

LAB SPECIFIC OPERATING PROCEDURE (LSOP) for Ammonium Nitrate

Principal Investigator (PI):

Building:

Lab(s) Covered by LSOP:

Department:

Lab Phone Number(s):

SECTION 1. PHYSICAL & CHEMICAL PROPERTIES

Formula : H₄N₂O₃ Molecular weight : 80.04 g/mol CAS-No. : 6484-52-2 EC-No. : 229-347-8 Registration number : 01-2119490981-27-XXXX-Appearance Form: solid Color: white b) Odor No data available c) Odor Threshold No data available d) pH 4.5 - 6.0 at 80.40 g/l at 25 °C (77 °F) e) Melting point/freezing point Melting point/range: 169 °C (336 °F) - lit. f) Initial boiling point and boiling range 210 °C (410 °F) - lit. Relative density 1.72 g/cm³ at 20 °C (68 °F) n) Water solubility 2,130 g/l at 25 °C (77 °F)

Hazard Classification:

For the purpose of transportation, AN that contains less than 0.2 percent combustible substances and AN fertilizers are classified by the U.S. Department of Transportation (DOT), as oxidizers. AN with more than 0.2 percent combustible substances is classified by DOT as an explosive.⁵ (see box below).

The National Fire Protection Association (NFPA) assigns an instability rating of 3 (in a range of 0-4) to AN, meaning AN is capable of detonation, explosive decomposition, or explosive reaction, but that a strong initiating source or confinement in extreme temperatures is required. AN can explode under certain conditions by adding energy (heat, shock), especially when contaminants are present or it is under confinement.

“Pure” ammonium nitrate is stable and will explode only under extraordinary circumstances. However, the addition of combustible materials such as sugar, grain dust, seed husks or other organic contaminants, even in fairly low percentages, creates a dangerous combination and the ammonium nitrate mixture becomes far more susceptible to detonation. This characteristic of ammonium nitrate underlies most of the advice and recommendations for safe handling contained herein.

AN will self-compress/self-confine under some conditions, becoming much more likely to explode.

AN is at risk for explosion when stored near other material that can add fuel to the AN – such as grain, sugar, seeds, sawdust, and most especially petroleum fuels such as diesel.

AN is a powerful oxidizer and a rich source of nitrate, which provides energy to an explosion. Thus, the presence of fuel and/or heat (and especially both) near AN is a very high hazard situation.

Keep in mind that ammonium nitrate is an oxidizer – that is – it provides its own oxygen and once combustion begins, it cannot be smothered. Moreover, the combination of heat and confinement will accelerate combustion, perhaps to the point of detonation. Confinement and/or the addition of fuel to AN creates a real danger of explosion. The addition of heat when either of these conditions exists can lead to disaster. Accordingly, the responder should quickly assess if AN has been involved in the fire and whether the AN has been compromised in any of these ways, and plan the fire response accordingly.

Niche uses;

Ammonium nitrate is used in some [instant cold packs](#), as its dissolution in water is highly [endothermic](#). It also was used, in combination with independently explosive "fuels" such as [guanidine nitrate](#),^{[13][14]} as a cheaper (but less stable) alternative to [5-aminotetrazole](#) in the inflators of [airbags](#) manufactured by [Takata Corporation](#), which were recalled as unsafe after killing 14 people.^[15]

SECTION 2. ACCIDENTS & LESSONS LEARNED


- Most recently, on April 17, 2013, a fire at a fertilizer storage and distribution facility in West, Texas, resulted in a detonation of AN fertilizer stored at the facility, **killing 15 people, including some of the firefighters** responding to the fire. That incident remains under investigation,⁴ but much has been learned from other AN explosions.
- On October 2, 2003, a fire and explosion occurred in a double story farm warehouse in St. Romain en Jarez, France, involving 3 to 5 tons of AN stored in bags. This incident **killed 26 people, 18 of whom were firefighters**. In this incident, improper storage methods are thought to have played a role.
- On September 21, 2001, a massive explosion occurred in a warehouse at the Azote de France fertilizer factory in Toulouse, France, involving 200-300 tons of AN, which was stored in bulk in a hangar. The explosion resulted in the **death of 30 people, 2500 injuries**, the destruction of the factory, and an additional 10,000 buildings being heavily damaged. The exact cause of this accident remains unknown. Storage of incompatible material with AN is believed to have been a factor.

SECTION 3. EXPOSURE CONTROL PARAMETERS

Appropriate engineering controls Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday

Components with workplace control parameters Contains no substances with occupational exposure limit values. Hazardous components without workplace control parameters

SECTION 4. OSHA's (GHS)-SDS INFORMATION

Chemical Name	GHS Pictogram(s)	Generic Chemical Definition
Ammonium Nitrate		Ammonium nitrate is a chemical compound , the nitrate salt of the ammonium cation . It has the chemical formula NH_4NO_3 , simplified to $\text{N}_2\text{H}_4\text{O}_3$. It is a white crystal solid and is highly soluble in water. It is predominantly used in agriculture as a high-nitrogen fertilizer . ⁴³ Its other major use is as a component of explosive mixtures used in mining, quarrying, and civil construction. It is the major constituent of ANFO , a popular industrial explosive which accounts for 80% of explosives used in North America; similar formulations have been used in improvised explosive devices . Many countries are phasing out its use in consumer applications due to concerns over its potential for misuse. ⁴⁴

OSHA's GHS Signal Word is **(DANGER)**

SECTION 5. GHS HAZARD (H) CODES and PRECAUTIONARY STATEMENT (P) CODES

(H)/Hazard Statement (s)

H272 May intensify fire; oxidizer.

H319 Causes serious eye irritation

(P)/Precautionary Statement (s)

P210 Keep away from heat.

P220 Keep/Store away from clothing/ combustible materials.

P221 Take any precaution to avoid mixing with combustibles.

P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish

P501 Dispose of contents/ container to an approved waste disposal plant.

SECTION 6. ADMINISTRATIVE CONTROLS

1.	Lab-specific safety training must be provided by the principal investigator (PI) or other qualified personnel to all researchers working with AN .
2.	The PI must perform a Workplace Hazard Assessment (WHA) form for Laboratories at, http://research.uchc.edu/wp-content/uploads/sites/1137/2015/09/workplace_hazard_assessment.pdf
3.	Researchers must not work alone with AN . Please note that UCONN Health/Storrs has a Working Alone Policy , found at http://content.research.uconn.edu/pdf/uch/rcs/ehs/policy-workingalone2017.pdf

4.	Documentation of training is required and satisfied upon review and sign-off of this LSOP and submission to EH&S for approval.
5.	In addition to reviewing this document, you must review the Safety Data Sheet (SDS) for AN prior to use, and instruct your employees.
6.	Whenever possible, find safer substitutes or reduce the quantities of AN.
7.	Experiments should be performed during normal business hours (e.g.) 8:00 am-5:00 pm Mon-Fri) if possible.
8.	Multiple transfers of small volumes/quantities of AN are preferred over a single transfer of larger volumes/quantities.
9.	Any handling of AN requires supervision from the Lab supervisor, PI or other experience employee.

SECTION 7. ENGINEERING CONTROLS

10.	Appropriate engineering controls-avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Wear the appropriate level of PPE per this document
11.	Chemical fume hoods must be running at over 90 linear feet/minute and tested by EH&S within the last year.
12.	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.
13.	Ensure that eyewash stations and safety showers are proximal to the workstation location and tested accordingly.
14.	EH&S certifies flow rates of fume hoods for UCONN Health, contact EH&S at 860-679-2723 for re-test.
15.	If the hood is not working properly, contact Facilities to repair the hood at 860-679-2125.
16.	Work with AN – the work must only be conducted in a suitable/rated fume hood .
17.	Sash height must be kept as low as possible to avoid escaping fumes and provide a physical barrier.

SECTION 8. PERSONAL PROTECTIVE EQUIPMENT *(At a minimum, follow these PPE guidelines)*

Eye and Face Protection

In case of eye contact-rinse thoroughly with plenty of water using an eyewash station for at least 15 minutes, occasionally lifting the upper and lower eyelids. Remove contact lenses if possible.

18.	Eye/face protection Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
19.	Ordinary prescription glasses will NOT provide adequate protection unless they also meet ANSI standard and have compliant side shields.

Skin and Body Protection

In case of skin contact If skin contact occurs, and/or skin or clothing are on fire, immediately remove all clothing and drench in the safety shower with copious amounts of water for no less than 15 minutes to remove any remaining contaminants. If possible to do so without further injury, remove any remaining jewelry or clothing.

20.	Handle with gloves -Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.
21.	Splash Contact -Material: Nitrile rubber Minimum layer thickness: 0.11 mm Break through time: 480 min Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)
22.	Full Contact - Material: Nitrile rubber Minimum layer thickness: 0.11 mm Break through time: 480 min Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)
23.	Long pants, closed-toe/closed-heel shoes, covered legs, and ankles.

SECTION 9. HAZARD REDUCTION REQUIREMENTS

Storage/Process Conditions to Avoid

Persons engaged in the handling, management or emergency planning for AN must be aware of the hazards of AN and ensure that the conditions that may lead to an explosion are not present. Measures that facilities should take to ensure the safe storage, use and handling of AN include:

24.	<p>CODES AND STANDARDS</p> <ul style="list-style-type: none"> ➤ NFPA codes and Compressed Gas Association (CGA) standards are developed through a consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing various viewpoints and interests to achieve consensus on safety issues. These codes and standards are not binding but may be adopted by reference into laws or regulations. Users of the codes and standards should consult applicable federal, state and local laws and regulations. <p>NFPA has developed a code for storage of AN, including mixtures containing 60 percent or more by weight of AN, and a code for explosives that would apply to blasting agents and explosives containing AN. These codes are listed below:</p> <p>NFPA 400 — Hazardous Materials Code, Chapter 11 - Ammonium Nitrate Solids and Liquids. (2013). Also see Annex A.11 in this document and Annex E: Properties and Uses of Ammonium Nitrate and Fire-Fighting Procedures.</p> <p>NFPA 495 — Explosive Materials Code (2013).</p> <p>National Fire Protection Association 1 Batterymarch Park PO Box 9101 Quincy, MA 02169-7471 Phone: 800-344-3555 (toll free) Website: http://www.nfpa.org/freeaccess</p>
25.	<ul style="list-style-type: none"> ➤ Avoid heating AN in a confined space. <ul style="list-style-type: none"> • Processes involving AN should be designed to avoid this possibility. • Avoid localized heating of AN, potentially leading to development of high temperature areas (e.g., AN fertilizer should not be stored near sources of heat such as steam pipes, radiators, hot ducts, light bulbs etc.) • Ensure that AN is not exposed to strong shock waves from explosives. AN storage near high explosives or blasting agents must conform to ATF's Table of Separation Distances, Title 22 of the Code of Federal Regulations, section 555.220 (22 CFR 555.220). Chemical Advisory: Safe Storage, Handling, and Management of Ammonium Nitrate August 2013 ➤ Avoid contamination of AN with combustible materials or organic substances such as packing materials, dust, seed, oils, and waxes <ul style="list-style-type: none"> • If possible, do not co-locate AN, especially bulk AN in bins, with dust-producing organics such as grains or seeds. • Avoid contamination of AN with inorganic materials that may contribute to its sensitivity to explosion, including chlorides and some metals, such as aluminum powder, chromium, copper, cobalt, and nickel. • Pay attention to the materials used to build storage areas and cribs. Wood and aluminum or other metals must be specially treated to prevent impregnation if they are going to be in contact with AN. Metal materials can be treated with epoxy tar or chlorinated rubbers to prevent corrosion of the metal and contamination of the AN. • Maintain the pH of AN solutions within the safe operating range of the process. In particular, avoid low pH (acidic) conditions. <ul style="list-style-type: none"> ○ If possible, do not co-locate acids in an AN storage area. • Keep molten or solid AN out of confined spaces, especially sewers or drains where it can react with organic materials there. <p>Certain specific safety and handling instructions (required and recommended) apply for safe handling and storage of AN6 under certain conditions:</p> <p>OSHA's standard for Explosives and Blasting Agents at 29 CFR 1910.109(i) contains requirements for AN stored in the form of crystals, flakes, grains or prills including fertilizer grade, dynamite grade, nitrous oxide grade, technical grade, and other mixtures containing 60 percent or more of AN by weight. AN should also be handled in accordance with safe practices found in NFPA 400 Hazardous Materials Code, Chapter 11.</p> <p>Building Design:</p> <ul style="list-style-type: none"> ➤ Store only in one-story buildings and buildings with no basements, unless the basement is open on one side. ➤ Use fire resistant walls within 50 feet of combustible building or materials. ➤ Flooring in storage and handling areas should be constructed of noncombustible material or protected from impregnation by AN. ➤ Avoid installing, or remove or close off any open drains, traps, tunnels, pits or pockets into which molten AN can flow and be confined in the event of fire. ➤ Buildings should be kept dry and free of water seepage through roofs, walls and floors. ➤ Have adequate ventilation or be constructed to self-ventilate in the event of a fire to avoid pressurization. ➤ Do not place AN into storage when the temperature of the product exceeds 130°F (54.4°C). <p>AN-based materials that are DOT Hazard Class 1 sensitive (explosives or blasting agents) must be handled and stored in accordance with requirements of OSHA's Standard for Explosives and Blasting Agents (29 CFR 1910.109) and ATF's</p>

Table of Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives or Blasting Agents (27 CFR 555.220) Facilities should also follow the NFPA 495- Explosive Materials Code, where applicable. Chemical Advisory: Safe Storage, Handling, and Management of Ammonium Nitrate August 2013

Storage in bags, drums or other containers:

- Piles of bags, drums and other containers should be no closer than 36 inches below the roof or supporting beams.
- Bags should be stored no less than 30 inches from walls or partitions.
- Piles of bags, drums, and other containers should not exceed a height of 20 feet, width of 20 feet, and length of 50 feet, unless the building is of noncombustible construction or protected by automatic sprinklers.
- Maintain aisles of at least 3 feet width between piles.

Fire Protection:

- AN storage areas should be equipped with an automatic sprinkler system, or have an automatic fire detection and alarm system if the areas are not continuously occupied. This is especially important when the facility in question is close to the public surrounding the facility.
- Facilities should NOT store more than 2500 tons of bagged AN without an automatic sprinkler system.
- An automatic sprinkler system, if installed, should be provided in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems.
- Suitable fire control devices such as hoses and appropriate portable fire extinguishers (AN is an oxidizer and not all fire extinguishers are appropriate) shall be provided throughout the warehouse and loading areas. Water supplies and fire hydrants should be available.
- Store AN fertilizer in separate buildings or separated by approved fire walls from organic, combustible or reactive materials, such as grains, wood or other organic materials, urea and urea compounds, flammable liquids or gases, corrosive acids, chlorates, chromates nitrites, permanganates or finely divided metals or sulfur.
- AN fertilizer should NOT be stored in the same building with explosives or blasting agents unless conditions in ATF's Table of Separation Distances of Ammonium Nitrate and Blasting Agents from Explosives and Blasting Agents, 27 CFR 555.220, are met.
- Prohibit smoking in AN storage areas.
- We recommend that AN be stored in purpose-built facilities/buildings of non-combustible construction. Dust-producing organic materials, such as grain, seeds and sugar, should not be stored near AN. Some metal powders such as aluminum powder are equally dangerous. AN should be stored so as to ensure it is not contaminated by gasoline, diesel or other fuels, and is not subject to high heat (even in one small area of a large stockpile) or water infiltration.

SECTION 10.

COMMUNITY EMERGENCY PLANNING

26. AN is a hazardous chemical covered under the OSHA Hazard Communication Standard. Therefore, facilities that handle and store AN are required by law to submit information regarding chemical hazards (including AN) to their State or Tribal Emergency Response Commission (SERC or TERC), Local Emergency Planning Committee (LEPC), and local fire department. This information must include the following:

- 1) Safety Data Sheets (SDS) providing the chemical's hazard information and emergency response guidelines &
- 2) Hazardous Chemical Inventory form that provides the quantity, storage types and locations of the AN at their facility.

27. It is recommended that fire services visit any facility reporting AN, and that the conditions of storage and manner of handling be reviewed by **fire service personnel**.

- **Fire service and other emergency responders** should take note of the specific location(s)
- Amounts and packaging of stored AN.
- Conditions of storage should be reviewed with the facility operator in light of the information provided in this document.

28. **The LEPC in conjunction with the fire department** should use this information to develop an emergency plan, in case of a fire or explosion involving AN or any other hazardous substance. The facility should consult with the LEPC to provide them the necessary information to develop the emergency plan, the elements of which should include:

- Identification of facilities and transportation routes of hazardous substances
- Description of emergency response procedures, on and off site
- Designation of a community coordinator and facility emergency coordinator(s) to implement the plan
- Outline of emergency notification procedures
- Description of how to determine the probable area and population affected by releases
- Description of local emergency equipment and facilities and the persons responsible for them

	<ul style="list-style-type: none"> ➤ Outline of evacuation plans ➤ A training program for emergency responders (including schedules) ➤ Methods and schedules for exercising emergency response plans ➤ LEPCs should also ensure that members of the community (which would include potentially affected populations) are aware of the emergency plan and the actions they need to take if an accident occurs. ➤ Local fire departments should use the information to determine what precautions they may need to take in responding to an accident at the facility and ensure the first responders have the appropriate training to respond to incidents involving AN. ➤ Owners and operators of facilities holding AN are required to report the AN hazard to local response officials under the Emergency Planning and Community Right-to-Know Act (EPCRA). Unfortunately, that obligation is not universally understood, and so some facilities may fail to report. ➤ Fertilizer-grade AN is typically found at those businesses that provide direct logistical support to agriculture. This may include crop service operations, farm co-ops, grange stores and similar operations. ➤ In the interest of community safety, it is often necessary and appropriate for first response officials to reach out to facility owners and operators, and determine if unreported risks are present in their community. Helping a neighbor, facility operator, or employer to understand and meet his obligations to the community and to workers is in everyone's best interest
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SECTION 11. SPILLS, ACCIDENTS & EMERGENCY PROCEDURES

29.	<p>Owners and operators of facilities holding AN have an obligation to ensure their community's first responders are aware of the hazards associated with the AN. Reliance on a report may not always be sufficient. Owners and operators should take a pro-active approach to reaching out to the emergency response officials in their location and ensuring that the hazards of AN are understood by the responders.</p>
30.	<p>Owner/operators of storage facilities should develop a site emergency response plan which includes:</p> <ul style="list-style-type: none"> ➤ Coordination with local first responders ➤ Joint training with first responders if possible ➤ Employee training ➤ Community outreach ➤ Analysis of what may be at risk in a serious accident and appropriate planning ➤ Signs that clearly mark high hazard areas, safe areas, emergency contact numbers, firefighting equipment, and other essential area during an emergency response ➤ A site and area evacuation plan
31.	<p>What do firefighters need to know when responding to an accident or fire involving AN?</p> <p>Before responding to a fire involving AN, firefighters should ensure the community emergency response plan includes:</p> <ul style="list-style-type: none"> ➤ AN hazard information and emergency response guidelines ➤ Quantity, storage types, and locations of AN at facilities in their community ➤ Specific response procedures; including a decision process to determine under which conditions a fire should be fought or whether the fire should be allowed to burn ➤ Evacuation procedures for the community ➤ Training requirements for all response personnel ➤ A schedule for exercising the response plan related to AN accidents <p>When responding to a fire where AN is stored; firefighters should:</p> <ul style="list-style-type: none"> ➤ First consider if they can safely fight the fire or whether they should just let it burn, move to a safe location, and focus on evacuating nearby residents and preventing further safety issues for the surrounding community. <p>To determine whether or not it makes sense to fight the fire or to let it burn, firefighters and emergency responders should consider the following information:</p> <ul style="list-style-type: none"> ➤ Firefighters should not fight an AN fire and everyone, including fire fighters, should be evacuated to a safe distance if they observe any of the following: <ul style="list-style-type: none"> ○ A fire involving AN is judged to be out of control; ○ The fire is engulfing the AN; or ○ Brown/orange smoke is detected, indicating the presence of nitrogen dioxide (which is toxic); or ○ A rapid increase in the amount/intensity of smoke or fire in the area of AN storage. ➤ If firefighters consider it safe and appropriate to respond to a fire involving AN, then the following information should be considered: <ul style="list-style-type: none"> ○ AN fires should be fought from protected locations or maximum possible distance. ○ Approach a fire involving or close to AN from upwind to avoid hazardous vapors and toxic decomposition products. ○ Self-contained breathing apparatus (SCBA) of types approved by the National Institute for Occupational Safety and Health (NIOSH) should be used to protect personnel against gases.

	<ul style="list-style-type: none"> ○ Use flooding quantities of water from a distance as promptly as possible. ○ It is important that the mass of AN be kept cool and the burning be quickly extinguished. ○ Keep adjacent fertilizers cool by spraying with large amounts of water. ○ When possible and appropriate, only use unmanned hose holders or monitor nozzles. ○ Do NOT use steam, CO₂, dry powder or foam extinguishers, sand or other smothering agents. ○ Ensure maximum ventilation of the AN storage container as quickly as practical to prevent heat and pressure buildup. This is different than ensuring maximum ventilation of the entire building or structure where the AN is stored. Ventilation of the structure should be conducted only in a manner to limit fire spread and growth and should be minimized until a suppression water supply is established. ○ If practicable and safe to do so, attempt to prevent AN from entering the drains where explosive confinement could occur. Remember AN may be washed into drains by fire water, but it can also melt and flow without impetus from water. ○ Prevent or minimize contamination of water bodies or streams to reduce the potential for environmental effects.
32.	Call 911 or 7777 from landline if Life Threatening and call EH&S at 860-679-2723 for Non-Life Threatening Spill Coordination efforts.
33.	Evacuate the laboratory and inform others in the immediate area to leave the work area. Evacuate the laboratory calmly yet safely, and rally at the Emergency Assembly Area (EAA) as designated by the Fire Department
34.	The (EAA) is a pre-determined safe zone for employees to meet during an emergency.
35.	Upon evacuation, also try to minimize damage; isolate/contain if able. (e.g.) open hoods to accelerate dissipation in air, hit HVAC purge button to increase laboratory air changes, disconnect electrical sources etc.
36.	Upon Evacuation, close door(s) to lab and post a “NO ENTRY” sign(s) or other warning information on the door.
37.	The Emergency Evacuation Attendants (EEA) are those who have been assigned take roll call of employees and report to the Emergency Evacuation Coordinator (EEC)
38.	No one shall be permitted to leave the Emergency Assembly Area (EAA) until the scene has been determined safe for re-entry by the On-Scene Emergency Coordinator (EC) -Senior Fire Department Official.
39.	Do not re-enter the lab/area until instructed to do so by the On-Scene Emergency Coordinator (EC) -Senior Fire Department Official.
40.	Should the Emergency Assembly Area (EAA) be compromised, evacuees will be instructed by Emergency Evacuation Attendants (EEA's) or the Emergency Evacuation Coordinator (EEC) to re-locate to a secondary Emergency Assembly Area (SEAA)
41.	EH&S recommends that individual labs discuss emergency response and readiness at their laboratory meetings and practice drill. EH&S can aid in this effort along with Public Safety.
42.	Report Spills, accidents which are also deemed non-life threatening or non-emergency situations to your respective PI/Supervisor and EH&S.
SECTION 12. FIRST AID PROCEDURES (Have your SDS Available for First Responders)	
First Aid- Eyes	<ol style="list-style-type: none"> 1. Remove contact lenses (if applicable) 2. Forcibly hold eyelids open and flush eyes under eyewash for 15 minutes 3. If pain persists after 15 minutes, dial 911 4. Keep flushing eyes until emergency personnel arrives 5. Report incident to PI/Supervisor and EH&S.
First Aid- Skin	<ol style="list-style-type: none"> 1. Remove contaminated clothing (if applicable) 2. Flush affected area(s) under safety shower for 15 minutes 3. If pain persists after 15 minutes, dial 911 4. Keep rinsing affected area until emergency personnel arrives 5. Report incident to PI/Supervisor and EH&S. 6. Needle stick/puncture exposure-wash the affected area with antiseptic soap/warm water for 15 minutes.
First Aid- Inhalation	<ol style="list-style-type: none"> 1. Move to fresh air 2. Dial 911 3. Report incident to PI/Supervisor and EH&S.
SECTION 13. HAZARDOUS WASTE MANAGEMENT-(GENERAL)	
48.	All hazardous wastes must be labeled with “Hazardous Waste” stickers or tags, use full chemical names to describe the waste (i.e. no chemical abbreviations or symbols), have 100% of the constituents by volume identified and be stored in containers with <u>tight-fitting caps or lids</u> , and be segregated by chemical compatibility.
49.	Hazardous wastes must be stored at or near a green (S.A.A.) aka “Satellite Accumulation Area” sign prior to disposal by EH&S.

50.	Hazardous wastes must accumulate under the control of the generator, with a container maintained in good condition, free of exterior residues on container or in the spill tray. All spills and residues must be immediately cleaned up.
51.	Hazardous wastes must be transferred within a chemical fume hood but then be removed for temporary storage with the generator's respective (SAA). When chemical waste is being transferred is the only time that it may remain open. Closed, means that no liquid will spill from a waste collection container, should the container be knocked over/inverted.
52.	All AN solutions and contaminated solids will be collected and characterized by EH&S as chemical hazardous waste

SECTION 14. SPECIFIC PROCEDURE *(left blank intentionally; please see & follow instructions)*

(Document the Experiment Information with regard to use of AN, too include the procedures for disposal of the waste and the selection and application of correct PPE)

Instructions As Follows:

SECTION 15. APPROVAL

I have reviewed, understand and agree to follow this LSOP regarding AN liquids and solids. Failure to follow the LSOP and lab-specific training guidelines for research with AN is a violation of the [University Health & Safety Policy](#) and [University Code of Conduct](#). Further approval from the PI is required if any of the following events occur:

- A change in the agreed-upon experimental set-up is planned
- Signs of a failure in safety design or equipment are observed
- Signs or symptoms of a chemical exposure to any personnel are observed
- Unexpected and/or potentially dangerous experimental results occur (e.g., fire, uncontrolled buildup of heat and/or pressure, etc.)

SECTION 16. GENERAL REFERENCES

GENERAL REFERENCES:

Storing and Handling Ammonium Nitrate, INDG230 (First published 8/96, Reprinted 11/04). Health and Safety Executive (HSE), United Kingdom <http://www.hse.gov.uk/explosives/ammonium/>

Safe Storage and Handling of Ammonium Nitrate (AN), Technical Note 60, (28/02/2006), SafeWork, South Australia. http://www.safework.sa.gov.au/uploaded_files/SSAN_Storage.T60.pdf

Safe Practice: Safe Storage of Solid Ammonium Nitrate. (2013). Resources Safety, Division of Mines and Petroleum, Government of Western Australia (WA), East Perth, WA.

http://www.dmp.wa.gov.au/documents/Code_of_Practice/DGS_COP_StorageSolidAmmoniumNitrate.pdf

Guidance for the Storage, Handling and Transportation of Solid Mineral Fertilizers. (2007). European Fertilizers Manufacturers Association, Brussels, Belgium, www.efma.org

Guidance for the Safe Handling and use of Non-conforming Fertilizers and Related Materials (Producers). (2003). European Fertilizers Manufacturers Association, Brussels, Belgium, www.efma.org

Guidance for the Safe Handling and Use of Non-conforming Fertilizers and Related Materials for Fertilizer Importers, Distributors and Merchants. (2004). European Fertilizers Manufacturers Association, Brussels, Belgium, www.efma.org

Guidance for the Storage of Hot Ammonium Nitrate Solution. (2005). European Fertilizers Manufacturers Association, Brussels, Belgium, www.efma.org

Guidance for Compatibility of Fertilizer Blending Materials. (2006). European Fertilizers Manufacturers Association, Brussels, Belgium, www.efma.org

The above five guidance documents from European Fertilizers Manufacturers Association can be found on the following webpage: <http://www.productstewardship.eu/site/index.php?id=259>

Ammonium Nitrate and Mixed Fertilizers Containing Ammonium Nitrate, FM Global Property Loss Prevention Data Sheet 7-89.

(April 2013). FM Global, Johnston, Rhode Island. <http://www.fmglobal.com/page.aspx?id=04010200> Free access with registration
Ammonium Nitrate Handling, (2013). Bunn Fertiliser, Ltd.
<http://www.bunnfertiliser.com/infocentre/bunnhealthsafety/ammoniumnitratehandling/>

PLEASE ENSURE THAT THIS LSOP AND THE SDS ARE REVIEWED, TRAINED UPON AND UNDERSTOOD BY END USERS. THIS FORM IS DESIGNED TO NOT ONLY PROVIDE UCONN HEALTH WITH RISK MITIGATION BUT FOR THE PRINCIPAL INVESTIGATOR AS WELL. PLEASE SEND A COPY OF THE COMPLETED LSOP TO EH&S FOR REVIEW AND APPROVAL. EH&S APPRECIATES YOUR COOPERATION WITH THIS MATTER.

Researcher Signature	Date	Trainer Signature	Training Date

SECTION 17. PRINCIPAL INVESTIGATOR CERTIFICATION

I approve the contents of the lab-specific standard operating procedure listed above:

PI Signature:

Date:

Date sent to EH&S for Review and Approval:

Date: