August 6, 2013

Lisa M. Brines, Ph.D.
National List Manager
USDA/AMS/NOP
1400 Independence Ave. SW
Room 2648-So., Ag Stop 0268
Washington, DC 20250-0268

Dear Dr. Brines:

Please find enclosed with this cover letter a petition to add aluminum sulfate commonly referred to as alum to the National List at section 205.603 (synthetic substances allowed for use in organic livestock production) based on its use as a poultry, turkey and livestock bedding (litter) amendment. Litter treated with aluminum sulfate is also used as a natural land applied fertilizer. Alum treated litter is approved by EPA/NRCS as part of their Environmental Quality Incentive Program (EQUIP), where NRCS pays an incentive in an attempt to encourage farmers to use alum based litter amendments. The purpose of the EQUIP program is to use aluminum sulfate to bind soluble phosphorus in litter preventing runoff of soluble phosphorus into ground water and waterways, which in turn prevents algae blooms, reducing the threat of algae related mycotoxin exposure to livestock and humans. With this in mind, it is also our wish to petition the NOP Board to add aluminum sulfate to the National List section 205.601 (synthetic substances allowed for use in organic crop production).

If you require additional information or clarification, please do not hesitate to call or email me.

Sincerely,

Pat Welch, Ph.D.
Aluminum Sulfate as a Poultry Litter Amendment for Ammonia Control and Improved Nutrient Content of Poultry Litter

Item A – Petition for inclusion of aluminum sulfate, commonly referred to as alum, at sections 205.601 (Synthetic substances allowed for use in organic crop production) and 205.603 (Synthetic substances allowed for use in organic livestock production).

At the present time there are no aluminum sulfate litter amendments approved for organic use in poultry, turkey and livestock bedding. Justification for permitting the use of aluminum sulfate is that it effectively reduces ammonia in poultry and livestock dwellings. It is well established that exposure of poultry and livestock to volatilated ammonia has a significant detrimental effects on animal health and well-being, livability and live performance. Volatilated ammonia exposure is also a health risk to caretakers. Aluminum sulfate has been shown to be a safe and effective economical way to control ammonia in poultry and livestock dwellings.

Item B – Information Regarding Aluminum Sulfate

1. The chemical name of the substance being petitioned is aluminum sulfate commonly referred to as alum.

   Aluminum sulfate is marketed as a dry granule, a liquid and an acidified liquid:

   - Al*Clear® Poultry Grade Alum … (dry alum)
   - Al*Clear® Liquid Alum
   - Al*Clear® A7 … (acidified liquid alum)

2. This petition is being filed on behalf of Chemtrade Logistics US, LLC; 90 East Halsey Road, Parsippany, NJ 07054 … Phone: (601) 319-5944. Email: pwelch@chemtradelogistics.com, pwelch5944@comcast.net.

3. Intended or current uses of aluminum sulfate:

   a. Ammonia Control: The intended and current use of aluminum sulfate is to be used as a poultry and livestock bedding amendment. Aluminum sulfate has been in poultry, turkeys and livestock for decades to safely and effectively protect animals and caretakers from volatilated ammonia that is generated from poultry and livestock manure, which accumulates in poultry and livestock bedding. For the sake of clarification the term litter will be used synonymously with bedding and mixtures of used bedding and manure. Volatilated ammonia that occurs from the natural decomposition process in litter is the result of bacterial enzyme hydrolysis of uric acid to urea which is further hydrolyzed to ammonia (NH₃). Ammonia has been shown to be detrimental to animal health, livability, well-being and overall live performance. Aluminum sulfate reacts with ammonia by donating acid ions, converting ammonia (NH₃) to ammonium (NH₄⁺), a highly reactive ion that bonds with nitrates, phosphates and sulfates forming

   ...
stabile non-volatile ammonium salts that are retained in the litter, which improve the litter’s nutrient value as a natural fertilizer.

b. **Aid to the Environment:** Alum also has the unique ability to bind soluble phosphorus which is the basis for its use in the EPA/NRCS Environmental Quality Incentive Program. NRCS pays poultry farmers a cost-share incentive to use aluminum sulfate containing products (acidified liquid aluminum sulfate and dry liquid aluminum sulfate). When phosphorus is bound by aluminum sulfate, soluble phosphorus no longer is an environmental threat to ground water, lakes, streams and waterways, preventing phosphorus related eutrophication that leads to algae bloom.

Some algae species are toxigenic and this is the reason EPA provides incentives and financial compensation for use of aluminum sulfate as a litter amendment. It should also be noted that most of the water in the United States is treated with aluminum sulfate, as a clarifying step in the reuse and water purification process.

c. **As a Natural Fertilizer:** By retaining nitrogen in the litter through the conversion of NH$_3$ to NH$_4^+$, and by binding soluble phosphorus, the fertilizer nutrient value of alum treated litter is improved. When land applied, litter that has been treated with alum contains bound soluble phosphorus that is utilized by plants on an as need basis. Plants have the ability to secrete acid from their roots to break the aluminum phosphate bonds resolubilize phosphorus, making the essential nutrient available to plants. Aluminum sulfate in water treatment is classified as a flocculent and its function is to precipitate silica, minerals and organic material out of suspension. It is incorporated as one of the initial steps in municipal water purification. Aluminum sulfate based products have also been used for decades in municipal water treatment and lake restorations in the US and Canada. Over 50% of the municipal water in the US is treated with Chemtrade aluminum sulfate, the sponsor for this petition and aluminum sulfate is the most widely used water clarification chemical in the world.

d. **Other Uses and Facts Regarding Aluminum Sulfate**

i. **Food Additives:** Alum (aluminum sulfate) is an acid salt and is used to adjust acidity of foods. It is used in pickling, leavening agent in baked goods, and in cheese processing.

ii. **Personal Care Products:** Used in styptic pencils, treatment of cold sores, and some veterinary treatment procedures as an acidifying astringent and desiccant.

iii. **Soil Amendment:** Aluminum sulfate is used as a direct source of acidity in the remediation of alkaline soils and to tie up phosphorus and improve water holding capacity of the soil.
iv. Aluminum is the third most common element in the earth’s crust and the most abundant metal.

v. Soils are from 1-15% aluminum, with the US average approximately 7%.

vi. Solid dry alum (aluminum sulfate) is 9.2% aluminum, liquid alum is 4.2% aluminum and liquid 7% acid alum is 3.25% aluminum.

4. List of crops, livestock and handling activities for which substance will be used:

   a. Aluminum sulfate treated litter is used as a land applied natural fertilizer in all areas of plant agriculture, e.g., forages, row crops, and forest management.

   b. Poultry and turkeys are the primary production animal class where aluminum sulfate is used to control ammonia and to sanitize bedding, but it has been used to control ammonia in bedding used with virtually all confined animal species.

   c. The rate is dictated by litter conditions, weather, type of housing, ventilation equipment and general husbandry expertise. Under less desirable conditions application rates increase. Likewise under desirable conditions application rates can be reduced to lower levels.

   d. Application Techniques: Dry aluminum sulfate is applied using drop spreaders, and centrifugal (slinger) spreaders, varying in size and complexity depending on application demand. Liquid aluminum sulfate is applied using a vehicle designed with a storage tanks, a pump and a PVC spray wand equipped with stainless steel nozzles. Typical dry product application rates range from 50 to 200 lbs. /1000 ft². Typical liquid product application rates range from 20 to 55 gal/ 1000 ft². Dry aluminum sulfate is either applied by the poultry farmer or by custom applicators. Liquid aluminum sulfate and acidified aluminum sulfate products are applied by custom applicators.

5. Source and Manufacturing: Aluminum sulfate is manufactured by reacting bauxite ore or hydrated aluminum $\text{Al(OH)}_3$ or $\text{Al}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ with sulfuric acid and water. Water is added to dry aluminum sulfate to produce liquid alum and acidified liquid alum is fortified with 7% sulfuric acid.
6. **Availability of Previous Reviews:** No previous reviews by any State have been conducted; however, USDS-ARS has conducted considerable research on aluminum sulfate and has numerous publications which are listed in the reference list in this petition, where they looked at a variety of parameters including reducing volatilized ammonia, the effects of alum treated litter on forage yields and reducing ammonia emissions from broiler houses. David Carter with Crystal Springs Consulting, a private consultant, was hired to do a thorough review of aluminum sulfate products and programs to determine the feasibility of acceptability of aluminum sulfate products as an approved synthetic compound for organic use. His conclusion was that based on the chemistry of aluminum sulfate there should be no reasonable objection in its use as a litter amendment to control ammonia and as a natural fertilizer when treated litter is land applied.

7. **Information regarding EPA, FDA and State regulatory authority registration numbers.**
   
   a. **California Proposition 65** – This product does not contain any Proposition 65 chemicals.
   

8. **CAS Number:** 10043-013

9. **Physical properties, chemical mode of action, interaction with other substances, toxicity and environmental persistence:**
a. Physical Properties

b. As aluminum sulfate is hydrolyzed by moisture in the litter, aluminum sulfate produces acid ions (H\(^+\)) which react with ammonia (NH\(_3\)) for form ammonium (NH\(_4^+\)) an ion that readily bonds with soluble phosphorus. This is the basis for EPA/NRCS' Environmental Quality Improvement Program where NRCS pays poultry farmers to use alum based litter amendments because of the ability of aluminum sulfate to bind soluble phosphorus preventing runoff of soluble phosphorus into groundwater, streams and lakes which can result in algae blooms. Certain species of algae produce toxins that are toxic to animals and humans.

c. Possibility of hazardous reactions as applied will not occur. RE: MSDS.

d. Acute toxicity for mice is 6.21 grams/kg; rats 1.92 grams/kg. Long term studies conducted by USDA have shown no adverse effects to the environment when alum treated litter was land applied, and plant yields from tall fescue test plots were equal to or greater than test plots treated with non-alum treated litter or ammonium nitrate fertilizer. References...
10. MSDS are available (below) but a substance report from the National Institute of Environmental Health Studies has not been conducted. Also included is an assessment conducted by Dave Carter with Crystal Springs Consulting, Westminster, CO; an independent consultant retained by General Chemical Corporation to evaluate the feasibility of acquiring organic certification.
Material Safety Data Sheet

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Al+Clear Poultry Grade Alum
Other/Generic Names: Aluminum Sulfate
Recommended Use: Agricultural
Manufacturer: General Chemical, LLC
90 East Halsey Road
Parsippany, NJ 07054

Further information
FOR MORE INFORMATION CALL:
Customer Service US ONLY: 800-631-8050
(Monday-Friday, 9:00am - 4:30pm)
Customer Service CANADA ONLY: 866-543-3896
(Monday-Friday, 9:00am - 4:30pm)

Emergency Telephone Number
IN CASE OF EMERGENCY CALL CHEMTREC: 800-424-9300 US ONLY
24 Hours/Day, 7 Days/Week) CANADA ONLY CALL CANUTEC: 613-396-6666
(24 Hours/Day, 7 Days/Week)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: White or creamy white granules or powder with no odor. Can irritate the skin and eyes. Not flammable, but may release toxic vapors if decomposed in a fire.

OSHA Regulatory Status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects:
GC-2081 Al+Clear Poultry Grade Alum

Skin: May cause skin irritation, especially under repeated or prolonged contact, or when moisture is present.

Eyes: May irritate or burn eyes. Similarly for the aqueous solution.

Inhalation: Dust or mist inhalation at levels above the TLV may cause irritation to the respiratory tract.

Ingestion: May irritate the gastrointestinal tract.

Delayed Effects: None known.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td>10043-01-3</td>
<td>100</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

**Eye Contact:** Immediately flush eyes with water for at least 15 minutes. Get medical attention if irritation persists.

**Skin Contact:** Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes. If irritation develops, get medical attention.

**Inhalation:** Remove victim immediately to fresh air.

**Ingestion:** If conscious, immediately give large quantity of water or milk. If not already vomiting, induce vomiting by touching finger to back of throat. Get medical attention.

**Notes to Physician** Treat symptomatically.

### 5. FIRE-FIGHTING MEASURES

**Flammable Properties**

Flash Point: Not flammable
FLASH POINT METHOD: Not applicable
Autoignition Temperature: Not applicable
UPPER FLAME LIMIT (volume % in air): Not applicable
LOWER FLAME LIMIT (volume % in air): Not applicable
FLAME PROPAGATION RATE (solids): Not applicable
OSHA FLAMMABILITY CLASS: Not applicable

**Suitable Extinguishing Media**

Product is not flammable. Use any extinguishing agent suitable for surrounding fire.

**Unsuitable Extinguishing Media**

No information available.

**Explosion Limits**

**Hazardous Combustion Products**

No information available

Impact sensitivity

Sensitivity to static discharge

No information available

No information available

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MSDS Number: GC-2081
6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE:
Shovel up dry chemical and place in empty container and cover. Spray residue with plenty of water. Neutralize residue with alkali such as soda ash, lime or limestone. Adequate ventilation is required for soda ash or limestone due to release of CO2 gas. Collect liquid and/or residue and dispose of in accordance with applicable regulations.

7. HANDLING AND STORAGE
Handling
Avoid contact with skin, eyes and clothing. Do not breathe product mists.

Storage
Store in a cool, dry place.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>Ontario TWAEV</th>
<th>Mexico OEL (TWA)</th>
<th>NIOSH IDLH</th>
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<tbody>
<tr>
<td>aluminum sulfate</td>
<td>10043-01-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Engineering Measures
Use local exhaust if dusty or misty conditions prevail.

Personal Protective Equipment
Eye/face Protection
Wear chemical safety goggles. Do not wear contact lenses.

Skin Protection
Wear gloves and appropriate industrial work clothing including long sleeved shirts and trousers for routine product handling. If prolonged or repeated contact is anticipated, all clothing should be impervious to liquid.

Respiratory Protection
A NIOSH approved dust or mist respirator should be worn in areas where product dusts or mists are present.

General Hygiene Considerations
Eyewash and safety showers are recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value or Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
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</tr>
<tr>
<td>Color</td>
<td>White or creamy white</td>
</tr>
<tr>
<td>Chemical Formula</td>
<td>Al2(SO4)3*14H2O</td>
</tr>
<tr>
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<tr>
<td>Physical State</td>
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<tr>
<td>pH</td>
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<td>Flash Point:</td>
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<tr>
<td>Autoignition Temperature</td>
<td>Not applicable</td>
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<tr>
<td>Boiling Point/Range</td>
<td>Not applicable</td>
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<tr>
<td>Melting Point/Range</td>
<td>No information available</td>
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<tr>
<td>Flammability Limits in Air</td>
<td>No information available</td>
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<tr>
<td>Explosive Properties</td>
<td>No information available</td>
</tr>
<tr>
<td>Oxidizing Properties</td>
<td>No information available</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Chemical Stability
Normally stable.

Conditions to Avoid
Avoid temperatures above 760°C, as this will yield toxic and corrosive gases.

Incompatible Products
Alkalis and water reactive materials such as oleum; causes exothermic reactions.

Hazardous Decomposition Products
At elevated temperatures, sulfur oxides may be formed. These are toxic and corrosive and are oxidizers. Sulfur trioxide is also a fire hazard. The loss of these gases leaves a caustic residue.

Possibility of Hazardous Reactions
Will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
LD₅₀ Oral: aluminum sulfate component:
(oral-mouse): 6207 mg/kg
(oral-rat): 1330 mg/kg

Component Information

Irritation
No information available

Corrosivity
No information available.

Sensitization
No information available.

Chronic Toxicity

Carcinogenicity
There are no known carcinogenic chemicals in this product.

Mutagenic Effects
No information available.

Reproductive Effects
No information available.

Developmental Effects
No information available.

Teratogenicity
No information available.
12. ECOLOGICAL INFORMATION

Ecotoxicity
Contains no substances known to be hazardous to the environment or not degradable in waste water treatment plants.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
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<tr>
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<td></td>
<td>LC50= 100 mg/L goldfish 96 h</td>
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</tr>
</tbody>
</table>

Persistence and Degradability
No information available.

Bioaccumulation
No information available.

Mobility in Environmental Media
No information available.

Other adverse effects
- aluminum sulfate component:
  - 14 ppm/36 hr./fundulus/fatal/fresh water;
  - 240 ppm/48 hr./mosquito fish/TLm/water type not specified;
  - TLM Mosquito fish, 235 ppm, 96 hours;
  - LC50 Largemouth bass, 250 ppm, 96 hours

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods
If permitted by regulations, material may be dissolved in water and neutralized with alkali. Neutralized waste may have to be disposed of by an approved contractor.

Contaminated Packaging
Empty containers should be taken for local recycling, recovery or waste disposal.

US EPA Waste Number
No information available

<table>
<thead>
<tr>
<th>Component</th>
<th>RCRA</th>
<th>RCRA - Basis for Listing</th>
<th>RCRA - D Series Wastes</th>
<th>RCRA - U Series Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td></td>
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<tr>
<td>- 10443-01-3</td>
<td></td>
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</table>

14. TRANSPORT INFORMATION

DOT
- Proper Shipping Name: Regulated
  - Environmentally hazardous substances, solid, n.o.s. (contains aluminum sulfate) (only if greater than 8700 lbs. in one package)
- Hazard Class: 9
- UN-No: UN3077

TDG
- Hazard Class: Regulated
- UN-No: UN3077

15. REGULATORY INFORMATION

International Inventories
- Complies

TSCA
- Complies
GC-2081 Al+Clear Poultry Grade Alum

Complies
Complies
Does not Comply
Complies
Complies
Complies
Complies

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and and Title 40n of the Code of Federal Regulations, Part 372.

SARA 311/312 Hazardous Categorization

<table>
<thead>
<tr>
<th>Chronic Health Hazard</th>
<th>Acute Health Hazard</th>
<th>Fire Hazard</th>
<th>Sudden Release of Pressure Hazard</th>
<th>Reactive Hazard</th>
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<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Clean Water Act

CERCLA

U.S. State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals.

State Right-to-Know

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
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<td>aluminum sulfate</td>
<td>X</td>
<td>X</td>
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</tbody>
</table>

Other International Regulations

Mexico - Grade
No information available

Canada

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Hazard Class
D2B Toxic materials

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MSDS Number: GC-2081
### 16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>Prepared By</th>
<th>Kaci Rosario, Product Safety Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation Date</td>
<td>August 22, 2008</td>
</tr>
<tr>
<td>Revision Date</td>
<td></td>
</tr>
<tr>
<td>Revision Summary</td>
<td>Transfer to new Werca format</td>
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**Disclaimer**

All information, statements, data, advice and/or recommendations, including, without limitation, those relating to storage, loading/unloading, piping and transportation (collectively referred to herein as "Information") are believed to be accurate and reliable. However, no representation or warranty, express or implied, is made as to its completeness, accuracy, fitness or a particular purpose or any other matter, including, without limitation, that the practice or application of any such information is free of patent infringement or other intellectual property misappropriation. General Chemical, LLC, is not engaged in the business of providing technical, operational, engineering or safety information for a fee, and therefore, any such information provided herein has been furnished as an accommodation and without charge. All information provided herein is intended for use by persons having requisite knowledge, skill and experience in the chemical industry. General Chemical, LLC, shall not be responsible or liable for the use, application or implementation of the information, provided herein, and all such information is to be used at the risk, and in the sole judgement and discretion, of such persons, their employees, advisors and agents.

**End of MSDS**
MATERIAL SAFETY DATA SHEET
Liquid Al+Clear®

4. FIRST AID MEASURES

SKIN: Flush with plenty of water, removing contaminated clothing. If irritation develops, get medical attention.

EYES: Immediately flush with water, continuing for at least 15 minutes. If irritation persists, get medical attention.

INHALATION: Promptly remove to fresh air.

INGESTION: If conscious, immediately give large quantity of water or milk. If not already vomiting, induce vomiting by touching finger to back of throat. Get immediate medical assistance.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:
Not flammable
FLASH POINT METHOD:
Not applicable
AUTOIGNITION TEMPERATURE:
Not applicable
UPPER FLAME LIMIT (volume % in air):
Not applicable
LOWER FLAME LIMIT (volume % in air):
Not applicable
FLAME PROPAGATION RATE (solids):
Not applicable
OSHA FLAMMABILITY CLASS:
Not applicable

EXTINGUISHING MEDIA:
Product is not flammable. Use any extinguishing agent suitable for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
None.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:
Use self-contained breathing apparatus. Use water spray to keep containers cool.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)
Dilute small spills or leaks cautiously with plenty of water. Neutralize any further residue with alkali such as soda ash, lime or limestone. Adequate ventilation is required if soda ash or limestone is used, because of the consequent release of carbon dioxide gas. Large spills: dike up with soda ash and neutralize as above. Collect liquid and/or residue and dispose of in accordance with applicable regulations.
Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)
Avoid contact with skin, eyes and clothing. Do not breathe product mists.

MSDS Number: GC-8101
Current Issue Date: June, 2001
1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Liquid Al+Clear®
OTHER/GENERIC NAMES: Mixture of Aluminum Sulfate in water.
PRODUCT USE: Agricultural.
MANUFACTURER: General Chemical Corporation
90 East Halsey Road
Parsippany, NJ 07054

FOR MORE INFORMATION CALL: 973-515-1840
IN CASE OF EMERGENCY CALL: 800-631-8050
(Monday-Friday, 9:00am-4:30pm)
(24 Hours/Day, 7 Days/Week)

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>CAS NUMBER</th>
<th>WEIGHT %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum sulfate</td>
<td>10043-01-3</td>
<td>&lt;50</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>Balance</td>
</tr>
</tbody>
</table>

Trace impurities and additional material names not listed above may also appear in Section 15 towards the end of the MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: This product is considered hazardous under the OSHA Hazard Communication Standard.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A clear, odorless light green or amber liquid. Can irritate the skin and eyes. Not flammable, but may release toxic vapors if decomposed in a fire.

POTENTIAL HEALTH HAZARDS

SKIN: May cause skin irritation.

EYES: May strongly irritate or burn the eyes.

INHALATION: Product mists may cause irritation to the respiratory tract.

INGESTION: May irritate the gastrointestinal tract. Concentrated solutions may cause burns to the digestive tract.

DELAYED EFFECTS: None known.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>NTP STATUS</th>
<th>IARC STATUS</th>
<th>OSHA LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ingredients listed in this section.</td>
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<td></td>
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</table>

MSDS Number: GC-6101
Current Issue Date: June, 2001
STORAGE RECOMMENDATIONS:
Store in a cool area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:
Use local exhaust if misting is anticipated.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: Wear impervious (e.g. rubber) gloves and apron and full work clothing including long sleeved shirts, trousers and boots. Full impervious clothing is recommended if prolonged product contact is anticipated.

EYE PROTECTION: Wear chemical safety goggles. Do not wear contact lenses.

RESPIRATORY PROTECTION: A NIOSH approved mist respirator should be worn in areas where product mists are present.

ADDITIONAL RECOMMENDATIONS: The presence of an eyewash and safety shower is recommended.

EXPOSURE GUIDELINES

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>OTHER LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum sulfate (as Aluminum)</td>
<td>2 mg/m³</td>
<td>2 mg/m³</td>
<td>None</td>
</tr>
</tbody>
</table>

1 = Limit established by General Chemical Corporation.
2 = Workplace Environmental Exposure Level (AIHA).
3 = Biological Exposure Index (ACGIH).

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
None

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, light green or amber liquid.
PHYSICAL STATE: Liquid
MOLECULAR WEIGHT: Mixture
CHEMICAL FORMULA: Mixture
ODOR: Odorless
SPECIFIC GRAVITY (water = 1.0): 1.335
SOLUBILITY IN WATER (weight %): 100
pH: ~3.5 (1% solution)
BOILING POINT: 101°C
MELTING POINT: -16°C
VAPOR PRESSURE: Not applicable
VAPOR DENSITY (air = 1.0): Not applicable

MSDS Number: GC-6101
Current Issue Date: June, 2001
MATERIAL SAFETY DATA SHEET
Liquid Al+Clear®

EVAPORATION RATE: Not determined
% VOLATILES: ~50
FLASH POINT: Not flammable
(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

NORMALLY STABLE? (CONDITIONS TO AVOID):
Normally stable. If evaporated to dryness, residue should not be exposed to elevated temperatures (above 760°C), as this will yield toxic and corrosive gases.

INCOMPATIBILITIES:
Alkalis and water reactive materials such as oleum; causes exothermic reactions.

HAZARDOUS DECOMPOSITION PRODUCTS:
At elevated temperatures, sulfur oxides may be formed. These are toxic and corrosive and are oxidizers. Sulfur trioxide is also a fire hazard. The loss of these gases leaves a caustic residue.

HAZARDOUS POLYMERIZATION:
Will not occur

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:
Aluminum sulfate:
LD₅₀ (oral, mouse): 6207 mg/kg
LD₅₀ (oral, rat): 1930 mg/kg

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
Data not available

OTHER DATA:
None

12. ECOLOGICAL INFORMATION

Aluminum sulfate:
14 ppm/36 hr/ fundulus/fatal/fresh water.
240 ppm/48 hr/mosquito fish/TLₑₐ/water type not specified.
TLₑₐ Mosquito fish, 235 ppm, 96 hours
LC₅₀ Largemouth bass, 250 ppm, 96 hours

MSDS Number: GC-6101
Current Issue Date: June, 2001

Page 4 of 6
13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes
If yes, the RCRA ID number is: D002 (corrosive)

OTHER DISPOSAL CONSIDERATIONS:
If permitted by regulations, material may be neutralized with alkali.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: 8
US DOT ID NUMBER: UN3264
PROPER SHIPPING NAME: Corrosive liquid, acidic, inorganic, N.O.S. (contains aluminum sulfate)

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: All ingredients listed on the TSCA Inventory
OTHER TSCA ISSUES: None

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>SARA/CERCLA RQ (lb)</th>
<th>SARA EHS TPQ (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum sulfate</td>
<td>5000</td>
<td>None</td>
</tr>
</tbody>
</table>

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ingredients listed in this section.</td>
<td></td>
</tr>
</tbody>
</table>

MSDS Number: GC-8101
Current Issue Date: June, 2001
MATERIAL SAFETY DATA SHEET
Liquid Al+Clear®

STATE RIGHT-TO-KNOW
In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>WEIGHT %</th>
<th>COMMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>None listed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ADDITIONAL REGULATORY INFORMATION:
None listed

WHMIS CLASSIFICATION (CANADA):
E (corrosive based upon transportation classification), D2B.
Classified in accordance with WHMIS Controlled Product regulations.

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:
All ingredients listed on Canadian DSL.

16. OTHER INFORMATION

CURRENT ISSUE DATE: June, 2001
PREVIOUS ISSUE DATE: Not applicable

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Not applicable - new product

OTHER INFORMATION: Not for Food or Drug Use.
Material Safety Data Sheet

Preparation Date: August 22, 2008
Revision Number: 0

Product Name: Al+Clear® A7

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: Al+Clear® A7
Other/Generic Names: None.
Recommended Use: Agricultural
Manufacturer: General Chemical, LLC
90 East Halsey Road
Parsippany, NJ 07054

Further information
FOR MORE INFORMATION CALL:
Customer Service US ONLY: 800-631-8050
(Monday-Friday, 9:00am - 4:30pm)
Customer Service CANADA ONLY: 866-543-3896
(Monday-Friday, 9:00am - 4:30pm)

Emergency Telephone Number
IN CASE OF EMERGENCY CALL CHEMTREC: 800-424-9300 US ONLY
24 Hours/Day, 7 Days/Week) CANADA ONLY CALL CANUTEC: 613-996-6666
(24 Hours/Day, 7 Days/Week)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: A clear, light green or amber liquid with a negligible degree of odor. Can cause severe skin and eye irritation. Not flammable, but may release toxic vapors if decomposed in a fire.

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential Health Effects
Skin: May cause severe skin irritation.
Eyes: May irritate or burn eyes.
Inhalation: Product mists may cause irritation to the respiratory tract.
Ingestion: May irritate or burn the gastrointestinal tract.
Delayed Effects: None known.

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td>10043-01-3</td>
<td>&gt;45</td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>7664-93-9</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Water</td>
<td>7732-18-5</td>
<td>&gt;45</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

**Eye Contact:** Immediately flush eyes with water for at least 15 minutes. Get immediate medical assistance.

**Skin Contact:** Flush with plenty of water, removing contaminated clothing. If irritation develops, get medical attention.

**Inhalation:** Remove victim immediately to fresh air.

**Ingestion:** If conscious, immediately give large quantity of water or milk. Do not induce vomiting. Get medical attention immediately.

**Notes to Physician** Treat symptomatically.

### 5. FIRE-FIGHTING MEASURES

**Flammable Properties**

- **Flash Point:** Not flammable
- **FLASH POINT METHOD:** Not applicable
- **Autoignition Temperature:** Not applicable
- **UPPER FLAME LIMIT (volume % in air):** Not applicable
- **LOWER FLAME LIMIT (volume % in air):** Not applicable
- **FLAME PROPAGATION RATE (solids):** Not applicable
- **OSHA FLAMMABILITY CLASS:** Not applicable

**Suitable Extinguishing Media**
Product is not flammable. Use any extinguishing agent suitable for surrounding fire.

**Unsuitable Extinguishing Media**
No information available.

**Explosion Limits**
No information available.

**Hazardous Combustion Products**
No information available

**Impact sensitivity**
No information available

**Sensitivity to static discharge**
No information available
Specific Hazards Arising from the Chemical
Keep product and empty container away from heat and sources of ignition.

Protective Equipment and Precautions for Firefighters
Use self-contained breathing apparatus. Use water spray to keep containers cool.

NFPA  Health 2  Flammability 0  Instability 1

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See Section 8 for recommended personal protective equipment.) Dilute small spills or leaks cautiously with plenty of water. Neutralize any further residue with alkali such as soda ash, lime or limestone. Adequate ventilation is required if soda ash or limestone is used, because of the consequent release of carbon dioxide gas. Large spills: dike up with soda ash and neutralize as above. Collect liquid and/or residue and dispose of in accordance with applicable regulations.

7. HANDLING AND STORAGE

Handling
Avoid contact with skin, eyes and clothing. Do not breathe product mists.

Storage
Store in a cool area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>Ontario TWA EV</th>
<th>Mexico OEL (TWA)</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td></td>
<td></td>
<td></td>
<td>TWA: 2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>10043-01-3</td>
<td></td>
<td></td>
<td></td>
<td>TWA: 2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>15 mg/m³</td>
</tr>
<tr>
<td>7664-93-9</td>
<td></td>
<td></td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td></td>
</tr>
<tr>
<td>7732-18-5</td>
<td></td>
<td></td>
<td></td>
<td>TWA: 1 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

Engineering Measures
Use local exhaust if misting is anticipated.

Personal Protective Equipment

Eye Protection
Wear chemical safety goggles. Do not wear contact lenses.

Skin Protection
Wear impervious (e.g. rubber) gloves and apron and full work clothing including long sleeved shirts, trousers and boots. Full impervious clothing is recommended if prolonged product contact is anticipated.

Respiratory Protection
A NIOSH approved mist respirator should be worn in areas where product mists are present.

General Hygiene Considerations
Eyewash and safety showers are recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance
No information available

Color
Clear, light green or amber

Chemical Formula
Mixture

Odor
Negligible

Odor Threshold
No information available

Physical State
Liquid

pH
0.4 - 2.4

Flash Point:
Not flammable

Autoignition Temperature
Not applicable

Boiling Point/Range
~100 °C
GC-6135 Al+Clear A7 Al+Clear® A7

Melting Point/Range
-18 °C

Flammability Limits in Air
No information available

Explosive Properties
No information available

Oxidizing Properties
No information available

Evaporation Rate
Not applicable

Vapour Pressure
Not applicable

Vapour Density
Not applicable

Specific Gravity
1.3 - 1.45

Solubility
No information available

Partition Coefficient (n-octanol/water)
No information available

Viscosity
No information available

Molecular Weight
Mixture

Water Solubility
100

10. STABILITY AND REACTIVITY

Chemical Stability
Normally stable. If evaporated to dryness, residue should not be exposed to elevated temperatures (above 760°C), as this will yield toxic and corrosive gases.

Incompatible Products
Alkalis and water reactive materials such as oleum: causes exothermic reactions.

Hazardous Decomposition Products
At elevated temperatures, sulfur oxides may be formed. These are toxic and corrosive and are oxidizers. Sulfur trioxide is also a fire hazard. The loss of these gases leaves a caustic residue.

Possibility of Hazardous Reactions
Will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral:
- aluminum sulfate component:
  (oral-mouse): 5207 mg/kg
  (oral-rat): 1930 mg/kg

LC50 Inhalation:
- sulfuric acid component:
  (inhi-rat): 510 mg/m²/2 hr

Component Information

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>2140 mg/kg (Rat)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>90000 mL/kg (Rat)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Irritation
No information available

Corrosivity
No information available.

Sensitization
No information available.

Chronic Toxicity

Carcinogenicity
There are no known carcinogenic chemicals in this product.

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>A2</td>
<td>Group 1</td>
<td>Known</td>
<td>X</td>
<td>A2</td>
</tr>
</tbody>
</table>

Page 4 / 8
MSDS Number: GC-6135
Mutagenic Effects: No information available.
Reproductive Effects: No information available.
Developmental Effects: No information available.
Teratogenicity: No information available.
Target Organ Effects: No information available.
Other Adverse Effects: Delayed (Subchronic and chronic) effects: Sulfuric acid component. Chronic exposure can produce changes in pulmonary function and/or chronic bronchitis.

Endocrine Disruptor Information

12. ECOLOGICAL INFORMATION

Ecotoxicity
Contains no substances known to be hazardous to the environment or not degradable in waste water treatment plants.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td></td>
<td>LC50= 100 mg/L</td>
<td></td>
<td>EC50 = 136 mg/L 15 min</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carassius auratus 96 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>LC50= 37 mg/L Gambusia affinis 96 h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td></td>
<td>LC50= 500 mg/L Brachydanio rerio 96 h</td>
<td></td>
<td>EC50 = 29 mg/L 24 h</td>
</tr>
</tbody>
</table>

Persistence and Degradability: No information available.
Bioaccumulation: No information available.
Mobility in Environmental Media: No information available

Other adverse effects: 14 ppm/36 hr./Fundulus/fatal/fresh water; 240 ppm/48 hr./mosquito fish/TLm/water type not specified; TLm Mosquito fish, 236 ppm, 96 hours; LC50 Largemouth bass, 250 ppm, 96 hours

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods: If permitted by regulations, material may be neutralized with alkali. The information offered in Section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

Contaminated Packaging: Empty containers should be taken for local recycling, recovery or waste disposal.

US EPA Waste Number: No information available

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td>10043-01-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>- 7664-93-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
14. TRANSPORT INFORMATION

DOT
Proper Shipping Name: Regulated
Corrosive liquid, acidic, inorganic, n.o.s. (contains aluminum sulfate and sulfuric acid)
Hazard Class: 8
UN-No: UN3264
Packing Group: PGII

TDG
Hazard Class: Regulated
8
UN-No: UN3264
Packing Group: PGII

15. REGULATORY INFORMATION

International Inventories
TSCA: Complies
DSL: Complies
NDSL: Does not Comply
EINECS/ELINCS: Complies
ENCS: Complies
CHINA: Complies
KECL: Complies
PICCS: Complies
AICS: Complies

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and and Title 40 on of the Code of Federal Regulations, Part 372:

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>7664-93-9</td>
<td>&lt;10</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazardous Categorization

- Chronic Health Hazard: No
- Acute Health Hazard: Yes
- Fire Hazard: No
- Sudden Release of Pressure Hazard: No
- Reactive Hazard: No

Clean Water Act

<table>
<thead>
<tr>
<th>Component</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>1000 lb</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7664-93-9 (&lt;10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CERCLA
**GC-6135 Al+Clear A7 Al+Clear® A7**

**Revision Date**

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>1000 lb</td>
<td>1000 lb</td>
</tr>
</tbody>
</table>

**U.S. State Regulations**

**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>California Prop. 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfuric acid</td>
<td>7844-93-9</td>
<td>Carcinogen</td>
</tr>
</tbody>
</table>

**State Right-to-Know**

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>aluminum sulfate</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**Other International Regulations**

**Mexico - Grade**

No information available

**Canada**

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

**WHMIS Hazard Class**

E  Corrosive material
D2B  Toxic materials

---

**16. OTHER INFORMATION**

**Prepared By**

Kaci Rosario, Product Safety Supervisor

**Preparation Date**

August 22, 2008

**Revision Date**

**Revision Summary**

Transfer to new Wercs format

---

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MSDS Number: GC-6135
Disclaimer
All information, statements, data, advice and/or recommendations, including, without limitation, those relating to storage, loading/unloading, piping and transportation (collectively referred to herein as "information") are believed to be accurate and reliable. However, no representation or warranty, express or implied, is made as to its completeness, accuracy, fitness or a particular purpose or any other matter, including, without limitation, that the practice or application of any such information is free of patent infringement or other intellectual property misappropriation. General Chemical, LLC, is not engaged in the business of providing technical, operational, engineering or safety information for a fee, and therefore, any such information provided herein has been furnished as an accommodation and without charge. All information provided herein is intended for use by persons having requisite knowledge, skill and experience in the chemical industry. General Chemical, LLC, shall not be responsible or liable for the use, application or implementation of the information, provided herein, and all such information is to be used at the risk, and in the sole judgement and discretion, of such persons, their employees, advisors and agents.

End of MSDS
# Evaluation Criteria for Substances Added to the National List Questionnaire

**EVALUATION CRITERIA FOR SUBSTANCES ADDED TO THE NATIONAL LIST**

**Category 1. Adverse impacts on humans or the environment?**  
**Substance:** Aluminum Sulfate

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Documentation (TAP; petition; regulatory agency; other)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Are there adverse effects on environment from manufacture, use, or disposal? [§205.600 b.2]</td>
<td></td>
<td>x</td>
<td></td>
<td><strong>Manufacture:</strong> Aluminum sulfate is produced from mixing aluminum ore (bauxite or hydrate) with sulfuric acid and water. When bauxite is used, the process generates a non-hazardous mud which can be recycled to make cement or disposed in a landfill. No other process wastes are generated. <strong>Use:</strong> Reports of dehydration have been noted when product was not applied according to instructions (left in piles on top of litter). When used according to manufacturer’s instructions no adverse effects have been noted. In contrast improved bird health and well-being and better live performance have been documented when aluminum sulfate was used. <strong>Huff, W.E., P.A. Moore, J.M. Balog, G.R. Bayyari, and N.C. Rath. 1996.</strong> Poult. Sci.75:1359-1364. <strong>American Feed Control Officials. 2012.</strong> Aluminum sulfate IFN 8-20-861 FDA Regulation: Reg. 5821125. Anti-gelling agent for molasses, dewater of beet pulp. <strong>Miles, D.M., S.L. Branton, and B.D. Lott. 2004.</strong> Atmospheric ammonia is detrimental to the performance of modern commercial broilers. Poult. Sci. 83:1650-1654.</td>
</tr>
<tr>
<td>2. Is there environmental contamination during manufacture, use, misuse, or disposal? [§6518 m.3]</td>
<td></td>
<td>x</td>
<td></td>
<td><strong>None noted. Refer to MSDS.</strong></td>
</tr>
</tbody>
</table>
| 3. Is the substance harmful to the environment?  
[§6517c(1)(A)(i);6517c(2)(A)] |     | x  |     | **Aluminum sulfate actually is beneficial to the environment, in that it binds soluble phosphorus preventing phosphorus run-off into ground water, stock ponds streams, lakes and waterways. Its primary benefit to livestock, turkeys and poultry is to neutralize volatilized ammonia, improving air quality in animal rearing facilities. Volatile ammonia has been shown to be toxic to animals reared in confinement facilities, where ammonia levels were equal to or greater than 10 ppm.** **Miles, D.M., S.L. Branton, and B.D. Lott. 2004.** Atmospheric ammonia is detrimental to the performance of modern commercial broilers. Poult. Sci. 83:1650-1654. **Worley, J.W., M.L. Cabrera, and L.M. Risse. 2000.** Reduced levels of alum to amend broiler litter. J. Am. Soc. of Agri. Engineers. Vol 16(4)441-444. |
EVALUATION CRITERIA FOR SUBSTANCES ADDED TO THE NATIONAL LIST

Category 1.  Adverse impacts on humans or the environment?  Substance:  Aluminum Sulfate

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes/No/N/A</th>
<th>Documentation (TAP; petition; regulatory agency; other)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.  Are there adverse effects on environment from manufacture, use, or disposal? [§205.600 b.2]</td>
<td>x</td>
<td>Manufacture: Aluminum sulfate is produced from mixing aluminum ore (bauxite or hydrate) with sulfuric acid and water. When bauxite is used, the process generates a non-hazardous mud which can be recycled to make cement or disposed in a landfill. No other process wastes are generated. Use: Reports of dehydration have been noted when product was not applied according to instructions (left in piles on top of litter. When used according to manufacturer’s instructions no adverse effects have been noted. In contrast improved bird health and well-being and better live performance have been documented when aluminum sulfate was used. Huff, W.E., P.A. Moore, J.M. Balog, G.R. Bayyari, and N.C. Rath. 1996. Poult. Sci.75:1359-1364. American Feed Control Officials. 2012. Aluminum sulfate IFN 8-20-861 FDA Regulation: Reg. 5821125. Anti-gelling agent for molasses, dewater of beet pulp. Miles, D.M., S.L. Branton, and B.D. Lott. 2004. Atmospheric ammonia is detrimental to the performance of modern commercial broilers. Poult. Sci. 83:1650-1654. Disposal: None noted or reported.</td>
</tr>
<tr>
<td>2.  Is there environmental contamination during manufacture, use, misuse, or disposal? [§6518 m.3]</td>
<td>x</td>
<td>None noted. Refer to MSDS.</td>
</tr>
<tr>
<td>3.  Is the substance harmful to the environment? [§6517c(1)(A)(i);6517(c)(2)(A)]</td>
<td>x</td>
<td>Aluminum sulfate actually is beneficial to the environment, in that it binds soluble phosphorus preventing phosphorus run-off into ground water, stock ponds streams, lakes and waterways. Its primary benefit to livestock, turkeys and poultry is to neutralize volatilized ammonia, improving air quality in animal rearing facilities. Volatile ammonia has been shown to be toxic to animals reared in confinement facilities, where ammonia levels were equal to or greater than 10 ppm. Miles, D.M., S.L. Branton, and B.D. Lott. 2004. Atmospheric ammonia is detrimental to the performance of modern commercial broilers. Poult. Sci. 83:1650-1654. Worley, J.W., M.L. Cabrera, and L.M. Risse. 2000. Reduced levels of alum to amend broiler litter. J. Am. Soc. of Agri. Engineers. Vol 16(4)441-444. Worley, J.W., M.L. Cabrera, and L.M. Risse. 2000. Reduced levels of alum to amend broiler litter. J. Am. Soc. of Agri. Engineers. Vol 16(4)441-444.</td>
</tr>
<tr>
<td></td>
<td>Does the substance contain List 1, 2, or 3 inerts? [§6517 c (1) (B)(ii); 205.601(m)2]</td>
<td>x</td>
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<td></td>
<td>Is there potential for detrimental chemical interaction with other materials used? [§6518 m.1]</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Are there adverse biological and chemical interactions in agroecosystem? [§6518 m.5]</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>Are there detrimental physiological effects on soil organisms, crops, or livestock? [§6518 m.5]</td>
<td>x</td>
</tr>
<tr>
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<td></td>
<td></td>
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</tbody>
</table>

References:
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Is there a toxic or other adverse action of the material or its breakdown products? [%6518 m.2]</td>
<td>x</td>
<td>Dosages in excess of amounts normally consumed as a result of litter eating have been shown to be safe. Alum is considered GRAS for use in feeds and ingredients as a flow agent by AAFCO.</td>
</tr>
<tr>
<td>9. Is there undesirable persistence or concentration of the material or breakdown products in environment? [%6518 m.2]</td>
<td>x</td>
<td>USDA-ARS had conducted long term exposure studies showing insignificant impact on soil nutrient profiles.</td>
</tr>
<tr>
<td>10. Is there any harmful effect on human health? [%6517 c (1)(A)(i); 6517 c(2)(A); %6518 m.4]</td>
<td>x</td>
<td>Minor effects …Refer to MSDS</td>
</tr>
<tr>
<td>11. Is there an adverse effect on human health as defined by applicable Federal regulations? [205.600 b.3]</td>
<td>x</td>
<td>Aluminum sulfate is not listed as a known or suspected carcinogen, or any other type of adverse human health effect, in any Federal regulation.</td>
</tr>
<tr>
<td>12. Is the substance GRAS when used according to FDA's good manufacturing practices? [%205.600 b.5]</td>
<td>x</td>
<td>Aluminum sulfate IFN 8-20-861 FDA Regulation: Reg. 5821125 Anti-gelling agent for molasses, dewater of beet pulp.</td>
</tr>
</tbody>
</table>
13. Does the substance contain residues of heavy metals or other contaminants in excess of FDA tolerances? [§205.600 b.5]  
Concentrations of heavy metals (As, Cd, Cr, Cu, Hg, Ni, and Pb) are below analytical detection limits. Detection limits range from 0.5 ppm for Hg to 2 ppm for As.

*If the substance under review is for crops or livestock production, all of the questions from 205.600 (b) are N/A—not applicable.

**Category 2. Is the Substance Essential for Organic Production?**  
Substance: Aluminum sulfate

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Documentation (TAP; petition; regulatory agency; other)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is there a natural source of the substance? [§205.600 b.1]</td>
<td>x</td>
<td></td>
<td></td>
<td>Natural parasiticides may be considered an alternative to the use of synthetic products in organic production. Examples include garlic, wormwood, wild ginger, conifers, diatomaceous earth and charcoal, among others. Because these products do not go through the FDA’s drug approval process, their safety and efficacy may be unknown. Av Singh reports that natural dewormers may be poisonous so it is crucial that recommended dosages be followed. Additionally, some research has indicated that while diatomaceous earth administered to sheep seemed to promote lower fecal egg counts, this claim was not supported by statistical analysis and there was no improvement in the performance of treated sheep. Nemadectin is parasiticide that is the product of a natural fermentation product. Studies have indicated that it is as effective as moxidectin in the treatment of <em>Haemonchus contortus</em> infections in sheep and that it is effective against common gastrointestinal parasites of canines. However, no approved formulations of nemadectin are available for use in the United States.</td>
</tr>
<tr>
<td>2. Is there an organic substitute? [§205.600 b.1]</td>
<td>x</td>
<td></td>
<td></td>
<td>Controlling ammonia in any confined animal rearing facility improves animal health and well-being which has a direct impact on farm profitability, by improving growth rates, feed conversion, livability, and reducing downgrades. The impact of exposure to ammonia not only affects the animals but it is also toxic to caretakers.</td>
</tr>
</tbody>
</table>
### Category 3. Is the substance compatible with organic production practices?

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Is the substance used in handling, not synthetic, but not organically produced?</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>6. Is there any alternative substances?</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>7. Is there another practice that would make the substance unnecessary?</td>
<td>x</td>
<td>In order to ventilate confined areas like brood chambers sufficient to eliminate exposure to volatilized ammonia above 20 ppm under conditions of high ammonia challenge would require ventilation duration and speed that would chill chicks. Baby chicks are unable to regulate their body temperature like older birds and must maintain body temperature (103-105 F) with supplemental heat the first week to 10 days post-hatch.</td>
</tr>
</tbody>
</table>

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1If the substance under review is for crops or livestock production, all of the questions from 205.600 (b) are N/A—not applicable.

Substance: **Aluminum sulfate**
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is the substance compatible with organic handling? [§205.600 b.2]</td>
<td></td>
<td></td>
<td>☒</td>
<td>The use of alum treated litter is used by farming operations as fertilizer. USDA-ARS research has shown that alum treated litter when used as fertilizer produced greater plant yields than ammonium nitrate.</td>
</tr>
</tbody>
</table>
| 2. Is the substance consistent with organic farming and handling?      | ☒   |    |     | A long-term study conducted by USDA-ARS has shown that there are not detrimental effects with long term use of alum as an amendment to poultry litter.  
| 3. Is the substance compatible with a system of sustainable agriculture? [§6518 m.7] | ☒   |    |     | No toxic residues have been reported from the use of aluminum sulfate in poultry and turkey litter and millions of birds have been raised on alum treated litter.  
| 4. Is the nutritional quality of the food maintained with the substance? [§205.600 b.3] | ☒   |    |     | No toxic residues have been reported from the use of aluminum sulfate in poultry and turkey litter and millions of birds have been raised on alum treated litter.  
| 5. Is the primary use as a preservative? [§205.600 b.4]                | ☒   |    |     | Although alum dries litter and has been shown to reduce Listeria and Darkling Beetles but it is primarily used to neutralize ammonia (NH₃) and convert it to an ammonium ion (NH₄⁺). NH₄⁺ is not volatile remaining in the litter, increasing its fertilizer nutrient value.  
References:  
| 6. Is the primary use to recreate or improve flavors, colors, textures, or nutritive values lost in processing (except when required by law, e.g., vitamin D in milk)? [205.600 b.4] | ☒   |    |     | There is one publication that indicates that alum improves sellable processing yield.  
| 7. Is the substance used in production, and does it contain an active synthetic ingredient in the following categories: a. copper and sulfur compounds; | ☒   |    |     | Aluminum sulfate is 48.49% sulfate or 16.2% sulfur.  
**b. toxins derived from bacteria;**  
**c. pheromones, soaps, horticultural oils, fish emulsions, treated seed, vitamins and minerals?** | ☒   |    |     | Aluminum sulfate contains the minerals: Aluminum and sulfur.  
**d. livestock parasiticides and medicines?** | ☒   |    |     | Elevated application rates of aluminum sulfate have been shown effective against Darkling Beetles a poultry house pest know to be a bio-accumulator of several poultry pathogens. |
If the substance under review is for crops or livestock production, all of the questions from 205.600 (b) are N/A—not applicable.

References: Effects of aluminum sulfate on bird health, bird well-being, live performance and improved nutrient value when aluminum sulfate treated litter is used as fertilizer.

**Live Weight**


**Feed Conversion**


**Mortality**


**Condemnation**


**USDA Carcass Grade**


**Foot Pad Lesions**


**Breast Blisters**


**Fuel Cost Savings**


Reduced Air Sac Scores


Ammonia Control


Immune Suppression

Anderson, D.P., C.W. Beard, and R.P Hanson. 1964. The adverse effects of ammonia on chickens including resistance to infection with Newcastle Disease Virus. Avian Dis. 8:369-379.

Econometrics


Keratoconjunctivitis


Mucociliary Process Dysfunction


Increased Nitrogen Retention


Litter Acidification

Reducing Darkling Beetle Infestation


Pad (dirt pad below bedding) Treatment


Salmonella


Campylobacter


Clostridial Spore Suppression


Soluble Phosphorus Binding


Lower and Longer Lasting pH Control


11. Petition justification: At the present time no commercially available litter amendments are approved for organic use in poultry, turkeys or livestock. Air quality and the effects of even low levels of ammonia on bird physiology is significant, effecting bird health, well-being and live performance. Ammonia also poses a health risk to caretakers. Chemtrade has had numerous requests from poultry and turkey producers, and animal health distributors to obtain organic certification for alum based litter amendments. Aside from ammonia control alum (aluminum sulfate) containing litter amendments have the added environmental benefit of binding soluble phosphorus preventing runoff of soluble phosphorus into streams, lakes, waterways and groundwater. Because of aluminum sulfate’s ability to bind soluble phosphorus, alum based products are approved for use in EPA/NRCS EQUIP programs, where producers are paid an incentive for using alum based litter amendments. From a natural fertilizer standpoint, aluminum sulfate has been shown to increase plant yields of tall fescue research plots in a 20 year USDA study, achieving plant yields comparable to ammonium nitrate. Aluminum sulfate treated bedding that is land applied has a characteristic slow release of essential plant nutrients. Plants secrete acid from their roots that release aluminum sulfate bound minerals (phosphorus and other minerals) on an as needed basis into the soil, making them available to the plant. It is our belief that alum based litter amendments are the safest and the most
Effective litter amendments on the market. It is our hope that the NOP Board will give serious consideration to the approval of aluminum sulfate based litter amendments for use in organic poultry, turkey and livestock production.

End of Petition