FERTILIZER CANADA

SUMMARY OF OUTCOMES FROM AMMONIUM NITRATE CONSULTATION FORUM

AUGUST 04, 2020

SUMMARY OF OUTCOMES FROM AMMONIUM NITRATE CONSULTATION FORUM

FERTILIZER CANADA

PROJECT NO.: 211-05803-00

DATE: AUGUST 04, 2020

WSP
582 LANCASTER STREET WEST
KITCHENER, ON
CANADA N2K 1M3

T: +1 519 743-8778
WSP.COM

August 04, 2020

Fertilizer Canada
350 Sparks Street, Suite 907
Ottawa, ON
K1R 7S8
(613) 786-3040

Attention: Nadine Frost, Director, Policy & Industry Standards

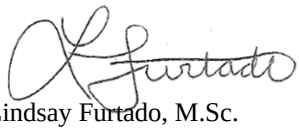
Dear Ms. Frost:

Subject: Summary of Outcomes from Ammonium Nitrate Consultation Forum

We are pleased to submit this report that summarizes the outcomes from the Ammonium Nitrate Consultation Forum that occurred on June 9, 2021.

The major findings are included in the attached report. If you have any questions regarding this report, please contact the undersigned.

Yours sincerely,
WSP Canada Inc.



Lindsay Furtado, M.Sc.
Project Manager and Risk Assessor

WSP ref.: 211-05803-00

582 LANCASTER STREET WEST
KITCHENER, ON
CANADA N2K 1M3

T: +1 519 743-8778
wsp.com

SIGNATURES

PREPARED BY

Lindsay Furtado, M.Sc., R.P.Bio
Project Manager and Risk Assessor

August 04, 2021
Date

APPROVED BY

Theresa Repaso-Subang, B.Sc.H, DABT, ERT, QP_{RA}
Senior Technical Lead - Toxicology & Risk Assessment

August 04, 2021
Date

In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

The original of this digital file will be kept by WSP for a period of not less than 10 years. As the digital file transmitted to the intended recipient is no longer under the control of WSP, its integrity cannot be assured. As such, WSP does not guarantee any modifications made to this digital file subsequent to its transmission to the intended recipient.]

This limitations statement is considered an integral part of this report.

TABLE OF CONTENTS

1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Fertilizer Canada (FC) to prepare an Outcomes Report following the ammonium nitrate (AN) fertilizer consultation forum held on June 9th, 2021 amongst major industry and government stakeholders.

Transport Canada (TC) conducted a preliminary review pertaining to AN regulations and best practices in Canada following the Beirut explosion (TC, 2020). No significant issues were identified for the Canadian context. However, it was recommended to increase coordination and harmonization of regulatory oversight of AN across the multi-tiered governmental jurisdictions.

FC, with support from TC, hosted an industry-government consultative forum (the Forum) on AN regulation on June 9, 2021. While the TC draft report reviewed the regulations and best practices in Canada related to all AN products, the focus of the Forum was on agricultural AN and AN-based fertilizers.

The Forum aimed to meet the following objectives:

- Discuss the Canadian fertilizer industry and its positioning for fertilizer safety and security as it pertains to AN handling, storage and transportation;
- Identify any opportunities for greater alignment/harmonization between jurisdictions regulating AN in Canada;
- Discuss international best practices for the handling, storage and transportation of AN, and assess any opportunities to further strengthen practices related to AN in Canada; and
- Following the Forum, create an Outcomes Report with recommendations for governments and industry to reaffirm confidence in the regulatory framework for AN.

2 FORUM PARTICIPANTS

There were over 90 participants representing including federal and provincial agencies involved in the regulation and management of AN, members of the fertilizer industry, and other major stakeholders. The following organizations participated in the Forum:

- Transport Canada (TC)
- Natural Resources Canada (NRCan)
- Environment Canada and Climate Change (ECCC)
- National Research Council (NRC)
- Health Canada
- Defence Research and Development Canada (DRDC)
- Alberta Transportation
- Manitoba Conservation and Climate
- Ontario Office of the Fire Marshal
- Quebec Ministère de l'Environnement et de la Lutte contre les changements climatiques (MELCC), Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ), and Ministère des Transports of Québec (MTQ)
- WorkSafeNB (New Brunswick)
- Ports / Port Authorities
- First Responders
- Transportation Sector
- Explosives Sector
- Academia (University of Sherbrooke)
- Canadian Association of Agri-Retailers
- Canadian Trucking Alliance
- Fertilizer Industry Associations and Members (Borealis, Cavendish Agri Services, CF Industries, Federated Co-Operatives Limited, Fertilizer Canada (FC), Grupo Fertiberia, Nutrien, Orica, Sollio Agriculture, Sylvite, Synagri, UNIFA (Union of Fertilizer Industries) and Yara)

3 ISSUES IDENTIFICATION

3.1 AMMONIUM NITRATE PROPERTIES AND HAZARDS

As defined in the TC (2020) report, AN is a white salt that forms a solution when dissolved in water. There are several properties that promote hazards during the storage and transport of AN. This includes:

- **Violent Fire**: AN is a strong oxidizer that can increase the burning of combustible materials by providing oxygen as it breaks down;
- **Toxic Fumes:** The decomposition of AN can release toxic gases causing irritation and corrosion of the respiratory system and skin; and
- **Explosion:** AN can absorb moisture from the air and form a large solid mass that is highly explosive under high temperatures (i.e., decomposition temperature of 210ºC).

As a dangerous good, AN-based products can be classified under three categories:

- **Explosives** (Class 1), in which AN is mixed with more than 0.2% of combustible or organic substances;
- **Oxidizers** (Class 5.1), in which AN is mixed with less than 0.2% of combustible or organic substances, as well as AN based fertilizer with a concentration of AN that is ≥ 70 %; and
- **Miscellaneous Dangerous Goods** (Class 9), in which AN-based fertilizers have a concentration of AN that is ≤70 %.

This report will focus on the potential hazards and regulations related to fertilizer grade ammonium nitrate (FGAN) in its solid form.

3.2 OVERVIEW OF CURRENT REGULATORY FRAMEWORK FOR AMMONIUM NITRATE

In Canada, the regulatory framework related to AN is a shared responsibility that falls under the federal, provincial and municipal levels of government.

The storage, handling and transport of AN are covered by federal regulations shared between TC, NRCan, ECCC, and the Canadian Border Services Agency (CBSA). Land planning and zoning, building structure, construction design, and fire prevention requirements for AN are enforced by provinces, territories, and municipalities through building and fire codes, which are often adopted from model codes provided by the federal National Research Council (NRC) under the National Building Code (NBC) and National Fire Code of Canada (NFCC). The Canadian AN industry, with the support of Fertilizer Canada, have also developed Codes of Practices pertaining to AN based fertilizer that encourage industries to implement best practices related to the safety and security of AN (TC, 2020).

Overall, the regulatory framework is robust and supported by industry's comprehensive Codes of Practices and international best practices; however, it is recognized that there are opportunities for improvement. This was further discussed in the presentations provided in **Section 3.3.**

3.3 SUMMARY OF PRESENTATIONS ON AN REGULATION

To help facilitate moderated discussions during the Forum, presentations were provided by NRCan, TC and FC. This section summarizes the major issues and recommendations with respect to AN regulation and best practices from these presentations.

3.3.1 TRANSPORT CANADA

3.3.1.1 *AMMONIUM REGULATIONS AND BEST PRACTICES*

The major issues and recommendations identified by TC during their presentation with respect to AN regulations and best practices is summarized below:

Regulatory Overlap

- TC regulates FGAN under the following regulations: *Ammonium Nitrate Storage Facilities Regulations*, (C.R.C,c. 1145) *under Railway Safety Act*, 1985; *Cargo Fumigation and Tackle Regulations* (SOR/2007-128) under *Canadian Shipping Act, 2001*; and, *Transportation of Dangerous Goods Regulations* under *Transportation of Dangerous Goods Act, 1992*
- Potential issues identified among these regulations include:
  - The classification and identification of AN-based fertilizers differ amongst the regulations, which may cause confusion (i.e., the regulations do not provide shipping name and UN numbers);
  - Temporary storage requirements and maximum limits permitted for AN can be unclear or confusing for some, which may result in unintended non-compliance;
  - The *Ammonium Nitrate Storage Facilities Regulations* only apply to storage facilities located on rights-of-way owned or leased by federally regulated railway companies and do not address storage requirements for farmers, distributers and/or manufacturers;
  - The safety distances required between storage facilities and the nearest residential structure are not based on a risk assessment of each facility that shows acceptable threshold and limit capacity; and
  - Storage facilities can be made of combustible materials (i.e., materials incompatible with AN).
- Recommendations include:
  - TC harmonizing regulations, which would ensure that they are aligned and updated as required to reflect the latest safety requirements.

Multiple Jurisdictions

- In Canada, the regulatory framework related to AN fall under three different levels of government. A company must examine regulations at the federal, provincial, and municipal level for the following areas: storage, handling, land-use planning, transportation, occupational health and safety regulations, construction standards and fire prevention requirements.
- Potential issues identified with the multi-jurisdictional approach include:
  - Creates challenges for the industry to navigate the requirements and remain compliant; and
  - A company must locate and navigate the required provisions through a series of different acts, regulations, and bylaws on storage, handling and transport of AN.
- Recommendations include:
  - TC collaborating among federal departments to develop guidelines outlining the roles and responsibilities of each department and best practices for safe and secure storage of AN; and
  - TC leveraging existing relationships with the provinces and municipalities to sensitize them to safety issues pertaining to AN.

International Best Practices

- Agricultural associations such as Fertilizers Europe have developed guidance that is used by manufacturers, importers, retailers, shippers, and farmers across Europe. These guides provide safety and security guidelines for the storage and transport of AN. They are used by many countries including Canada, United States, United Kingdom, Australia, and those of the European Union.
- Potential issues identified with international best practices include:
  - Industry may be following guidelines based on older best practices for the storage of AN-based fertilizer; and
  - International best practices may not have been adopted by industry resulting in possible safety risks.
- Recommendations include:
  - TC consulting with industry to review international best practices not applied in Canada; and
  - TC encouraging further development of industry standards for specific areas of activities, such as the storage of AN-based fertilizer in urban areas.

Different Versions of Model Codes

- Storage facilities containing AN are subject to provisions that specify construction standards and fire prevention requirements. Model codes are published every five years by the NRC, including: NBCC, NFCC and the NFBC.
- Potential issues identified with the model codes include:
  - Model code adoption varies across Canada. The latest versions of the codes present updated standards which may differ from earlier versions;
  - Each municipality may adopt/modify the national/provincial codes according to their needs, which creates a multitude of code variations between geographic locations; and
  - Storage facilities containing less than 1,000 kg of AN have no specific safety or security requirements and may be found in a densely populated urban area.
- Recommendations include working with industry members and associations where TC holds regulatory authority to:
  - Understand the limitations of modal specific safety requirements; and
  - Encourage the development of industry standards for specific areas of activities (for example, the storage of AN in urban areas of development).

Thresholds

- AN is subject to certain provisions when stored in quantities exceeding 3000 lbs or 1500 kg of FGAN as per the AN Storage Facilities Regulation, 1000 kg when AN is classified as Class 5.1 as per the Building and Fire Codes, and 1000 kg FGAN as per the AN Code of Practice.
- TC is looking to gain more information on the rationale behind the establishment of these thresholds and if these threshold limits are based on a risk assessment.

Safety Limits

- Different codes and regulations (federal, provincial, municipal) are prescribing safety distances from other buildings. For example, 15 m from buildings containing low hazard industrial products, 30 m from buildings containing flammable liquid, 45 m from offices and restaurants, and 90 m from schools and multi-unit residential.
- TC is looking to gain more information on how these safety distances were established.

3.3.1.2 *AMMONIUM NITRATE RISK ANALYSIS AND EVALUATION*

The findings from the AN Risk Analysis and Evaluation presented by TC Transportation of Dangerous Goods (TDG) Directorate is summarized below:

Purpose and Objectives

- TDG supports an ongoing risk analysis and evaluation on the transportation of AN in Canada to support the development on plans, policies and regulations. The intent of the analysis is to determine if the risk associated with the transport of AN products is tolerable.

Method

- The risk analysis and evaluation measures the likelihood and impact of incidents involving the handling, offering for transport, transporting and importing (HOTI) of AN products in Canada, collating information related to: risk exposure of AN/AN-based products, frequency/likelihood of incidents, and severity of incidents.

Preliminary Findings

- Compliance of AN sites generally tends to be consistent with compliance rates of other dangerous good sites.
- Production, import, and export data suggests more AN is currently stored and moved within Canada than in the past, which could increase risks.
- 40% of incidents involving AN/AN-based products in the past five (5) years resulted in no release.
- The majority of incidents involving AN/AN-based products occurred on roads.
- Preliminary analysis of data suggests that movement of AN by rail and marine is increasing.

3.3.2 *FERTILIZER CANADA*

The major issues and recommendations identified by Fertilizer Canada during their presentation with respect to AN regulations and best practices is summarized below.

Codes of Practice

- The Codes of Practice cover the full scope of fertilizer safety and security including: security and site requirements; safe transportation and storage; training and documentation; and environmental and emergency response procedures.
- Compliance with the Codes of Practice is mandatory for members of FC.
- The CAN and AN Codes are supported by industry training courses available through FCs eLearning platform.
- The industry Codes of Practice can be used to address gaps in domestic best practices.

Recommendations for Regulators

- Regulatory oversight for AN fertilizer – industry recommendations:
  - Ensure regulations for these products are: science-based, risk-based, clear and consistent.
  - Look for opportunities for greater alignment/harmonization.
- Federal alignment of AN thresholds:
  - *AN Storage Facilities Regulation* was promulgated under the *Railway Safety Act*, and the 60% AN threshold from these Regulations has been referenced / carried over to other federal Regulations and Codes with provisions applicable to AN and ANBF.
  - Presents challenges where ANBF with 60% AN, that are not classified as dangerous goods, are subject to additional restrictions.
  - Consider establishing a mechanism to seek exemption for certain products (e.g. CAN) based on safety profiles, rather than %AN threshold alone. The process should align with the previous requests through the NFPA.

- Federal alignment of CAN thresholds:
  - CAN has a very specific product definition. This definition needs to be harmonized in the relevant Regulations to ensure alignment.
  - NRCan: CAN will be defined on the Restricted Components List under the Explosives Regulations.
  - Canadian Food Inspection Agencies (CFIA): CAN is defined on Fertilizers Regulations List of Materials – opportunity to update this reference to align with the CAN Code of Practice and Explosives Regulations.

First Responder Awareness Training

- FC has been successful with developing and delivering agricultural anhydrous ammonia first responder awareness training; there may be opportunities to increase awareness of AN fertilizer safety and security with Canada's first responder community.

4 SUMMARY OF MODERATED DISCUSSIONS

Moderated discussions between key federal government departments, industry and stakeholder participants took place during the Forum to gather input related to regulatory harmonization and benchmarking of AN in Canada. To help facilitate this process, a set of guiding questions were provided by FC for each workshop Based on these discussions, this section summarizes the major regulatory issues identified and the recommendations for improving guidance of AN activities in Canada.

4.1 REGULATORY HARMONIZATION

4.1.1 OBJECTIVES OF DISCUSSION

- Identify any opportunities for greater alignment/harmonization between jurisdictions regulating AN in Canada;
- Based on the discussions, seek agreement on commitments for Outcomes and next steps for governments and industry to document in Outcomes Report.

4.1.2 FEEDBACK ON OPPORTUNITIES FOR GREATER ALIGNMENT/ HARMONIZATION

The major issues highlighted by participants related to greater alignment/harmonization between jurisdictions regulating AN in Canada is summarized below:

Separation / Setback Distances

- TC acknowledges that the safety distances are a key aspect of differences between regulations and is currently reviewing their *AN Storage Facility Regulations*. The separation distances from other structures should be examined /re-evaluated based on science- and -risk based approach.
- Industry wants setback distances to consider urban areas, where some fertilizer facilities are being encroached, which limits their ability to expand and operate. The primary safety concerns should be preventing fire, contamination, and theft of the product. Setbacks should also consider storage methods (e.g. size of building, ventilation, material of building, etc.).

Volume Thresholds in Storage and Transportation

- Industry has identified that there are varying definitions within federal regulations when it comes to thresholds of a product containing AN. Thresholds identifying AN based product are not consistent with definitions by TDGR, and therefore compliance differs across regulations and causes confusion for the supply chain. It is important to find ways to clarify and have a consistent approach on which AN product should be regulated, and which should not.
- ECCC has been reviewing the standards and are aware that there are differences in thresholds. However, it can be difficult to align all thresholds as the different regulations apply to different mandates or are evaluating different types of risk.

Science- and Risk- Based Analysis and Regulation

- It appears to industry that there is little to no clarity from most regulatory agencies enforcing setbacks / thresholds as to who created these limits and why. It appears government does not know the rationale for all regulations and are having difficulty tracing the development of some regulations; therefore, this could be an opportunity to develop regulations that are based on risk and current science. Industry experience can be used to help with this. Industry has helped to develop standards based on science and knowledge of their products, which has been used to improve regulations (e.g. industry has helped with recommendations for the NFPA).
- ECCC recognizes that it is difficult to find historical information on how certain thresholds or standards were identified. We need to establish thresholds which are based on today's knowledge and science. There are tools available to evaluate the risks and these can be used to conduct risk assessments to work towards standardization, while fitting the mandate of respective authorities.
- NRCAN identified that volumes and distances are based on operational requirements; therefore, we should turn to something science based such as modelling technologies (e.g., Institute Makers of Explosives Safety Analysis for Risk (IMESAFR) has a good AN model).

Classification:

- Industry would like to see a consistent following of TDGR under UN Classifications.
- TC highlighted that there is a need to align / harmonize AN classification among TC regulations and it is suggested to use the TDGR classification. Need to also consider bulk storage where the AN content might not be classified as hazardous but can cause issues when stored in bulk.

Common Definitions Across Regulations and Industry Codes of Practice

- Fertilizer Canada highlighted that it is important to use common definitions. There are different AN-based products with different applicable regulations and requirements. It is also important to differentiate between technical grade vs. fertilizer grade AN when government agencies are reviewing statistics and data related to regulations.

Roadmap or Guidance on AN Fertilizer Requirements and Best Practices

- Fertilizer Canada discussed that the role of the industry Codes of Practice is to verify compliance with AN and CAN regulations and to provide guidance to sites selling and distributing products. The Codes of Practices can be used to provide a better roadmap to compliance.
- Industry stated that they are looking for Codes of Practice to have consistency, and easily identify risks and regulation standards.

4.1.3 FEEDBACK ON NEXT STEPS

Based on the feedback from Forum participants, the following next steps were identified for improving regulatory alignment and harmonization:

- TC consulting with industry on their regulations and incorporating feedback from the Forum;
- TC considering the type of AN and AN-based product when completing their TDG risk analysis around the regulatory activity during the transportation of AN, in particular:
  - validating the consumption, transportation and production data used in the risk assessment based on AN grade (fertilizer vs. technical);
  - accounting for AN-based products that have specific improved safety characteristics (e.g. CAN); and
  - ensuring the risk analysis not only considers explosive risk, but considers the whole characteristics of the product(s);
- TC aligning / harmonizing the AN classification among their regulations based on the TDGR classification;
- TC maintaining the alignment of the TDGR classification with the international UN classification;

- Collaborating between federal agencies to ensure alignment of definitions and classification for AN and AN based fertilizer is consistent with UN models;
- Convening a committee to review separation distances and thresholds to ensure that they are risk-based, consider the most recent science, consider the type of AN-based product (i.e., CAN vs. AN), and building characteristics;
- Completing a risk analysis related to the full cycle of AN supply chain, evaluating different transport and storage conditions as well as explosion scenarios; which can help harmonize regulations and the industry Codes of Practice with respect to classification and safe setback / separation distances;
- Using the industry Codes of Practice as a roadmap or guidance on AN fertilizer requirements and best practices; and
- Utilizing the industry Codes of Practice to verify compliance with AN and CAN regulations and to provide guidance to sites selling and distributing products.

4.2 REGULATORY BENCHMARKING

4.2.1 OBJECTIVES OF DISCUSSION

- Identify any gaps in domestic industry best practices to ensure sufficient oversight of AN related activities in Canada relative to international best practices; and
- Based on the discussions, seek agreement on commitments for Outcomes and next steps for governments and industry to document in Outcomes Report.

4.2.2 FEEDBACK ON GAPS IN DOMESTIC INDUSTRY BEST PRACTICES

The major issues highlighted from participants related to regulatory benchmarking and gaps in domestic industry best practices is summarized below:

Calcium Ammonium Nitrate

- The industry has converted to products which have safer forms of AN (i.e., CAN). Industry working groups have presented to the NFPA that CAN should not be recognized in the same manner as AN. Therefore, hazards of certain AN products, including CAN, may be misidentified in regulations.

AN Incidents by Truck

- TC indicated that there has been safety incidents / near-misses related to transportation of AN by truck; however, the transportation sector wants more education and awareness on what the actual risk factors are related to transporting AN by truck that contributed to past incidents.

Best Practices from Other Jurisdictions

- The explosives industry highlighted that their best practices should also be considered, such as: US Institute of Makers of Explosives Code of Practice for AN, International Industry Working Group (SAFEX) Code of Practice for AN storage, NFPA standard for AN Storage.
- Industry discussed that FC's Codes of Practice need to be looked at as part of the evaluation of AN regulations, in addition to looking at NFPA 400, IMESAFR, and best practices from the International Fertilizer Association and Fertilizer Europe.

Toxic Fumes:

- Transport Canada discussed that the hazard of explosion is not the only hazard of AN. The release of toxic fumes from AN is the main hazard based on reported incidences for the marine mode. The release of toxic fumes, such as when it decomposes, is not as well addressed as the risk of explosion.
- Emergency planning needs to have a total understanding of what can happen following incidents, including risk of fumes.
- Alberta Transportation highlighted that it is important to have standards in place to protect first responders from fumes.

Detonation Resistance Test[1]

- TC's review identified that Canada has not adopted the Detonation Resistance Test (DRT) to establish the different safety distances and other parameters for safe storage of AN. The TC TDGR classification does not prescribe the detonation test.
- Industry things that the DRT should be prescribed under TC TDGR. Manufactures are undertaking this test regardless of TC prescribing it.

Better Communication Between Government Agencies and Between Government, Industry, And First Responders

- Fertilizer Canada discussed that it would be valuable to have more conversations between regulatory agencies that do not typically engage with each other, and that Fertilizer Canada and their Codes of Practice could be used to help aid with this.
- The industry highlighted that it is important to consider their knowledge on how to transport and store AN. This can help with developing regulations and help other uses understand the safety of their products. Industry wants to work with government, and wants government to recognize that they are well trained and well prepared in how to deal with safety issues.

4.2.3 FEEDBACK ON NEXT STEPS

Based on the feedback from forum participants, the following next steps were identified for improving domestic industry best practices:

- Completing a risk analysis of the hazards related to AN toxic fumes following incidents and how to mitigate these risks though emergency planning and first responder training;
- TC collaborating on awareness raising activities for municipalities and urban areas on the actual risk factors from AN related to transportation, land use, hazards, emergency response, etc.;
- Preparing an industry led discussion paper outlining the issues in the regulatory framework with recommendations for improvement;
- Industry engaging with the government to help improve AN regulation and best practices based on industry knowledge and experience, in particular:
  - establishing science and risk- based thresholds and separation distances;
  - incorporating the DRT and understanding its applicability;
- Industry undertaking a review of their Codes of Practice to reflect the latest developments in terms of safety;
- Continuously improving the industry Codes of Practice based on current and risk-based best practices; and
- Engaging the first responder communities to improve awareness and best practices for safe response to an incident involving AN.

[1] The detonation resistant test is a variation of the gap test in Test Series 2. To align with the UNMR AN must be subjected to TS2 rather than the DRT

5 CONCLUSIONS AND RECOMMENDATIONS

MAJOR GAPS AND ISSUES IDENTIFIED

Overall, the following major gaps and issues were identified by the Forum with respect to regulatory harmonization and benchmarking of AN and AN-based fertilizers:

- Need for analysis and regulations to be science- and risk-based, particularly around separation / setback distances and volume thresholds.
- Need for consistency across the regulatory framework:
  - Finding alignment on and rationales for separation / setback distances and volume thresholds in storage and transportation. Separation / setback distances and volume thresholds should consider:
    - All aspects of the supply chain (e.g., railway, ports, farmers, distributors and manufacturers);
    - Site-specific factors (e.g., building construction and urbanization);
    - Applicability to product type (e.g., CAN vs. AN) and grade (fertilizer vs. explosive); and
    - Regulatory mandate (e.g., protection from explosion vs. protection of environment).
  - Harmonizing the classification and identification of AN-based fertilizers among TC regulations.
  - Establishing common definitions across regulations and industry Codes of Practices, particularly around AN- and AN-based fertilizers such as CAN.
- Need to explore if there are any safety gaps related to storage, transport and emergency response, particularly around:
  - Understanding the actual risk factors related to transporting AN based on the mode (e.g., truck vs. railway) and the product (e.g. fertilizer grade vs. technical grade);
  - Considering the adoption of the Detonation Resistance Test (DRT) into Canada's regulatory framework or into industry best practices; and
  - Considering other risk factors from AN incidents, such as toxic fumes during emergency planning.
- Need to review current best practices, for both fertilizer and technical grades, based on risk assessment to ensure current best practices are adequate in relation of the hazards posed by AN and AN-based products.
- Need for better communication between government agencies and between government, industry, and first responders.

RECOMMENDATIONS FOR GOVERNMENT

The Forum highlighted the following recommendations for government to consider with respect to regulatory harmonization and benchmarking:

- TC consulting with industry on their regulations and incorporating feedback from the Forum;
- TC considering the type of AN and AN-based product when completing their TDG risk analysis in regard to the regulatory activities during the transportation of AN, in particular:
  - validating the consumption, transportation and production data used in the risk assessment based on AN grade (fertilizer vs. technical);
  - accounting for AN-based products that have specific improved safety characteristics (e.g. CAN); and
  - ensuring the risk analysis not only considers explosive risk, but considers the whole characteristics of the product(s);
- TC aligning / harmonizing the AN classification among their regulations based on the TDGR classification;
- TC maintaining the alignment of the TDGR classification with the international UN classification;

- Collaborating between federal agencies to ensure alignment of definitions and classification for AN and AN based fertilizer is consistent with UN models;
- Convening a committee to review separation / setback distances and volume thresholds to ensure that they are risk-based, consider the most recent science, consider the type of AN product, and consider site characteristics;
- Completing a risk analysis related to the full cycle of the AN supply chain, evaluating different transport and storage conditions as well as explosion scenarios, which can help harmonize regulations and Codes of Practice with respect to volume thresholds and separation/ setback distances;
- Considering the role of industry Codes of Practice as a roadmap or guidance on AN fertilizer requirements and best practices;
- Completing a risk analysis of the hazards related to toxic fumes following AN incidents and how to mitigate these risks though emergency planning and first responder training; and
- TC collaborating on awareness raising activities for municipalities and urban areas on the actual risk factors from AN related to transportation, land use, hazards, emergency response, etc.

RECOMMENDATIONS FOR INDUSTRY

The Forum highlighted the following recommendations for industry to consider with respect to regulatory harmonization and benchmarking:

- Preparing an industry led discussion paper outlining the issues in the regulatory framework with recommendations for improvement;
- Engaging with the government to help improve AN regulation and best practices based on industry knowledge and experience, in particular:
  - establishing science and risk- based thresholds and separation distances; and
  - incorporating the DRT and understanding its applicability;
- Industry undertaking a review of their Codes of Practice to reflect the latest developments in terms of safety;
- Utilizing the industry Codes of Practice to verify compliance with AN and CAN regulations and to provide guidance to sites selling and distributing products;
- Continuously improving the industry Codes of Practice based on current and risk-based best practices; and
- Engaging the first responder communities to improve awareness and best practices for safe response to an incident involving AN.

6 REFERENCES

Transport Canada. 2020. A Review of Ammonium Nitrate Regulations and Best Practices in Canada. Draft Report. December 21, 2020.

Fertilizer Canada. 2016. AN Code of Practice. Available online at: https://fertilizercanada.ca/our-focus/safety-security/standardized-codes-of-practices/ammonium-nitrate/. Last revised: April 2016.

Fertilizer Canada. 2019. CAN Security Code of Practice: https://fertilizercanada.ca/our-focus/safety-security/standardized-codes-of-practices/calcium-ammonium-nitrate/. Last revised: January 2019.