body Protection:** Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

- Hygiene Measures:** Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

**Product Name:** HYPERFLOC® AF 307

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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<b>Form:</b>	Granular solid
<b>Color:</b>	White
<b>Odor:</b>	None
<b>pH:</b>	4 - 9 @ 5 g/l
<b>Melting Point (°C):</b>	Not applicable
<b>Flash Point (°C):</b>	Not applicable
<b>Autoignition Point (°C):</b>	Not applicable
<b>Vapor Pressure (mm Hg):</b>	Not applicable
<b>Bulk Density:</b>	See Technical Bulletin
<b>Water Solubility:</b>	See Technical Bulletin
<b>Viscosity (mPa s):</b>	See Technical Bulletin

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## 10. STABILITY AND REACTIVITY

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<b>Stability:</b>	Product is stable, no hazardous polymerization will occur.
<b>Materials to Avoid:</b>	Oxidizing agents may cause exothermic reactions.
<b>Hazardous Decomposition Products:</b>	Thermal decomposition may produce: carbon oxides and nitrogen oxides (NOx).

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## 11. TOXICOLOGICAL INFORMATION

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### Acute toxicity:

- **Oral:** LD50/oral/rat > 5000 mg/kg
- **Dermal:** The results of testing on rabbits showed this material to be non-toxic even at high dose levels.
- **Inhalation:** The product is not expected to be toxic by inhalation.

### Irritation

- **Skin** The results of testing on rabbits showed this material to be non-irritating to the skin.
- **Eyes:** Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctivae.

**Sensitization:** The results of testing on guinea pigs showed this material to be non-sensitizing.

**Chronic Toxicity:** A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

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## 12. ECOLOGICAL INFORMATION

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- **Fish:** LC50/Danio rerio/96 hours > 100 mg/l (OECD 203)  
(Based on results obtained from tests of analogous products)
- **Algae:** IC50/Clorella vulgaris/72 hours > 100 mg/l (OECD 201)  
(Based on results obtained from tests of analogous products)
- **Daphnia:** EC50/Daphnia magna/48 hr > 100 mg/L (OECD 202)  
(Based on results obtained from tests of analogous products)

**Bioaccumulation:** The product is not expected to bioaccumulate.

**Persistence / Degradability:** Not readily biodegradable.

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## 13. DISPOSAL CONSIDERATIONS

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**Waste from residues / unused products:** In accordance with federal, state, and local regulations

**Contaminated Packaging:** Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

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## 14. TRANSPORT INFORMATION

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Not regulated by the Department of Transportation

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## 15. REGULATORY INFORMATION

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All components of this product are on TSCA and DSL inventories.

**RCRA status:** Not a hazardous waste.

**Hazardous Waste Number:** Not applicable.

**Reportable Quantity (40 CFR 302):** Not applicable.

**Threshold Planning Quantity (40 CFR 355):** Not applicable.

**California Proposition 65 Information:** The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986: This product contains a chemical(s) known to the State of California to cause cancer: residual acrylamide.

HMIS & NFPA Ratings:	HMIS	NFPA
Health:	1	1
Flammability:	1	1
Reactivity:	0	0

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## 16. OTHER INFORMATION

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**Person to Contact:** A. Sands