SAFETY DATA SHEET
AMMONIUM NITRATE

According to EC Regulation no. 1907/2006 (REACH) / EC Regulation no. 1272/2008 / Regulation no. 830/2015

SECTION 1
IDENTIFICATION OF THE SUBSTANCE/MIXTURE
AND OF THE PRODUCER

1.1 Product identification
Name: AMMONIUM NITRATE
Other names: NITRIC ACID AMMONIUM SALT
IUPAC name: AMMONIUM NITRATE
Chemical formula: \( \text{NH}_4\text{NO}_3 \)
SMILES notation: \([\text{NH}_4]^+.[\text{N}^+](=\text{O})([\text{O}^-])[\text{O}^-]\)
UN number: 2067
CAS number: 6484-52-2
EINECS number: 229-347-8
ECHA reference number: 01-2119490981-27-0064

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses
Industrial use: Manufacture of the substance, including handling, storage and quality control
  - Sampling, loading, filling, transfer, disposal, packaging of the substance (charging / discharging) in dedicated facilities
  - Storage
  - Transfer of substance into small containers (dedicated filling line, including weighing)
  - Quality control
  - Use of ammonium nitrate in the manufacturing of formulations for adhesives, sealants, explosives, fertilizers and water treatment chemicals
  - Use of ammonium nitrate as intermediate in the synthesis of other substances

Professional use: Use of fertilizers containing ammonium nitrate – fertigation with liquid fertilizer in open field (non-industrial spraying)
  - Use of fertilizers containing ammonium nitrate – fertigation with liquid fertilizer of the soil
  - Use of fertilizers containing ammonium nitrate – fertigation with fertilizer in open field

Consumer use - Fertigation in open field

Uses advised against
the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), with its subsequent amendments and completions.

1.3 Details concerning the supplier of the Safety Data Sheet

**Producer:**
Azomureş S.A.Tg.-Mureş, 300 Gheorghe Doja St., tel.004-0265 253 700, Romania
Fax: 004-0265 252 986, e-mail: office@azomures.com, www.azomures.com
e-mail (competent person responsible for the SDS): fds.azo@azomures.com

1.4 Emergency telephone number

The institution responsible with providing information in case of a health emergency is The National Institute for Public Health, Department for the International Sanitary Regulation and Toxicological Information.
Telephone: 021.318.36.06, working hours: Monday – Friday from 8 a.m. to 3 p.m.

### SECTION 2

#### HAZARDS IDENTIFICATION

**2.1 Classification of the substance or mixture**
Ammonium nitrate is an inorganic, monoconstituent substance, being classified as oxidizing substance and an irritant to eyes, in accordance with Regulation (EC) No. 1272/2008 and dangerous substance in transport, according to the ADR, RID and IMDG.

**Classification according to EC Regulation no. 1272/2008 (CLP)**

Hazard Classes/Categories:
- Oxidizing solid, Class 3
- Serious damage of the eyes/irritation of the eyes, Class 2

**Hazard statements H:**
- H 272 – May intensify fire; oxidizer
- H 319 – Causes serious eye irritation

**Human health hazard**

This product is not dangerous if handled accordingly.
Nevertheless, the following aspects will be taken into consideration:
- Skin contact: may cause irritation in case of prolonged contact
- Eye contact: may cause irritation in case of prolonged or repeated contact
- Ingestion: no toxic effects in case of small quantities, in large quantities it may cause gastrointestinal disorders, and, in extreme cases (especially in children) it may cause methaemoglobinaemia, the “blue baby syndrome” and cyanosis (blueness around the mouth)
- Inhalation: large quantities of dust containing this product may cause irritation of the nose and airways; the symptoms include sore throat and cough

**Environmental hazards:**

No environmental hazard assessment was conducted as ammonium nitrate presents little danger for aquatic organisms.

Due to the reduced hazardous potential on aquatic organisms, and its main effect, eutrophication, the substance is not considered dangerous for the environment, according to Community/national Regulations.

**Ignition or explosion hazard**

The fertilizer itself is not combustible, but it may sustain combustion even in the absence of air.
At approx. 170 °C the substance melts, slowly decomposing into ammonia and nitric acid.
At over 200 °C the decomposition is accelerated and the decomposition reaction may turn into a chain reaction if no immediate measures for cooling are taken, by spraying a maximum quantity of water (actual flooding). Decomposition products (nitrogen oxides) catalyze the reaction, causing an explosion.

At high temperatures (over 400 °C) the fertilizer may ignite and burn, with simultaneous decomposition in nitrogen oxides. The decomposition may cause an explosion in case of contamination with incompatible materials, such as: fuels (gasoline, Diesel fuel), lubricants (petrolatum, oils), metallic powders and other materials specified in section 10.5.

2.2 Labeling

Labeling according to CLP Regulation

Substance name: FERTILIZER CONTAINING AMMONIUM NITRATE
ECHA reference number: 01-2119490981-27-0064
EINECS number: 229-347-8
Producer: Azomureş S.A.Tg.-Mureş, 300 Gheorghe Doja St., tel. 004-0265 253 700, Romania
Fax: 004-0265 252 986, e-mail: office@azomures.com, www.azomures.com
Emergency telephone number: 021.318.36.06, working hours: Monday – Friday from 8 a.m. to 3 p.m.

Hazard labels: symbols
GHSO3 – flame over a circle
GHSO7 – exclamation point
Warning word: Attention!

GHSO3 – Oxidizer solid, class 3
GHSO7 – Eye irritation, class 2

Hazard statements H: H 272 – May intensify fire; oxidizer
H 319 – Causes serious eye irritation

Precautionary statements: Prevention
P210 – Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P220 – Keep/Store away from clothing/combustible materials (lubricants, Diesel fuel, oil, paints etc.)
P 264 – Wash hands thoroughly after handling
P 280 – Wear protective gloves (heat resistant)/protective clothing (powder resistant overalls)/tight safety goggles/face mask

Intervention
P 370 + P 378 – In case of fire use plenty of water (flooding). Use dust or carbon dioxide extinguishers for cooling;
P 305+351+338 – If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P 337+ P313 – if irritation persists see the doctor.

EU label (according to ADR)
IDENTITY OF THE SUBSTANCE
AZOMUREŞ S.A.TĂRGU- MUREŞ
ROMANIA

Substance name: FERTILIZER CONTAINING AMMONIUM NITRATE
EC label, EINECS number: 229-347-8
Producer:
Azomureş S.A.Tg.-Mureş, 300 Gheorghe Doja St., tel.004-0265 253 700, Romania
Fax: 004-0265 252 986, e-mail: office@azomures.com , www.azomures.com
Emergency telephone number: 021.318.36.06, working hours: Monday – Friday from 8 a.m. to 3 p.m.
Class 5.1 – oxidizing substances
Content: TOTAL NITROGEN (N); AMMONIACAL NITROGEN; NITRIC NITROGEN
Net weight of the fertilizer
Hazard symbol:

2.3 Other hazards
According to Annex XIII of the EC Regulation no. 1907/2006, the PBT and vPvB assessment has not been conducted because ammonium nitrate is an inorganic substance.
Other hazards: not known.

SECTION 3
COMPOSITION/INFORMATION ON COMPONENTS

3.1 The product must be considered:
Substance
Chemical identity of the substance – AMMONIUM NITRATE is a monoconstituent substance
CAS number: 6484-52-2
EINECS number: 299-347-8
IUPAC name: ammonium nitrate
Molecular formula: H3N.HNO3
SMILES notation: [NH4+].[O-] [N+] (=O)[O-]
Molecular weight range: 80.0434
ECHA reference number: 01- 2119490981- 27- 0064
Purity degree: >= 98.04% - <= 99.85% (w/w)
Typical concentration: 98.88 % (w/w)
Concentration limit: >= 98.04% - <= 99.85 % (w/w)
Remarks: N = 34.608%
Chemical identification of impurities
Ammonium dihydrogen phosphate – CAS number: 7722-76-1
EINECS number: 231-764-5
IUPAC name: ammonium dihydrogen phosphate
Typical concentration: 0.52% (w/w)
Concentration limit: >= 0 - <=0.81 % (w/w)
Calcium dinitrate – CAS number: 10124-37-5
IDENTITY OF THE SUBSTANCE
AMMONIUM NITRATE
AZOMUREȘ S.A.TÂRGU- MUREȘ
ROMANIA

EINECS number: 233-332-1
IUPAC name: calcium dinitrate
Typical concentration: 0.3 % (w/w)
Concentration limit: >= 0 - <= 0.7 % (w/w)

Water – CAS number: 7732-18-5
EINECS number: 231-791-2
IUPAC name: water
Typical concentration: 0.3 % (w/w)
Concentration limit: >= 0.15 - <= 0.45 % (w/w)

SECTION 4
FIRST AID MEASURES

4.1 Description of the first aid measures
4.1.1 First aid instructions are provided depending on the relevant exposure routes.
Skin contact: rinse the affected area with plenty of water. Remove contaminated clothing and shoes. In case symptoms occur, seek medical advice.
Eye contact: rinse/irrigate eyes with plenty of water for 10 minutes; if irritation persists, seek immediately medical advice.
Ingestion: in case of ingesting the product, rinse mouth with water (only if the victim is conscious). Do not induce vomiting. In case symptoms occur, seek medical advice.
Inhalation: in case of inhaling the product, remove victim to fresh air. In case symptoms occur, seek medical advice.

4.1.2 Recommendations:
Remove the victim from the area contaminated with dust or gas, keep the victim at rest in a warm area, even in the absence of symptoms; administer oxygen, especially in case of blueness around the mouth; artificial respiration must be used only as a last resort, in case of prolonged exposure.

4.2 The most important symptoms and effects, acute as well as delayed
Keep under medical observation at least 48 hours, in order to prevent the development of a pulmonary edema or methaemoglobinaemia.

4.3 Indications concerning any emergency medical assistance and necessary special treatments
Note for the attending doctor: methaemoglobinaemia

SECTION 5
FIREFIGHTING MEASURES

5.1 Fire extinguishing means
Adequate extinguishing means
Small fires
The substance is not combustible. This product may sustain combustion. Use water to extinguish the fire.
Large fires
The substance is not combustible. This product may sustain combustion. Use water to extinguish the fire.
Inadequate extinguishing means
Do not use chemicals or foam to extinguish the fire, use sand or soil for emerging fires, if there is no water source available.

5.2 Special hazards caused by the substance or mixture
Unusual fire and explosion hazards
The substance may be explosive in contact with flammable or organic substances, or if it is confined during the fire.
Hazardous decomposition products and combustion products
In case of fire, hazardous decomposition products may be generated, such as nitrogen oxides (NO, NO₂ etc.), ammonia (NH₃), amines.

Special procedures for fire extinguishing
Special measures are not necessary.

Wear adequate protection equipment. Use a self-contained breathing apparatus.

5.3 Advice for firefighters
Special procedures for fire extinguishing
Special measures are not necessary.

Wear adequate protection equipment. Use a self-contained breathing apparatus.

SECTION 6
ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
6.1.1 For personnel not involved in emergency situations
(a) Protective equipment
Hand protection:
Protective gloves (heat resistant).
Eye protection:
Face protection equipment - tight safety goggles (plastic frame, polycarbonate lens) for chemical substances.
- face mask (polycarbonate) – in case of danger of nitrate splashes
Skin protection
Protective clothing:
Dust resistant overalls (breastplate duck overalls, coat).
Winter or summer shirt (natural fibers – duck)
Protective footwear:
Chemical and mechanical aggression resistant boots, with anti-static properties that allow usage in explosive environments (leather with rubber soles).
(b) Keep away from heat and fire sources
Use a self-contained breathing apparatus and adequate equipment for firefighting.
Open doors and windows to produce maximum ventilation of the room.
(c) Emergency procedures
In case of great danger, the surrounding area must be evacuated.
Avoid inhaling toxic fumes by standing up wind from the fire.

6.1.2. For the personnel involved in emergency situations
The personnel involved in emergency situations must wear duck, dust resistant equipment, chemical aggression resistant boots and protection mask.
6.2 Precautions for the environment
Avoid contamination of the soil and groundwater courses.

6.3 Methods and material for containing fires and for cleaning
Containment and cleaning method for the dispersed substance

Dispersion and leakage of small quantities
Vacuum or collect the product in special containers, marked as waste. Clean the contaminated area using a large quantity of water. In case the spilled substance reaches into watercourses, inform local authorities.

Dispersion and leakage of large quantities
Vacuum or collect the products in special containers, marked as waste. Recycle if possible. Clean the contaminated area with a large quantity of water. In case the spilled substance reaches into watercourses, inform local authorities.

Inadequate techniques for containment and cleaning
Do not contain the spilled product using sawdust or any other combustible material.
Do not use plugs made from organic materials, such as wood, in order to stop leakage.

6.4. Reference to other sections
Note: see chapter Exposure control / individual protection, for information concerning personal protection equipment and the section Disposal considerations.

SECTION 7
HANDLING AND STORAGE

7.1 Precautions for safe handling
7.1.1 Recommendations for safe handling
Use adequate ventilation. A local exhaust ventilation system must be provided. Avoid all possible ignition sources (spark or flame). Avoid contamination with any source, including metals, dust or organic substances.

7.1.2 Recommendations concerning good general hygiene practices at the work place
(a) Do not eat, drink or smoke in the working area. “NO SMOKING” signs are to be placed in the working area.
(b) Wash hands thoroughly after each use.
(c) Remove contaminated clothing and protection equipment before entering lunch areas.

7.2 Safe storage conditions, including possible incompatibilities
The product should be stored in closed, dry, clean and well ventilated areas away from heat of and fire sources.
Avoid contact with combustible materials and reducing agents. Do not expose the substance to high temperatures. Smoking and open fire are forbidden in storage areas.
Stacking of bags should be made in such a way that any danger is avoided.
The product is packed in 50 kg, 500 kg, 600 kg, 1000 kg bags or is delivered in bulk, in wagons covered with waterproof, fire-resistant tarpaulin or TALS metal wagon.
50 kg polyethylene bags are packed through palletization and closed by welding.
Double 50 kg bags (polyethylene and polypropylene) are closed by welding (polyethylene) or by sewing of the polyethylene bags together with the polypropylene bags.
Double bags (polyethylene and polypropylene) of 50 kg, 500 kg, 600 kg, 1000 kg are closed by soldering or bonding.
According to the provisions of EC Regulation no. 1272/2008, package labeling will include the following legible items: substance name, producer’s full name and address, nominal weight, product identifiers, symbols referring to hazard labels, warnings, hazard statements (H), precautionary statements (P).

The product is usually packed in 50 kg bags, but it may also be packed in 500 kg or 1000 kg bags, or it may be transported in bulk, in wagons covered with a waterproof, nonflammable cover, or in metallic TADS wagons.

Labels on the bag and accompanying documents must be edited in the official language of the Member State where the product is put on the market, unless the contract stipulates another international language. Packed chemical products are identified by the data on the label or the package. Identification data for the product delivered in bulk are mentioned in accompanying documents.

7.3 Specific end use(s)
Specific end uses of ammonium nitrate are mentioned in the Exposure Scenarios attached to the Safety Data Sheet.

SECTION 8
EXPOSURE CONTROL / PERSONAL PROTECTION

8.1 Control parameters
No official limits are specified.
Values recommended by ACGIH (1995-1996) for inhalable particles:
TLV/TWA: 10 mg/m$^3$

Relevant DNEL / DMEL values and NOAEL values are provided in the CSA, depending on the type of exposure for workers in an industrial setting and for the general public. As no acute toxicity hazard was identified, that would lead to the classification of the substance according to CLP Regulation, the long-term DNEL value is considered sufficient to ensure that no effects occur from acute exposure to the substance.

No local effects were observed after dermal and inhalation exposures and no DNEL value for local effects was derived.

Repeated dose toxicity

Long-term systemic effects - dermal - DNEL: 21.3 mg/kg bw/d
NOAEL: 255.6 mg/kg bw/d
- inhalation - DNEL: 37.6 mg/m$^3$
  NOAEC: 451.2 mg/m$^3$

DNEL values for human exposure are derived according to ECETOC guideline (final draft).

a) Workers exposure - dermal - DNEL: 21.3 mg/kg bw/d
- inhalation - DNEL: 37.6 mg/m$^3$

b) Exposure of the general public - dermal - DNEL: 12.8 mg/kg bw/d
- inhalation - DNEL: 11.1 mg/m$^3$
- oral - DNEL: 12.8 mg/kg bw/d

8.2 Exposure control
The information related to exposure control are provided in the Exposure Scenarios attached to the Safety Data Sheet.

8.2.1 Adequate technical controls
General measures at company level
The CSSM (The Committee for Work Health and Safety) was constituted at the company level, where the risk factors of professional injury and illness in the work place are assessed. The evaluation of the risks of professional injury and illness at the work place was carried out by committees established by the management; preventive measures were taken to eliminate or to diminish the risks that cannot be avoided, having as purpose the work safety and health, reduction of work injuries and of professional illnesses.

**The Chemical Plant:**
- Risk evaluation when using dangerous chemical substances
- Ammonium Nitrate Plant II-III-ADEX (operation – chemists, packing machinists)

As a result of the analysis and evaluation of the risks at the work place:
The plan for prevention and protection at company level was elaborated and approved.
A record is held of the work places of great danger and imminent danger of injury.
A situation of the hazardous chemical substances used in the work process is kept.
The toxic gases, released by chemical substances at the work place, are monitored.
The health of the staff exposed to the action of chemical substances is supervised and monitored.
The auditing of the safety and health at the work place is carried out, establishing the noncompliance with the law in force and taking measures to ensure compliance with such laws.
Statistics are drafted, referring to work accidents and professional illnesses caused by hazardous chemical substances.
Intervention teams in case of chemical accident with periodically instructed staff are organized at company level.
Authorized employees of the internal prevention and protection service perform the inspection of the work places according to the operational procedure.
The explosion protection document is elaborated according to Government Ordinance no. 1058/2006 for the following plants: Ammonia, Nitric Acid, and Ammonium Nitrate.
The equipment used in areas with danger of explosion is certified upon availability date.
Workers have access to personal instructions regarding the usage of dangerous chemical substances:
- The staff has individual protection equipment
- Measures of collective protection are ensured.

**Collective protection measures for the source of risk – ammonium nitrate**

**Technical Measures**
Monitoring system of the main functioning parameters for the safety of the equipment (pressure, temperature, concentration, flow capacity, level etc), with acoustic and optical warning signals in case of malfunction.
Toxic gas, fire and explosion detectors
Protection devices – flange fenders on all the dangerous liquids layouts
Ammonia and nitric acid layouts painted in conventional colors
Signaling for work safety health and according to Government Ordinance no. 971/2006 (safety, warning, interdiction, obligation marks, delimitation of danger zones)
Ventilation systems.
Rescue showers for the danger of splashing with corrosive substances.
Water sources with upward jet (for washing the eyes in case of splashing)
Periodical ISICR inspections of under-pressure equipment.
Toxic gases level control
Organization and provision of individual insulating protection equipment
Endowment and organization of medical help trained in case of gassing.
Administrative measures
Manufacturing regulation, work instructions regarding work safety and health and fire prevention
Safety data sheets for hazardous substances
Organization of an information system for surveillance and intervention:
- Action plan in case of fire
- Internal Emergency Plan (PUI).
- Evacuation action plan in emergency situations
- Action plan in case of earthquake
- Action plan for safe road transport (PSTR).
Authorization for the job position, employees in the production sector, maintenance, repair
(mechanic, electric, automation) in technological installations.
Work safety and health training for Azomures employees, in all stages (upon hiring, at work,
periodically, supplementary) and work safety and health instruction for the employees from the
companies that perform services based on contract and for the persons that are on the platform
with the employer’s permission, related to:
- risk of professional injury and illness at the place of work
- minimal requests of health and safety of work, stipulated by legal regulations
  applicable to the specific activity at the work place
- tasks and responsibilities of the employees
- usage of work equipment and individual protection equipment
- prevention and protection measures, action plan in case of danger
- giving first aid to the injured at the work place

Risk management measures for human health
During ammonium nitrate manufacturing process, eyes might be exposed to dust in concentrations
that cause irritations. If existing control measures are applied (technical control measures and
personal protection equipment, based on the classification and labeling as H272 and H319), the
substance is not hazardous for workers.

8.2.2. Personal protection measures, such as personal protection equipment
Technical measures: provide a ventilation system, where necessary.
Hygiene measures: do not eat, drink or smoke while handling the product. Wash hands after
handling and before eating, smoking or using the toilet, as well as at the end of the working
period.
(a) Respiratory protection:
Personal protection during production activities – breathing apparatus
  - protective mask

(b) Hand protection:
Protective gloves (heat resistant).

(c) Eye protection:
Face protection equipment - tight safety goggles (plastic frame, polycarbonate lens) for chemical
  substances
  - face mask (polycarbonate) – in case of danger of nitrate splashes

(d) Skin protection:
Protective clothing:
Dust resistant overalls (breastplate duck overalls, coat).
Winter or summer shirt (natural fibers – duck)
Protective footwear:
Chemical and mechanical aggression resistant boots, with anti-static properties that allow usage in explosive environments (leather with rubber soles).

### 8.2.3 Environmental exposure control

Recommendations on personal protection apply for high levels of exposure. Select the personal protection equipment depending on the type of risk

**Risk management measures for the environment**

Due to the low toxicity of ammonium nitrate for aquatic organisms and its regulation by various European/national regulations, a risk and environmental exposure assessment is not considered necessary for this substance.

### SECTION 9

**PHYSICAL AND CHEMICAL PROPERTIES**

#### 9.1 Information concerning the main physical and chemical properties

<table>
<thead>
<tr>
<th>No.</th>
<th>Physical and chemical properties of the substance / mixture</th>
<th>Unit</th>
<th>Value for the substance / mixture</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>c)</td>
<td>Boiling point/boiling temperature range</td>
<td>°C</td>
<td>&gt;210</td>
<td>Decomposes before boiling</td>
</tr>
<tr>
<td>d)</td>
<td>Melting/freezing point</td>
<td>°C</td>
<td>169.6</td>
<td>At 1013 hPa</td>
</tr>
<tr>
<td>e)</td>
<td>Flammability</td>
<td>% vol</td>
<td></td>
<td>Nonflammable (based on molecular structure)</td>
</tr>
<tr>
<td>f)</td>
<td>Relative density</td>
<td></td>
<td>1.72</td>
<td>At 20 °C</td>
</tr>
<tr>
<td>g)</td>
<td>Vapor pressure</td>
<td>Pa</td>
<td>Negligible</td>
<td>At room temperature</td>
</tr>
<tr>
<td>h)</td>
<td>Granulometry</td>
<td></td>
<td></td>
<td>Ammonium nitrate in prilled form does not contain particles with an inhalable fraction (0%&lt;0.5mm).</td>
</tr>
<tr>
<td>i)</td>
<td>Water solubility</td>
<td>g/L</td>
<td>&gt;100</td>
<td>At 20 °C</td>
</tr>
<tr>
<td>j)</td>
<td>Partition coefficient n-octanol/water</td>
<td>Log Kow</td>
<td></td>
<td>Not necessary as the substance is inorganic.</td>
</tr>
<tr>
<td>k)</td>
<td>Viscosity</td>
<td>Cp</td>
<td></td>
<td>Testing method not applicable for solids; relevant for liquids.</td>
</tr>
<tr>
<td>m)</td>
<td>Explosive properties</td>
<td></td>
<td>Non explosive</td>
<td></td>
</tr>
<tr>
<td>n)</td>
<td>Oxidizing properties</td>
<td></td>
<td>It has oxidizing properties</td>
<td></td>
</tr>
<tr>
<td>o)</td>
<td>Surface tension</td>
<td></td>
<td>No surface activity (based on molecular structure).</td>
<td></td>
</tr>
<tr>
<td>p)</td>
<td>Dissociation constant</td>
<td></td>
<td>Testing is not necessary, as ammonium nitrate is a salt that</td>
<td></td>
</tr>
</tbody>
</table>

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IDENTITY OF THE SUBSTANCE
AZOMUREŞ S.A.TÂRGU- MUREŞ
ROMANIA

AMMONIUM NITRATE

completely dissociates in water.

| r) Stability in organic solvents and identity of the relevant decomposition products | Not necessary if the substance is inorganic. |

9.2 Additional information
No available additional information.

SECTION 10
STABILITY AND REACTIVITY

10.1 Reactivity
Ammonium nitrate reacts with combustible substances, organic substances, metallic powders and reducing agents.

10.2 Chemical stability
The product is stable in normal storage, handling and usage conditions.
In order to increase product stability, additives are used – conditioning agents and anti-caking agents.
Additive of unknown composition (anti-caking)
IUPAC name: additive of unknown composition
Conditioning agents:
Aluminium sulphate – CAS number: 10043-01-3
EINECS number: 233-135-0
IUPAC name: aluminium sulphate
Dolomite - CAS number: 16389-88-1
EINECS number: 240-440-2
IUPAC name: calcium magnesium dicarbonate

10.3 Hazardous reactions potential
If heated at very high temperatures, over 170 °C and over 200 °C, ammonium nitrate may cause an explosion at any moment, especially if contaminated with combustible substances, organic substances, coal, oil, or if ammonium nitrate is confined in closed spaces (pipes, containers, tankers with metallic walls).
The product is prone to chemical self-ignition when it comes into contact with readily oxidizing organic substances, finely divided metals, superphosphates.

10.4 Conditions to avoid
The product decomposes when heated. Avoid confined spaces.

10.5 Incompatible materials
Reducing agents, strong acids and bases, metallic powders, combustible materials, chromates, zinc, copper and its alloys, chlorates.

10.6 Hazardous decomposition products
Nitrogen oxides (NO, NO₂) released during ammonium nitrate decomposition are highly toxic.

SECTION 11
TOXICOLOGICAL INFORMATION
Toxicokinetics (absorption, metabolism, distribution and elimination)
The results of the studies on absorption, metabolism, distribution and elimination:
Based on low MW, high water solubility, assumed low logPow, high absorption is expected. However, the ion formation of the substance immediately when in contact with a fluid decreases the absorption. Therefore, 50% absorption is taken for oral, dermal and inhalation exposure

11.1 Information on toxicological effects
The relevant hazard classes for which information is provided are:
(a) Acute toxicity
(b) Skin corrosion / irritation
(c) Eye irritation / damage
(d) Sensitization of the skin or the respiratory system
(e) Mutagenicity germ cell
(f) Carcinogenicity
(g) Toxicity for reproduction
(h) STOT (specific target organs of toxicity) – unique exposure
(i) STOT (specific target organs of toxicity) – repeated exposure
(j) Aspiration hazard

11.1.1 Information for each hazard class
(a) Acute toxicity - oral LD50 > 2000 mg/kg bw
   - dermal LD50 > 5000 mg/kg bw
   - inhalation LC50 > 88.8 mg/l
   - other routes – no available information

Ammonium nitrate does not have to be classified for acute oral, dermal or inhalation toxicity as all LD50/LC50 tested values exceed the highest value used for classification according to CLP Regulation.

Repeated dose toxicity
Oral 28 days - NOAEL >=1500 mg/kg bw/d (with potassium nitrate)
   52 weeks - 256 mg/kg bw/d (with ammonium sulphate)
Inhalation 2 weeks - NOAEL >= 185 mg/m³ air
Dermal – no available studies

Value used for CSA (oral route): NOAEL: 256 mg/kg bw/d (with ammonium sulphate)
Value used for CSA (route: inhalation): NOAEC >=185 mg/m³ (2 weeks)

Based on available data, ammonium nitrate is not classified according to CLP Regulation for repeated dose toxicity.
(b) Skin corrosion/irritation
Ammonium nitrate does not cause skin irritations and is not corrosive.
(c) Serious eye damage / irritation
Ammonium nitrate is irritating for the eyes.
(d) Sensitizing of the airways and skin
No available data on sensitization of the respiratory system.
Ammonium nitrate is not classified according to CLP Regulation for skin sensitization.
Value used for CSA: not sensitizing for the skin
Value used for CSA: not sensitizing for the respiratory system.
(e) Mutagenicity
Based on the results of in vivo and in vitro studies, ammonium nitrate is not considered genotoxic.
Value used for CSA: genetic toxicity: negative.
(f) Carcinogenicity
Not carcinogen (tests using ammonium sulphate).

(g) Toxicity for reproduction
Oral 28 days - NOAEL >= 1500 mg/kg bw/d (with potassium nitrate)
Ammonium nitrate is not classified according to CLP Regulation with regard to reproduction and developmental toxicity.

(h) STOT (specific target organs of toxicity) – unique exposure - conclusive but not sufficient for classification
(i) STOT (specific target organs of toxicity) – repeated exposure - conclusive but not sufficient for classification
(j) Aspiration hazard - there is no data available

11.1.2 The data in this subsection apply to the ammonium nitrate in the form under which it is placed on the market – no data available.

11.1.3 The results of experimental studies by route of exposure:
The acute toxicity after oral administration – the studies were conducted on rats and mice.
For rat: LD50: 2950 mg/kg – key study; experimental result
   LD50: 2800 mg/kg, LD50: 2462 mg/kg, LD50: 4500 mg/kg supporting studies
For mouse: LD50: 2085 mg/kg – supporting studies; experimental result
The acute toxicity after administration by inhalation - the studies were conducted on rats.
LC50: > 88.8 mg/L - supporting studies; experimental result
The acute toxicity after dermal administration - the studies were conducted on rats.
LD50: > 5000 mg/kg
Ammonium nitrate must not be classified for acute oral toxicity, dermal and inhalation toxicity, because all the values used for the LD50/LC50 tests are more than the highest value that is used in the classification of the CLP Regulation.

11.1.4 For the following hazard classes: STOT – single exposure, STOT – repeated exposure, aspiration hazard – conclusive but not sufficient for classification.

11.1.5 Information on the likely routes of exposure
The likely routes of exposure are ingestion (swallowing), inhalation or skin / eyes exposure - there are no known health effects.

11.1.6 Symptoms related to the physical, chemical and toxicological characteristics
No data available.

11.1.7 The known delayed and immediate effects and the chronic effects of long term exposure and short term exposure
The toxicological tests were made on rats, tests for skin irritation / eyes, the respiratory tract were made on rabbits.
There is no conclusive data on the effects of delayed or chronic of long term or short-term exposure.

11.1.8 Interactive effects
No data available.

11.1.9 Absence of specific data
No data available.

SECTION 12
ECOLOGICAL INFORMATION

12.1 Toxicity
Aquatic compartment (including sediments)

Toxicity data
The main toxic component in ammonium salts is ammonia. Recent assessments concerning ammonia toxicity show that both ionized and un-ionized forms are toxic. For this reason a common toxicity model is proposed, in which ammonia is more toxic at elevated pH values and ammonium ion contributes to toxicity at lower pH values.

Short-term toxicity for fish
Values used for CSA: LC50 for static water fish: 447 mg/L (at 48 hours).

Long-term toxicity for fish
No data available.

Short-term toxicity for aquatic invertebrates
Values used for CSA: EC50/LC50 for fresh water invertebrates: 490 mg/L

Long-term toxicity for aquatic invertebrates
There are no available long-term studies for aquatic invertebrates.

Algae and aquatic plants
Value used for CSA: EC50/LC50 for fresh water algae: >1700 mg/L
NOEC for fresh water algae: 1700 mg/L

Sediment organisms
The chemical safety assessment does not indicate the need for a study concerning the effects on sediment organisms.

Other aquatic organisms
No available information.

PNEC derivation - PNEC water (fresh water): 0.45 mg
PNEC water (marine water): 0.045 mg/L
PNEC water (intermittent releases): 4.5 mg/L
PNEC in sediments - PNEC values for sediments should be calculated using the equilibrium partitioning method (EPM) in EUSES, by using the PNEC aqua and the log Kow. For inorganic substances the PNEC value cannot be derived.

Due to the low toxicity of ammonium nitrate for aquatic organisms and its regulation by different European/national laws, the hazard and environmental exposure assessment is not considered necessary.

Terrestrial compartment - studies scientifically unjustified.

Atmospheric compartment – no available data.

Microbiological activity in STP
Toxicity for aquatic micro-organisms
Value used for CSA: EC50/LC50 for aquatic micro-organisms: >1000 mg/L
NOEC aquatic micro-organisms: 180 mg/L
PNEC for STP: 18 mg/L

The Urban Wastewater Directive (1991) sets standards for the collection and treatment of wastewater from homes and some industrial sectors.

12.2 Persistence and degradability

Abiotic degradability
Ammonium nitrate completely dissociates in water. No additional information is requested/available.

Biotic degradability
Studies are not necessary as the substance is inorganic. The biodegradation rate in wastewater treatment plants is of 52 g N/kg dissolved solid/day at 20 °C.
In the anaerobic transformation of nitrate into N₂, N₂O and NH₃, the biodegradation rate in wastewater plant at 20 °C is 70 g N/kg dissolved solid/day at 20 °C.

Hydrolysis – ammonium nitrate is completely dissociated into ions in water: NH₄⁺ and NO₃⁻. Therefore, testing is considered not necessary.

Photolysis - in air, water, soil – no available data

Biodegradation – inorganic substances are not biodegradable (based on chemical properties).

12.3 Potential for bioaccumulation
The partition coefficient octanol - water (Kow): not relevant as the substance is inorganic, but it is considered low (based on high water solubility).
The bioconcentration factor (BCF) – low potential for bioaccumulation (based on substance’s properties).

12.4 Mobility in soil
Adsorption/desorption
Adsorption coefficient – low potential for adsorption (based on substance’s properties).

Volatilization – no available data.
Distribution modeling – no available data.

12.5 PBT and vPvB assessment results
In accordance with Annex XIII of the EC Regulation no. 1907/2006, PBT and vPvB assessments have not been conducted as ammonium nitrate is inorganic.

12.6 Other adverse effects
There is no information concerning other adverse effects on the environment.

SECTION 13
DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Disposal methods
Wastes must be disposed of in compliance with national and local regulations. Controlled biodegradation in wastewater treatment is possible.

Relevant provisions of the harmonized EU legislation and domestic legislation regarding waste.

National legislation in force:
Law no. 211/2011 concerning wastes treatment.
Law no. 249/2015 related to the packaging and waste packaging management.
GD no. 856/2002 - The evidence of wastes management, with subsequent modifications.
Decision no. 1061/2008 on transport of hazardous or non-hazardous wastes on Romanian territory, with subsequent modifications.

UE Legislation in force:
European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).
European Agreement concerning the International Carriage of Dangerous Goods by Rail (RID).

### SECTION 14
TRANSPORT INFORMATION

**Information concerning classification for**

**Road transportation (ADR):**
14.1. UN number: 2067
14.2. UN name for dispatch: AMMONIUM NITRATE BASED FERTILIZER
14.3. Transportation hazard class (classes) 5.1- oxidizing substances O2 (solids), hazard identification no. 50 label 5.1
14.4. Packaging group: Group III
   Special provisions – Loading, unloading, handling – CV24
   Bulk - AP6, AP7, VC1, VC2
   Transport category / tunnel restriction code – 3 (E)

**Rail transportation (RID):**
14.1. UN number: 2067
14.2. UN name for dispatch: AMMONIUM NITRATE BASED FERTILIZER
14.3. Transportation hazard class (classes) 5.1- oxidizing substances O2 (solids), hazard identification no. 50
   NHM code 310520, label 5.1
14.4. Packaging group: Group III
Packaging instructions: P002, IBC08, LP02, R001
   Special packaging provisions: B3
   Special provisions – Loading, unloading and handling – CW24
   Bulk – AP6, AP7, VC1, VC2
   Transport category - 3

**Marine transportation (IMDG/IMO Code):**
14.1. UN number: 2067
14.2. UN name for dispatch: AMMONIUM NITRATE BASED FERTILIZER
14.3. Transportation hazard class (classes): hazard class 5.1, label 5.1
   EmS Fire – F-H
   EmS Spiel- S-Q
14.4. Packaging group: Group III
   Special provisions - Stacking: category A
14.5. Environmental hazards
According to the criteria of the IMDG Code, ammonium nitrate is not pollutant for the environment and marine aquatic compartment.
14.6. Special precautions for users
Ammonium nitrate transportation complies with the legislation in use concerning hazardous substances; RID, ADR and IMDG provisions will be respected. Transportation and storage of the
product is carried out at temperatures between -10 and +30°C. Transportation means must be clean, dry and covered with waterproof covers, free of sharp edges that might cut or rip the bags. The product may also be transported in bulk, covered with a waterproof, nonflammable cover, or in TALS metallic wagons. The product must not come into contact with wood or combustible material (the floor of the truck is covered with a non-flammable, waterproof cover). The product is packed in polyethylene bags or double bags (polyethylene and polypropylene). Polyethylene bags are closed by welding, plying or sewing together with polypropylene bags and the polypropylene bags are closed by sewing. Each delivery is accompanied by the Conformity Statement. At the client’s request, the product is accompanied by a Test Report. Tolerances comply with EC Regulation no. 2003/2003 Annex II; they are negative values in mass percentage [for ammonium nitrate (N over 32%): 0.6%]. The personnel transporting ammonium nitrate must be instructed and periodically tested regarding the dangers caused by the product. The tests are carried out by the company where the personnel is employed. Vehicles which transport packages (bags) with ammonium nitrate should be signaled by applying 2 rectangular reflective orange plates (front and back), which indicate on the top hazard identification number and on the bottom UN number specific for dangerous substance, of dimensions specified in legislation in use (ADR), labeled so that in case of fire the markings must remain legible for at least 15 minutes (figure 1). For completing signaled plates will be applied label plate, exposed to view on the sides and in the back of the vehicle applied in such a manner that it cannot be removed, in this case oxidizing substances – conventional sign – flame over a black circle on a yellow background, the symbol “5.1” in the lower corner – figure 2.

According to the provisions of EC Regulation no. 1272/2008, package labels will include the following legible specifications: substance name, producer’s full name and address, nominal weight, product identifiers, hazard symbols, warnings, hazard statements (H), precautionary statements (P). All transports will be accompanied by the transport documents appropriate for transported goods, according to the legislation in use.

14.7. Bulk transport, according to Annex II to MARPOL Convention and IBC Code
Not applicable.
15.1 Safety, health and environmental regulations/legislation specific for the substance/mixture

Relevant information regarding the domestic legislation

Law no. 265/2006 for the amendment of GEO no. 195/2005 on environment protection

Decision no. 1391/2006 for the approval of the Regulation concerning the application of Government Emergency Ordinance no. 195/2002 regarding traffic on public roads, with subsequent amendments and supplements.

ISCIR technical prescriptions in use.

Order no. 2737/17.12.2012 regarding the approval of the Procedure concerning the designation of the bodies in charge with the issuance of the aggregation certificates and of the prototype conformity certificates according to the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), as well as with the inspection for the certification for maintaining the exploitation conformities for the specialized superstructures installed on the road vehicles for the carriage of dangerous goods and of packaging of dangerous goods transported on the road.

Law no. 59/2016 referring to the control of hazards in case of serious accidents involving dangerous substances.

Decision no. 1175/2007 for the approval of the Norms referring to the performance of road transportation activities for dangerous goods in Romania.

Law no. 360/2003 on dangerous substances and preparations republished in 12.03.2014.

Law no. 278/2013 on industrial emissions.

Relevant information regarding the EU legislation


EC no. 2003/2003 regulation of the European Parliament regarding fertilizers with its subsequent amendments relating to EN standards drawn up by the European Committee for Standardization.

European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), 2017 edition.


15.2 Chemical safety assessment
A chemical safety assessment (CSA) was conducted and a chemical safety report (CSR) was elaborated for ammonium nitrate. Ammonium nitrate is mainly used for the manufacture of
chemical fertilizers, but it is also an ingredient in various preparations and materials. Qualitative assessment was based on the manufacture of fertilizers, used by professionals and consumers. Moreover, the uses in applications other than fertilizers were also assessed. An evaluation of potential exposures to ammonium nitrate associated with industrial, professional and consumer uses was conducted.

SECTION 16
ADDITIONAL INFORMATION

a) A clear evidence of added, deleted or modified information

<table>
<thead>
<tr>
<th>Version(revision, edition) number</th>
<th>Date</th>
<th>Page number</th>
<th>Evolution of the information</th>
</tr>
</thead>
<tbody>
<tr>
<td>edition 6 revision 0</td>
<td>12.02.2013</td>
<td>3, 17, 19, 20, 21</td>
<td>At page 3 it was added the warning word: attention and an intervention phrase, at section 2 chapter 2.2, elements for label. At page 17 section 14.6 Special precautions for users – it was mentioned the type of warning panels which are put up on vehicles, if transports packages (bags) or goods in bulk. At page 19 section 15, chapter 15.1, at page 20 and 21 section 16 b) and c) it was modified the ADR and RID edition number.</td>
</tr>
<tr>
<td>edition 7 revision 0</td>
<td>20.11.2013</td>
<td>10, 18</td>
<td>At page 10, chapter 8.2.1. - Organizational measures, Monitoring and intervention plans were modified At page 18 section 15.1 – information regarding national legislation was modified</td>
</tr>
<tr>
<td>version 8</td>
<td>24.09.2014</td>
<td>4, 7, 8, 12, 13</td>
<td>Updated the registration dossier of ammonium nitrate in ECHA</td>
</tr>
<tr>
<td>version 9</td>
<td>28.11.2014</td>
<td>1</td>
<td>At page 1, section 1, chapter 1.2 at uses advised against were introduced provisions Regulation (EU) No 98/2013.</td>
</tr>
<tr>
<td>version 10</td>
<td>06.01.2015</td>
<td>8</td>
<td>At page 8, section 7, chapter 7.2 was modified the number of rows it is stored bags.</td>
</tr>
<tr>
<td>version 11</td>
<td>01.06.2015</td>
<td>2, 16, 17, 19</td>
<td>At page 2, section 1.4 emergency telephone number was modified, and section 2.1 it was removed classification in accordance with directive 67/548/EEC. At page 16, chapter 13.1 - Waste treatment methods national legislation</td>
</tr>
</tbody>
</table>

Issuing date: 15.02.2017 | Version: 14 | Page: 20 / 23 |
### IDENTIFY OF THE SUBSTANCE
AZOMUREŞ S.A.TÂRGU- MUREŞ
ROMANIA

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Section(s)</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>version 12</td>
<td>01.02.2016</td>
<td>14, 19</td>
<td>At page 17, section 14 they were added specials provisions for carriage. At page 19, section 15.1 was added to EU legislation.</td>
</tr>
<tr>
<td>version 13</td>
<td>09.05.2016</td>
<td>7, 19</td>
<td>At page 14, section 11 they have introduced additional toxicological data. At page 19, section 15.1 it was introduced Law 360/2003 republished and Regulation no.830/2015.</td>
</tr>
<tr>
<td>version 14</td>
<td>15.02.2017</td>
<td>17, 18, 20</td>
<td>At page 17, in chapter 14.4 was introduced transport category / tunnel code. At page 18, chapter 14.6 it changed the name of the hazard labels in label places, according to ADR 2017. At page 20, chapter 15.1 it changed the edition number ADR, RID, IMDG.</td>
</tr>
</tbody>
</table>

### b) List of abbreviations and acronyms used throughout the Safety Data Sheet

- **SDS**: Safety Data Sheet
- **ECHA**: European Chemicals Agency
- **EC**: European Commission
- **ESIS**: European Chemical Substances Information System
- **(FE) EFMA**: Fertilizers Europe (European Fertilizer Manufacturers Association)
- **REACH**: EC Regulation No. 1907/2006 of the European Parliament and Council concerning the registration, evaluation, authorization and restriction of chemical substances
- **CSR**: Chemical Safety Report
- **CSA**: Chemical Safety Assessment
- **ES**: Exposure Scenario
- **DNEL**: Derived no effect level
- **DMEL**: Derived minimal effect level
- **PNEC**: Predicted No Effect Concentration
- **BCF**: Bioconcentration factor
- **NOAEL**: No observed adverse effect level
- **NOAEC**: No Observed Adverse Effects Concentration
- **ECETOC**: European Center for Ecotoxicology and Toxicology of Chemicals
- **EUSES**: The European Union System for the Evaluation of Substances
- **NA**: Not applicable
- **STP**: Sewage Treatment Plant

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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC50</td>
<td>Concentration of toxic material for which 50% of the tested organisms survive</td>
</tr>
<tr>
<td>LD50</td>
<td>Lethal dose for 50% of the tested population</td>
</tr>
<tr>
<td>LC50</td>
<td>Lethal concentration for 50% of the tested population</td>
</tr>
<tr>
<td>STOT</td>
<td>Specific target organs of toxicity</td>
</tr>
<tr>
<td>PBT</td>
<td>Persistent, Bioaccumulative, Toxic</td>
</tr>
<tr>
<td>VPvB</td>
<td>Very Persistent, very Bioaccumulative</td>
</tr>
<tr>
<td>RMM</td>
<td>Risk Management Measures</td>
</tr>
<tr>
<td>IPPC</td>
<td>Integrated pollution prevention and control</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>ISCIR</td>
<td>State Inspection for the Control of Boilers, Under-Pressure Vessels and Lifting Devices</td>
</tr>
<tr>
<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienists</td>
</tr>
<tr>
<td>ADR</td>
<td>European Agreement referring to the International Carriage of Dangerous Goods by Road, 2017 edition</td>
</tr>
<tr>
<td>RID</td>
<td>Regulation referring to the International Carriage of Dangerous Goods by Rail (RID), 2017 edition</td>
</tr>
<tr>
<td>IMDG</td>
<td>Regulations referring to the maritime transportation of hazardous Substances, 2017 edition</td>
</tr>
<tr>
<td>MARPOL</td>
<td>International Convention for the Prevention of Pollution From Ships</td>
</tr>
<tr>
<td>IBC</td>
<td>International Code for the Construction Equipment of Ships Carrying Dangerous Chemicals in Bulk</td>
</tr>
<tr>
<td>GESTIS</td>
<td>Information system on hazardous substances of the German Social Accident Insurance</td>
</tr>
<tr>
<td>w/w</td>
<td>mass unit</td>
</tr>
<tr>
<td>b/w</td>
<td>body weight</td>
</tr>
</tbody>
</table>

**c) Bibliography**

GESTIS Database - Material Safety Data Sheets

Amului Proca, Gabriel Stănescu - Substanţe şi produse utilizate în industria chimică-pericol de incendiu - pericol de explozie – toxicitate (Substances and products used in the chemical industry-fire hazard-explosion hazard-toxicity), 1984

Studies according to the Chemical Safety Report

Guidance on safe use – The joint/individual ECHA Registration file for the substance

Official Journal of the European Union – EU Regulation no. 830/2015 of the European Council of 28.05.2015

EFMA - Guidance for the Compilation of Safety Data Sheets for Fertilizer Materials.

ESIS - European Chemical Substances Information System


ADR - European Agreement referring to the International Carriage of Dangerous Goods by Road, 2017 edition
d) Relevant hazard statements
H 272 – May intensify fire; oxidizer
H 319 – Causes serious eye irritation

Relevant precautionary phrases
Precautionary statements: Prevention
P210 – Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P220 – Keep/Store away from clothing/combustible materials (lubricants, Diesel fuel, oil, paints etc.)
P264 – Wash hands thoroughly after handling
P 280 – Wear protective gloves (heat resistant)/protective clothing (powder resistant overalls)/tight safety goggles/ face mask

Intervention
P 370 + P 378 – In case of fire use plenty of water (flooding). Use dust or carbon dioxide extinguishers for cooling;
P 305+351+338 – If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P 337+ P313 – if irritation persists see the doctor.

Note:
The information included in this safety data sheet is based on the data available at the time of publication.
The client and the user assume all risks regarding usage, handling and storage of this product.
There are no guarantees for the product in case of improper handling, transport and storage of the product, not complying with the specifications of the Technical Specification and the Safety Data Sheet.
EXPOSURE ASSESSMENT

Under the REACH Regulation a chemical safety assessment (CSA) for the whole life-cycle of a substance is required. The CSA describes how the manufacturer controls, or recommends downstream users to control, exposures of humans and the environment.

Human exposure assessment
A qualitative assessment has been performed since the leading toxicological effect is a local endpoint (eye irritation). For this endpoint no dose-effect response curve can be determined and therefore a DNEL cannot be derived. However, DNELs are derived for systemic toxicity for workers and the general population but are not assessed against exposure estimates. A quantitative assessment for systemic toxicity is not considered relevant for this substance as it did not show any systemic effects in an subacute toxicity study for an analogue (potassium nitrate, tested up to 1500 mg/kg bw/day) and only minor effects in studies conducted with the analogue ammonium sulfate: 90 days oral subchronic toxicity study and 2 years oral chronic toxicity study which revealed NOAELs of 886 mg/kg bw/day and 256 mg/kg bw/day, respectively. These effects are noted at levels that humans are normally not exposed to. Furthermore, ammonium nitrate was assessed within the OECD HPV program (SIAM 25) as part of the nitrates category and concluded to be of low priority for further work for human health.

Environmental exposure assessment
An environmental exposure and risk assessment has not been performed. Although ammonium nitrate belongs to the nitrates category it has to be mentioned that ammonium nitrate can act different compared to the other nitrate compounds due to the ammonium cation:
In aqueous solution, ammonium salts are completely dissociated into NH4+ and a corresponding anion. This equilibrium depends on temperature, pH and ionic strength of the water in the environment. Un-ionized NH3 species exists in the aquatic environments and the fraction (NH3 / (NH3+ NH4+)) steeply increases with elevated pH value or temperature. It is well known that toxicity to aquatic organisms has been attributed to un-ionized ammonia (NH3) species, and NH4+ species is considered to be non- or significantly less-toxic (Emerson et al., 1975). However, recent developments in assessing ammonia toxicity clearly show that in contrast to earlier assumptions where un-ionized ammonia was considered to be the toxic component, both the uncharged and charged molecule are toxic. Therefore, a joint toxicity model has been proposed, with ammonia causing most toxicity at high pH values and ammonium ion also contributing to toxicity at lower pH values (U.S. EPA 1999, OECD 2007). It is generally accepted, that the principal toxic component of ammonium salts such as ammonium nitrate, -sulphate or -chloride is ammonia, rather than the corresponding anion (see also: OECD2004, SIDS ammonium chloride or OECD 2007 ammonium sulphate). Therefore toxicity values for ammonium salts (such as: ammonium -sulphates, phosphates, carbonates, chlorides or nitrates), where the major toxic component is ammonia, can be considered as equivalent. Consequently, this hazard assessment comprises the total topic of ammonia toxicity. U.S. EPA (1999) published an excellent review on Ammonia toxicity, with special consideration on the pH- and temperature dependence. A huge amount of studies is available on Ammonia toxicity, however a comparability of these toxicity data is difficult, since various temperature- and pH conditions were present during testing. U.S. EPA (1999) re-evaluated existing data on Ammonia toxicity by adjusting toxicity values to definite temperature and pH- conditions and by thereby allowing comparability.
Study results of the group of the following nitrates were evaluated: ammonium nitrate, calcium nitrate, calcium nitrate double salt, magnesium nitrate, Nitcal-K, potassium nitrate and sodium nitrate.

All nitrates show a low or negligible toxicity to vertebrates, invertebrates and algae. Although results of the studies and publications are sometimes expressed as being > 100 mg/L, lowest measured value without effects is 447 mg/L (study with fish on ammonium nitrate).

Ammonium nitrate has been evaluated within the OECD HPV program (SIAM 25) as part of the nitrates category. It was concluded that all substances within this category are of low priority for further work due to their low hazard profile. The substance does not hydrolyze nor is there evidence for photodegradation. In aqueous solution, it is completely dissociated into nitrate (NO3-) and the corresponding cation. Due to the inorganic nature of the substance standard biodegradation testing systems are not applicable.

Nitrification and de-nitrification processes occur naturally in streams and rivers, as well as in many secondary sewage treatment processes. Based on the high water solubility and the ionic nature, the substance is not expected to adsorb or bioaccumulate to a significant extent. Based on the physico-chemical properties, water is expected to be the main target compartment.

Nitrate substances are known to play an important role in the nutrient enrichment of surface waters, commonly called eutrophication. Eutrophic waters are characterized by an elevated nutrient concentrations, which stimulate the growth of certain algal species, favoring simple algae and plankton growths. The oxygen concentration in water will generally decrease influencing other lives, such as most fish species leading to a negative effect on the biodiversity of the ecosystem. As eutrophication is a common effect due to an excess in nitrate in the environment, the problem is covered in European Regulations.

The Directive 2000/60 of the European parliament and of the council of 23 October 2000 establishing a framework for Community action in the field of water policy and the Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources are both important European Regulations regulating the emission and concentration of nitrate substances in the environment.

The Nitrates Directive (1991) aims to protect water quality across Europe by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The Nitrates Directive has close links with other EU policies concerning water, air, climate change and agriculture, and its implementation yields benefits in all these areas:

- Reducing nitrates is an integral part of the Water Framework Directive (2000), which establishes a comprehensive, cross-border approach to water protection organised around river basin districts (RBDs), with the aim of achieving good status for European bodies of water by 2015.
- The new Groundwater Directive (2006) confirms that nitrate concentrations must not exceed the trigger value of 50mg/l. Several Member States have set their own tighter limits, in order to reach good status.
- Air and soil quality: livestock management and farming cause, among other things, emissions of ammonia (NH3), which have an impact on human health and on the environment, as they contribute to the acidification process in soil, eutrophication of waters and ground-level ozone pollution, together with other pollutants (sulphur dioxide, nitrogen oxides, volatile organic compounds). The full implementation of the Nitrates Directive is expected to contribute to the reduction of ammonia emissions by 14% on 2000 levels by 2020, as measures limiting, for example, amounts of fertiliser applied, have a positive impact on both nitrate losses towards waters and ammonia emissions into the air.
• Climate change: All activities related to livestock and fertiliser management release nitrous oxide (N2O) and methane (CH4), greenhouse gasses with a global warming potential 310 and 21 times higher than CO2 respectively. If fully implemented, the Nitrates Directive could cut N2O emissions by 6% on 2000 levels by 2020, for example, and contribute to climate change mitigation.

• The common agricultural policy (CAP) backs up the Nitrates Directive through direct support and rural development measures. For example, several Member States have included nutrient management measures, such as wider buffer strips around water courses, among the agri-environmental initiatives for which farmers can receive payments. Direct support is subject to crosscompliance with EU environmental legislation, including the Nitrates Directive.

• The Urban Wastewater Directive (1991) sets standards for the collection and treatment of wastewater from homes and some industrial sectors.

Because of the low toxicity of ammonium nitrate towards aquatic organisms and regulation within several European/National Laws an environmental exposure and risk assessment for ammonium nitrate is not considered necessary.

Ammonium nitrate is mainly used in fertilizers, but besides that is also a constituent in several preparations and materials. The qualitative assessment will focus on the manufacturing of fertilizers, use by professionals and consumers. Furthermore the non-fertilizer uses will also be assessed. In table 1 the uses that have been further assessed are summarized.
<table>
<thead>
<tr>
<th>Number (IU)</th>
<th>Short description of identified use</th>
<th>Product Category (PC)</th>
<th>Life Cycle Stage(s) covered by the IU</th>
<th>Sector of use (SU)</th>
<th>Process Category (Proc)</th>
<th>Article Category (AC)</th>
<th>Environmental Release Category (ERC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturing of the substance, including handling, storage and quality control</td>
<td>-</td>
<td>X</td>
<td>SU8, 9</td>
<td>PROC2, PROC3, PROC1, PROC8a, PROC8b, PROC9,</td>
<td>-</td>
<td>ERC1</td>
</tr>
<tr>
<td>2</td>
<td>Sampling, loading, filling, transfer, dumping, bagging of substance (charging/discharging) at non-dedicated facilities. Industrial/professional setting.</td>
<td>-</td>
<td>X X X</td>
<td>SU3, 22</td>
<td>PROC8a</td>
<td></td>
<td>ERC2, ERC6a, ERC8b, ERC8e</td>
</tr>
<tr>
<td>3</td>
<td>Sampling, loading, filling, transfer, dumping, bagging of substance (charging/discharging) at dedicated facilities. Industrial/professional setting.</td>
<td>-</td>
<td>X X X</td>
<td>SU3, 22</td>
<td>PROC8b</td>
<td></td>
<td>ERC2, ERC6a, ERC8b, ERC8e</td>
</tr>
<tr>
<td>Number (IU)</td>
<td>Short description of identified use</td>
<td>Product Category (PC)</td>
<td>Life Cycle Stage(s) covered by the IU</td>
<td>Sector of use (SU)</td>
<td>Process Category (Proc)</td>
<td>Article Category (AC)</td>
<td>Environm ental Release Category (ERC)</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>--------------------------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>----------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>4</td>
<td>Storage</td>
<td>-</td>
<td>X X X</td>
<td>SU3, 22</td>
<td>PROC1</td>
<td>-</td>
<td>ERC2, ERC6a, ERC8b,</td>
</tr>
<tr>
<td>5</td>
<td>Transfer of substance into small containers (dedicated filling line, including weighing). Industrial/professional setting.</td>
<td>-</td>
<td>X X X</td>
<td>SU3, 22</td>
<td>PROC9</td>
<td>ERC2, ERC6a, ERC8b,</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Q control</td>
<td>-</td>
<td>X X X</td>
<td>SU3, 22</td>
<td>PROC15</td>
<td>ERC2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Use of ammonium nitrate in the manufacturing of formulations for adhesives and sealants, explosives, fertilizers and water treatment chemicals.</td>
<td>PC1, PC11, PC12, PC37</td>
<td>X</td>
<td>SU3, 10</td>
<td>PROC3, PROC5</td>
<td>-</td>
<td>ERC2</td>
</tr>
<tr>
<td>8</td>
<td>Treating or coating of seed with fertilizer containing ammonium nitrate</td>
<td>PC12</td>
<td>X</td>
<td>SU10</td>
<td>PROC13</td>
<td>-</td>
<td>ERC2</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Number (IU)</th>
<th>Short description of identified use</th>
<th>Product Category (PC)</th>
<th>Life Cycle Stage(s) covered by the IU</th>
<th>Sector of use (SU)</th>
<th>Process Category (Proc)</th>
<th>Article Category (AC)</th>
<th>Environmental Release Category (ERC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Use of ammonium nitrate as an intermediate to synthesise other substances</td>
<td>PC19</td>
<td></td>
<td>SU3</td>
<td>PROC2, PROC3</td>
<td>-</td>
<td>ERC6A</td>
</tr>
<tr>
<td>10</td>
<td>Professional use of fertilizers containing ammonium nitrate - liquid fertigation at open field (non industrial spraying)</td>
<td>PC12</td>
<td></td>
<td>SU22</td>
<td>PROC11</td>
<td>-</td>
<td>ERC8E</td>
</tr>
<tr>
<td>11</td>
<td>Professional use of fertilizers containing ammonium nitrate - liquid fertigation in the soil</td>
<td>PC12</td>
<td></td>
<td>SU22</td>
<td>PROC2</td>
<td>-</td>
<td>ERC8E</td>
</tr>
<tr>
<td>12</td>
<td>Professional use of fertilizers containing ammonium nitrate - fertigation at open field</td>
<td>PC12</td>
<td></td>
<td>SU22</td>
<td>PROC8A</td>
<td>-</td>
<td>ERC8E</td>
</tr>
<tr>
<td>13</td>
<td>Professional use of fertilizers containing ammonium nitrate - outdoor mixing</td>
<td>PC12</td>
<td></td>
<td>SU22</td>
<td>PROC19</td>
<td>-</td>
<td>ERC8E</td>
</tr>
<tr>
<td>Number (IU)</td>
<td>Short description of identified use</td>
<td>Product Category (PC)</td>
<td>Life Cycle Stage(s) covered by the IU</td>
<td>Sector of use (SU)</td>
<td>Process Category (Proc)</td>
<td>Article Category (AC)</td>
<td>Environmental Release Category (ERC)</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>---------------------------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-----------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>14</td>
<td>Professional use of fertilizers containing ammonium nitrate - indoor mixing</td>
<td>PC12</td>
<td>X</td>
<td>SU22</td>
<td>PROC19</td>
<td>-</td>
<td>ERC8B</td>
</tr>
<tr>
<td>15</td>
<td>Professional use of fertilizers containing ammonium nitrate - greenhouse liquid fertigation in the soil</td>
<td>PC12</td>
<td>X</td>
<td>SU22</td>
<td>PROC2</td>
<td>-</td>
<td>ERC8B</td>
</tr>
<tr>
<td>16</td>
<td>Professional use of fertilizers containing ammonium nitrate - greenhouse liquid fertigation (non industrial spraying)</td>
<td>PC12</td>
<td>X</td>
<td>SU22</td>
<td>PROC11</td>
<td>-</td>
<td>ERC8B</td>
</tr>
<tr>
<td>17</td>
<td>Consumer end use - fertilization at open field</td>
<td>PC12</td>
<td>X</td>
<td>SU21</td>
<td>-</td>
<td>-</td>
<td>ERC8E</td>
</tr>
<tr>
<td>18</td>
<td>Consumer end use - indoor use of fertilizers</td>
<td>PC12</td>
<td>X</td>
<td>SU21</td>
<td>-</td>
<td>-</td>
<td>ERC8B</td>
</tr>
<tr>
<td>19</td>
<td>Consumer end use - matches and fireworks</td>
<td>PC11</td>
<td>X</td>
<td>SU21</td>
<td>-</td>
<td>-</td>
<td>ERC10A</td>
</tr>
</tbody>
</table>
Table 1, as it is proposed above, contains the identified uses. It also contains all the information necessary for a Tier 1 exposure assessment with ECETOC TRA (workers and consumers). However, as explained in the introduction a qualitative assessment will be performed for man, as the leading effect is eye irritation from which no dose-response curve can be established and a DNEL cannot be set. Normally the information from table 46 is used to derive a table listing the target group template needed to build the exposure scenarios based on the Tier 1 method: for worker (PROC driver of Tier 1 exposure estimate) and for consumer (PC or AC driver of Tier 1 exposure estimate). In this table IUs with the same driver of exposure/release would be grouped. However, as in this case a qualitative assessment will be done the reported uses will be grouped into the main sector of uses as the applicable RMMs will be comparable for all processes within a specific sector. The following exposure scenarios will be described:

Table 2. Overview on exposure scenarios and corresponding use descriptors

<table>
<thead>
<tr>
<th>Exposure scenario</th>
<th>Short description of ES</th>
<th>Linked to IU</th>
<th>PC</th>
<th>SU</th>
<th>PROC</th>
<th>AC</th>
<th>ERC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES1</td>
<td>manufacturing</td>
<td>1</td>
<td>8, 9</td>
<td>-</td>
<td>1, 2, 3, 8a, 8b, 9, 14, 15</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>ES2</td>
<td>industrial use including distribution and other activities related to the processes in industrial settings</td>
<td>2, 3, 4, 5, 6, 7, 8, 9</td>
<td>1, 11, 12, 19, 37</td>
<td>3, 10</td>
<td>1, 2, 3, 5, 8a, 8b, 9, 13, 15, 6a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ES3</td>
<td>professional end use</td>
<td>2, 3, 4, 5, 6, 10, 11, 12, 13, 14, 15, 16</td>
<td>12</td>
<td>22</td>
<td>1, 2, 8a, 8b, 9, 11, 15, 19</td>
<td>-</td>
<td>8b, 8e</td>
</tr>
<tr>
<td>ES4</td>
<td>consumer end use</td>
<td>17, 18, 19</td>
<td>11, 12</td>
<td>21</td>
<td>-</td>
<td>-</td>
<td>8b, 8e, 10a</td>
</tr>
</tbody>
</table>

1. Manufacturing of the substance

1.1. Exposure scenario

1.1.1. Description of activities and processes covered in the exposure scenario
Manufacturing of the substance including handling, storage and q control: SU8/9, PROC1/2/3/8a/8b/9/14/15, ERC1

1.1.2. Control of workers exposure

Table 3. Worst case operational conditions and risk management measures

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
<th>Value</th>
<th>Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of worker exposure</td>
<td>&gt; 4</td>
<td>hours/day</td>
<td></td>
</tr>
</tbody>
</table>

**Product characteristics**

<table>
<thead>
<tr>
<th>Physical state of the substance/product</th>
<th>Solid</th>
<th>solid/liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatility of the substance/product</td>
<td>low</td>
<td>hPa</td>
</tr>
<tr>
<td>Relative molecular weight of the substance</td>
<td>80.04</td>
<td>Needed to calculate from ppm to mg/m³</td>
</tr>
<tr>
<td>Concentration of substance in product</td>
<td>-</td>
<td>%</td>
</tr>
</tbody>
</table>

**Operational conditions not accessible for risk management**

- Is the activity performed inside or outside? Inside

**Conditions and measures at process level (source) to prevent/limit release/exposure**

- Is local exhaust ventilation needed? No

**Conditions and measures related to personal protective equipment and hygiene**

- Is respiratory protection needed? No
- Is skin protection needed? No

According to CLP ammonium nitrate is classified as oxidizer H272 and irritating to eyes H319. Exposure of the eye to dust at concentrations leading to irritation during manufacturing of ammonium nitrate can occur.

1.1.3. Risk management measures

The risk management measures related to workers can be found in Table 4. Because ammonium nitrate is irritating to eyes, the risk management measures for human health aim to avoid direct contact with the substance.

Table 4. Risk management measures related to workers at industrial sites

<table>
<thead>
<tr>
<th>Information type</th>
<th>Data field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containment and local exhaust ventilation</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Information type</td>
<td>Data field</td>
<td>Explanation</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Containment plus good work practice required</td>
<td>Containment as appropriate</td>
<td></td>
</tr>
<tr>
<td>Local exhaust ventilation required plus good work practise</td>
<td>Good standard of general ventilation</td>
<td></td>
</tr>
<tr>
<td><strong>Personal protective equipment (PPE)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of PPE (gloves, respirator, face-shield etc)</td>
<td>Chemical goggles</td>
<td>To reduce exposure of the eye to a negligible level</td>
</tr>
<tr>
<td><strong>Other risk management measures related to workers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimise number of staff exposed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segregation of the emitting process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective contaminant extraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimisation of manual phases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance of contact with contaminated tools and objects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular cleaning of equipment and work area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training for staff on good practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good standard of personal hygiene</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets but are not necessarily required to control risk as laid out above.

### 2. Industrial use of ammonium nitrate for formulation of preparations,

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intermediate use and end-use in industrial settings, including distribution and other activities related to the processes in industrial settings

2.1. Exposure scenario

2.1.1. Description of activities and processes covered in the exposure scenario
Industrial use of ammonium nitrate for formulation of preparations, intermediate use and end-use in industrial settings: SU3/10, PC1/11/12/19/37, PROC1/2/3/5/8a/8b/9/13/15, ERC2/6a

2.1.2. Control of workers exposure

Table 5. Worst case operational conditions and risk management measures

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
<th>Value</th>
<th>Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of worker exposure</td>
<td>&gt; 4</td>
<td>hours/day</td>
<td></td>
</tr>
</tbody>
</table>

**Product characteristics**

| Physical state of the substance/product | Solid/liquid | solid/liquid |          |
| Volatility of the substance/product    | low         | hPa          | volatility of the substance |
| Relative molecular weight of the substance | 80.04      |             | Needed to calculate from ppm to mg/m³ |
| Concentration of substance in product  | -           | %            | Substance as such |

**Operational conditions not accessible for risk management**

| Is the activity performed inside or outside? | Inside |

**Conditions and measures at process level (source) to prevent/limit release/exposure**

**Conditions and measures related to control of dispersion towards the worker**

| Is local exhaust ventilation needed? | No |

**Conditions and measures related to personal protective equipment and hygiene**

| Is respiratory protection needed? | No |
| Is skin protection needed?       | No |

According to CLP ammonium nitrate is classified as oxidizer H272 and irritating to eyes H319. Exposure of the eye to dust/splashes at concentrations leading to irritation during industrial use of ammonium nitrate can occur.

2.1.3. Risk management measures
The risk management measures related to workers can be found in Table 51. Because ammonium nitrate is irritating to eyes, the risk management measures for human health aim to avoid direct contact with the substance.

Table 6. Risk management measures related to workers at industrial sites

<p>| Issuing date: 15.02.2017 | Version: 14 | Page: 11 / 15 |</p>
<table>
<thead>
<tr>
<th>Information type</th>
<th>Data field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containment and local exhaust ventilation</td>
<td>Containment plus good work practice required</td>
<td>Containment as appropriate</td>
</tr>
<tr>
<td></td>
<td>Local exhaust ventilation required plus good work practise</td>
<td>Good standard of general ventilation</td>
</tr>
<tr>
<td>Personal protective equipment (PPE)</td>
<td>Type of PPE (gloves, respirator, face-shield etc)</td>
<td>Chemical goggles To reduce exposure of the eye to a negligible level</td>
</tr>
<tr>
<td>Other risk management measures related to workers</td>
<td>Minimise number of staff exposed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Segregation of the emitting process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effective contaminant extraction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minimisation of manual phases</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Avoidance of contact with contaminated tools and objects</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regular cleaning of equipment and work area</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Training for staff on good practice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Good standard of personal hygiene</td>
<td></td>
</tr>
</tbody>
</table>

Additional good practices (Operational Conditions and Risk Management Measures) beyond the REACH Chemical Safety Assessment established within Chemical Industry are also advised and communicated through Safety Data Sheets but are not necessarily required to control risk as laid out above.
3. Professional use of ammonium nitrate for formulation of preparations and end-use

3.1. Exposure scenario

3.1.1. Description of activities and processes covered in the exposure scenario

Professional use of ammonium nitrate for formulation of preparations and end-use: SU22, PC12, PROC1/2/8a/8b/9/11/15/19, ERC8b/8e

3.1.2. Control of workers exposure

Table 7. Worst case operational conditions and risk management measures

<table>
<thead>
<tr>
<th>Frequency and duration of use</th>
<th>Value</th>
<th>Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of worker exposure</td>
<td>&gt; 4</td>
<td>hours/day</td>
<td></td>
</tr>
</tbody>
</table>

**Product characteristics**

| Physical state of the substance/product | Solid/liquid | solid/liquid |
| Volatility of the substance/product    | low         | hPa         |
| Relative molecular weight of the substance | 80.04 | Needed to calculate from ppm to mg/m³ |
| Concentration of substance in product | >25%        | %          |

Ammonium nitrate can occur in different concentrations in the endproducts

**Operational conditions not accessible for risk management**

<table>
<thead>
<tr>
<th>Is the activity performed inside or outside?</th>
<th>Inside/outside</th>
</tr>
</thead>
</table>

**Conditions and measures at process level (source) to prevent/limit release/exposure**

| Is local exhaust ventilation needed? | No |

**Conditions and measures related to personal protective equipment and hygiene**

| Is respiratory protection needed? | No |
| Is skin protection needed?       | No |

According to CLP ammonium nitrate is classified as oxidizer H272 and irritating to eyes H319. Exposure of the eye to dust/splashes at concentrations leading to irritation during professional use of ammonium nitrate can occur. However, it has to be noted that the endproducts are further diluted which can lead to levels at which no eye irritation will occur.

3.1.3. Risk management measures related to professionals

Because ammonium nitrate is irritating to eyes, the risk management measures for human health should focus on the prevention of direct contact with the substance. Product related design measures preventing direct eye contact with ammonium nitrate and preventing formation of aerosols and splashes are more important in addition to the personal protective equipment
Product related operational measures are required. These include specific dispensers and pumps etc specifically designed to prevent splashes/spills/exposure to occur.

Table 53 gives an overview of the personal protective equipment recommendations. The degree of restriction depends on the concentration of ammonium nitrate in the preparation.

**Table 8. Risk management measures related to workers in professional settings**

<table>
<thead>
<tr>
<th>Information type</th>
<th>Data field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containment and local exhaust ventilation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Containment plus good work practice required</td>
<td>Containment as appropriate</td>
<td></td>
</tr>
<tr>
<td>Local exhaust ventilation required plus good work practice</td>
<td>Good standard of general ventilation</td>
<td></td>
</tr>
<tr>
<td>Personal protective equipment (PPE)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of PPE (gloves, respirator, face-shield etc)</td>
<td>Chemical goggles</td>
<td>To reduce exposure of the eye to a negligible level</td>
</tr>
<tr>
<td>Other risk management measures related to workers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimise number of staff exposed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Segregation of the emitting process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effective contaminant extraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimisation of manual phases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidance of contact with contaminated tools and objects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regular cleaning of equipment and work area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management/supervision in place to check that the RMMs in place are being used correctly and OCs followed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training for staff on good practice</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2. Exposure estimation

Not performed, qualitative assessment.

4. Consumer end-use of fertilizers and matches/fireworks

4.1. Exposure scenario

4.1.1. Description of activities and processes covered in the exposure scenario.

Consumer end-use of fertilizers and matches/fireworks: SU21, PC11/12, ERC8b/8e/10a

4.1.2. Control of consumers exposure

Table 9. Risk management measures related to consumers’ use

<table>
<thead>
<tr>
<th>Information type</th>
<th>Data field</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal protective equipment (PPE) required under regular conditions of consumer use</td>
<td>Type of PPE (gloves, etc)</td>
<td>goggles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>To reduce exposure of the eye to a negligible level</td>
</tr>
<tr>
<td>Instructions addressed to consumers</td>
<td>Product labelling</td>
<td></td>
</tr>
</tbody>
</table>

According to CLP ammonium nitrate is classified as oxidizer H272 and irritating to eyes H319. Exposure of the eye to dust/splashes at concentrations leading to irritation during consumer use of ammonium nitrate can occur. However, it has to be noted that the endproducts are further diluted which can lead to levels at which no eye irritation will occur.

Exposure to eye irritating dilutions of ammonium nitrate can occur during consumer use of fertilizers. No exposure to ammonium nitrate is expected from the use of matches/fireworks. It is assumed that during normal use exposure will only occur incidentally. Furthermore, it is assumed that existing controls (i.e. personal protective equipment based on classification and labelling as H319) are applied for these exposure situations.

4.2. Exposure estimation

Not performed, qualitative assessment.