

# Anhydrous Ammonia Code of Practice

## Summary of Protocol Changes

### 2017 to 2020 Edition

Draft – Nov 22, 2020

#### Overall Comments:

As part of Fertilizer Canada’s commitment to continuous improvement, Codes of Practice are reviewed and updated on a five-year cycle. A revised Anhydrous Ammonia Code will come into force on January 1, 2022. The changes proposed from the 2017 Protocols fall into 4 categories:

1. Incorporation of Technical Bulletins issued since implementation of the 2017 Code. These changes are identified in Column 3 of the matrix below.
2. All previously “scored” items are now mandatory meaning all protocols in the Code must be satisfied for certification/recertification. These protocols are identified in Column 3 of the matrix below with an indication of “This protocol is now mandatory”.
3. Other Substantive changes include regulatory changes, evolution of industry best practices etc. Details are provided in the matrix in Column 3.
4. Language throughout the code was updated to provide clarity and consistency and some sections required re-numbering. Many of these changes are considered minor and the associated Protocols are noted as “No substantive changes made” in the matrix.

As indicated above the following matrix summarizes the changes to individual protocols and identifies substantive changes. A complete track change document comparing the 2017 Code protocols with the proposed 2022 Code is also provided (available at [INSERT A LINK](#)).

| #      | 2022 Proposed Code  | Change from 2017 Edition  |
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| A      | <b>SITING AND EXTERIOR REQUIREMENTS</b>   |   |
| A.1    | A.1 Siting Requirements – Distance from People  |   |
| A.1.1  | A.1.1 Minimum Distances   | No substantive changes made   |
| A.1.1. | <p>A.1.1 New and Expanded Anhydrous Ammonia Storage and Handling Operations:</p> <p>A.1.1.1 NEW SITES</p> <p>The minimum distances from occupancies for siting an anhydrous ammonia storage and handling operation certified under the Ammonia Code of Practice on or after January 1, 2011 are (refer to Figures in the User Guide):</p> | Section A.1.1 has been revised to address expansion at grandfathered or encroached sites. |

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|       | <p>(a) 1.5 kilometers from the border of a City, Town, Village or Hamlet, or from Evacuation-Sensitive facilities such as hospitals, schools, residential developments or senior citizens homes; <u>and</u></p> <p>(b) 500 meters from <u>any</u> occupancy (e.g. a rural residence or a small business, occupancy is defined in Section A1 of the User Guide); <u>and</u></p> <p>(c) 50 meters from an environmentally sensitive area (lake, stream, wetland etc.); <u>and</u></p> <p>Approval from the local authority having jurisdiction is also required.</p> <p><i>Compliance will be indicated by documentation such as dated facility plans demonstrating the required distances, and local authority approval documentation.</i></p> <p>Recommended Best Practices: Locate new anhydrous ammonia storage and handling operations a minimum of 3.0 kilometers from the boundary of a city, town, village, hamlet or evacuation sensitive facilities.</p> <p><b>A.1.1.1 EXPANSION AT EXISTING SITES</b></p> <p>Capacity expansion at existing certified ammonia sites that are within the setback distances outlined in A.1.1.1 (grandfathered or municipally encroached sites) will require</p> <ul style="list-style-type: none"> <li>a) Preapproval by Fertilizer Canada</li> <li>b) Equipment and measures as outlined in the Anhydrous Ammonia Code of Practice Renovation Policy</li> <li>c) Approval from the local authority having jurisdiction</li> </ul> <p><i>Compliance will be indicated by documentation such as dated facility plans and approvals demonstrating the required equipment, and local authority approval documentation.</i></p> |  |
| A.1.2 | <p>All Operations Less Than 500 Metres from Population Concentrations or Less Than 100 Metres from any Occupancy:</p> <p>All anhydrous ammonia storage and handling operations located less than 500 metres from the boundary of a city, town, village, hamlet or from an evacuation-sensitive facility (e.g. hospital, school or senior citizens home), or less than 100 metres from any occupancy (e.g. rural residence).</p> <p>In order to minimize the risk to people from an accidental release of anhydrous ammonia, the following measures are required:</p> <ul style="list-style-type: none"> <li>(a) Where loading and unloading is conducted at the operation, pull-away protection shall be</li> </ul>   | <p>Previous Section (b) is removed from the 2022 Edition - with the change in Protocol A4.1 where fencing at all sites is mandatory, Section (b) is redundant.</p> <p><del>(b) Additional security precautions shall be installed at the operation including:</del></p> <ul style="list-style-type: none"> <li>• <del>If fencing is in place, all fencing must be topped by</del></li> </ul> |

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|       | <p>installed on liquid and vapour hose connections (both in load and out load).</p> <p>All sites are required to have pull-away protection installed on <u>both</u> liquid and vapour hose connections (both in load and out load).</p>  | <p><del>three strands of barbed wire;</del> <del>AND</del></p> <p>• <del>Some form of security lighting</del></p>                                     |
| A.1.3 | Communication with Local People  | No substantive changes made   |
| A2    | Distance from Anhydrous Ammonia Storage and Handling Operation to Roadway or Railway   | No substantive changes made   |
| A3    | Distance from Anhydrous Ammonia Storage and Handling Operations to Environmentally Sensitive Areas   | No substantive changes made   |
| A4    | <b>Security for Anhydrous Ammonia Storage and Handling Operations</b>  |   |
| A.4.1 | <p>Anhydrous Ammonia Storage and Handling Security Fencing:</p> <p>The anhydrous ammonia storage and handling operation must incorporate measures to prevent unauthorized access to the product.</p> <p>All ammonia pressure vessels (stationary and/or mobile) and piping systems are secured within a security fence with lockable security gates.</p> <p>The minimum requirements for fencing of new sites, commissioned after January 1, 2019, is 6' chain link with a barbed wire top.</p> <p>Existing ammonia Code-compliant sites using fencing, as the primary means of site security / compliance with this Protocol, can continue to use either a 5-foot wire fence topped with three-strand barb wire or 6-foot chain link, with or without three strands of barbed wire.</p> | <p>Protocol A4.1 has been updated to reflect Bulletin # 04-2018 issued on October 4, 2018. The only means of acceptable site security is fencing.</p> |
| A4.2  | <p>Unattended Storage Site Inspections</p> <p>Unattended sites must be inspected every two weeks while unattended.</p>   | This protocol is now mandatory.   |
| A5    | <p>Operational Lighting:</p> <p>The anhydrous ammonia storage and handling operation is equipped with sufficient lighting to allow for the safe transfer of anhydrous ammonia during night-time operations.</p> <p>All points around the storage vessels where anhydrous ammonia is transferred require dedicated lighting sufficient for work to be done safely.</p>  | This protocol is now mandatory.   |
| A6    | Emergency Exits  | No substantive changes made   |

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| A7   | <p>Facility Signage:</p> <p>The anhydrous ammonia storage and handling operation is equipped with required warnings and emergency response signage.</p> <p>The following information must be located at the entrance to the site:</p> <ul style="list-style-type: none"> <li>A7.1 Caution/Danger Anhydrous Ammonia</li> <li>A7.2 Authorized Personnel Only</li> <li>A7.3 No Smoking or Open Flames (both statements, or both pictograms are required)</li> <li>A7.4 After hours and daytime emergency contact numbers including company and emergency services</li> <li>A7.5 Signs must be equipped with letters on a contrasting background that makes the sign legible to approaching emergency services.</li> </ul> | <p>Previous A7.4 – <i>Nearest location of publicly accessible phone</i> has been removed. Prior A7.5 is now A7.4. Prior A7.6 is now A7.5.</p> <p>Addition of pictograms to A7.3</p> <p>A7 is now mandatory.</p> |
| A8   | Housekeeping   | No substantive changes made   |
| B    | <b>FIXED STORAGE VESSEL AND EQUIPMENT</b>  |   |
| B1   | Storage Vessel Design and Construction   |   |
| B1.1 | Storage Vessel Construction  | No substantive changes made   |
| B1.2 | Storage Vessel Supports  | No substantive changes made   |
| B1.3 | Storage Vessel Maintenance & Testing   | No substantive changes made   |
| B2   | Storage Vessel Valves, Piping and Gauges   |   |
| B2.1 | <p>Storage Vessel Emergency Shut-off Valves:</p> <p>All storage vessels must be equipped with a positive emergency shut-off valve to stop the flow of product from the vessel in an emergency on all liquid lines except inlet lines equipped with check valves.</p> <ul style="list-style-type: none"> <li>– The emergency shut off must be able to be operated from both opposing ends of the storage vessel</li> <li>– Mechanical activating levers or devices for the emergency shut-off must be colour-coded blue</li> <li>– Electronic/Wireless Emergency Shut-off system activation devices shall be a red button with either a blue or yellow background labeled Emergency Stop</li> </ul>                     | <p>Protocol clarified:</p> <ul style="list-style-type: none"> <li>- Location of emergency shut off clarified</li> <li>- Electronic/wireless emergency shut-off, if used have been clarified.</li> </ul>         |
| B2.2 | Storage Vessel Excess Flow Valves  | No substantive changes made   |
| B2.3 | Storage Vessel Piping Systems, Valves & Fittings   | No substantive changes made   |
| B2.4 | Storage Vessel Hose-end Valves   | No substantive changes made   |

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| B2.5  | Storage Vessel Safety Relief Valves   | No substantive changes made   |
| B2.6  | Storage Vessel Safety Valve Rain Caps:<br>Safety relief valves shall be equipped with rain caps.    | Changed to reflect Bulletin # 02-2019. Prior version required standpipes and rain caps.<br><br>This protocol is now mandatory |
| B2.7  | Storage Vessel Safety Relief Valve Certification  | No substantive changes made   |
| B2.8  | Storage Vessel Hydrostatic Relief Valves  | No substantive changes made   |
| B2.9  | Storage Vessel Piping   | No substantive changes made   |
| B2.10 | Storage Vessel Fittings   | No substantive changes made   |
| B2.11 | Storage Vessel Colour Coding  | This protocol is now mandatory  |
| B2.12 | Storage Vessel Liquid Piping System Emergency positive shut-off valves                              | This protocol is now mandatory  |
| B2.13 | Storage Vessel Non-Stainless-Steel Flex Connectors  | No substantive changes made   |
| B2.14 | Storage Vessel Gauges   | No substantive changes made   |
| B2.15 | Storage Vessel Level Gauge  | No substantive changes made   |
| B2.16 | Storage Vessel Pressure Gauge   | No substantive changes made   |
| B3    | <b>Storage Vessel Hoses</b>   |   |
| B3.1  | Hose markings for Anhydrous use   | No substantive changes made   |
| B3.2  | MAWP Storage Vessel Hose Marking  | No substantive changes made   |
| B3.3  | Storage Vessel Hose Expiry  | No substantive changes made   |
| B3.4  | Storage Vessel Hose Couplings   | No substantive changes made   |
| B3.5  | Storage Vessel Hose Testing   | No substantive changes made   |
| B3.6  | <del>When the site is unattended, the hose-end valves are secured against unauthorized access</del> | Protocol Removed. With the change in Protocol A4.1 where fencing at all sites is mandatory, B3.6 is Redundant.                |
| B4    | <b>Storage Vessel Transfer Pumps and Compressors</b>  |   |

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| B4.1        | Storage Vessel Transfer Pump / Compressor  | Clarify that documentation is required.   |
| B4.2        | Storage Vessel Transfer Pump and Compressor Guards   | No substantive changes made   |
| B4.3        | Storage Vessel Transfer Pump and Compressor Mounting   | No substantive changes made   |
| B5          | <b>Storage Vessel Labels and Markings</b>  |   |
| B5.1        | Storage Vessel Labels:<br>The anhydrous ammonia storage vessel has been clearly labelled with “ANHYDROUS AMMONIA INHALATION HAZARD” in a colour contrasting from the white background of the pressure vessel. Letters must be a minimum of two (2) inches (50 mm) inches in height. Labelling must appear on the two long sides of the vessel.                                   | Merged with Protocol B5.2 to incorporate “INHALATION HAZARD”. Minimum lettering size changed to aligned with code requirements. INHALATION HAZARD statement is now mandatory. |
| B5.2        | Storage Vessel Placards  | Former B5.3. Protocol is now mandatory.   |
| B5.3        | Storage Vessel WHMIS Labels  | Former B5.4. No substantive changes made  |
| B5.4        | Storage Vessel Safe Handling   | Former B5.5. Protocol is now mandatory.   |
| B5.5        | Storage Vessel Emergency First Aid Signage   | Former B5.6. Protocol is now mandatory.   |
| B6          | <b>Bleed Off Containment</b>   |   |
| B6.1        | Storage Vessel Bleed-off Containment:  | No substantive changes made   |
| B6.2        | Storage Vessel Bleed-off Containment Tank Label  | Protocol is now mandatory   |
| B6.3        | Storage Vessel Bleed-off Disposal  | Protocol is now mandatory   |
| B6.4        | Storage Vessel Bleed-off Containment Tank Venting  | Protocol is now mandatory   |
| B7          | <b>Personal Protective Equipment</b>   |   |
| B7.1 – B7.5 | The anhydrous ammonia storage and handling operation is equipped with the required personal protective equipment.<br><br>When handling, transferring and or repairing equipment that has potential for release that could cause injury from anhydrous ammonia, all required Personal Protective Equipment (PPE) must be worn. Examples where PPE is required to be worn include: | PPE requirements are the same. Addition of description to clarify when PPE is to be worn.   |

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|                | <ul style="list-style-type: none"> <li>• While connecting and disconnecting hoses for transfer (Note: when transfer operations are being completed (i.e. pumping is taking place) the operator can remove the PPE when in a safe area).</li> <li>• While bleeding equipment for transfer and after transfer operations are completed.</li> <li>• While personnel are performing maintenance, until all anhydrous ammonia has been evacuated from the equipment that is being maintained.</li> </ul> <p>Each employee working with ammonia at an anhydrous ammonia operation must have the following:</p> <p>B7.1 Full-face cartridge style respirator complete with extra cartridges.</p> <p>B7.2 One- or two-piece anhydrous ammonia resistant suit (neoprene).</p> <p>B7.3 Gauntlet style anhydrous ammonia resistant gloves (neoprene).</p> <p>B7.4 CSA approved safety boot with a minimum six inch upper.</p> <p>B7.5 Individual emergency water bottle filled with clean, fresh water.</p>   |  |
| <b>B8</b>      | <b>Emergency Equipment</b>   |  |
| B8.1 –<br>B8.8 | <p>The anhydrous ammonia storage and handling operation is equipped with the required emergency equipment that is accessible and identifiable by all personnel.</p> <p>In addition to all personal protective equipment, specified in Section B7, the following designated emergency equipment is required:</p> <p>B8.1 Two anhydrous ammonia full-face respirators complete with spare canisters/cartridges.</p> <p>B8.2 If required by provincial regulations, two self-contained breathing apparatuses (SCBA).</p> <p>B8.3 Two one- or two-piece anhydrous ammonia resistant suits.</p> <p>B8.4 First Aid kit of a size appropriate for the number of employees at the site.</p> <p>B8.5 At minimum, a 10-pound charged ABC fire extinguisher (one located near each anhydrous ammonia transfer point).</p> <p>B8.6 Two water supplies are required for emergency requirements. Water supplies may be either safety showers or 200-gallon water troughs filled with clean, fresh water and labelled with a white cross on a green background to designate emergency response water. Troughs must be located within 10</p> | <p>Emergency equipment requirements are the same.</p> <p>B8.5 is now mandatory</p> <p>B8.6 was updated to reflect Bulletin # 02-2018, the requirement for a white cross on a green background.</p> |

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|          | metres of anhydrous ammonia transfer points. Water troughs must be located opposite to each other on either side of the storage vessel, considering the prevailing wind direction. Water must be heated to prevent freezing when transfer operations are occurring.  |   |
|          | B8.7 Emergency eyewash capability.   |   |
|          | B8.8 Two wind indicators must be located at the anhydrous ammonia storage operation in order to determine the wind direction for emergency response purposes.  |   |
| B9       | <b>Electrical Code Compliance</b>  |   |
| B9.1     | Storage Vessel Grounding   | No substantive changes made                     |
| B9.2     | Electric Motors  | No substantive changes made                     |
| B9.3     | Electrical Enclosures  | No substantive changes made                     |
| B9.4     | Emergency Heaters GFI  | No substantive changes made                     |
| <b>C</b> | <b>TRANSPORT AND APPLICATION EQUIPMENT<br/>PART 1 – DELIVERY UNITS</b>   |   |
| C1       | <b>Transport Vessel Design and Construction</b>  |   |
| C1.1     | Transport Vessel Design, Construction, Operation and Maintenance   | No substantive changes made                     |
| C1.2     | Transport Vessel Canadian Registration Number (CRN)  | No substantive changes made                     |
| C1.3     | Transport Vessel Maintenance and Testing<br><br>Regular scheduled maintenance and testing is required and can be verified through documentation and visual inspection.<br><br><i>Compliance will be indicated through a visual inspection of the markings on the vessel and testing documentation. Inspection frequency is determined as per current B620 standard Table 7.1. Tank pressure and leak testing is determined as per B620 requirements.</i> | Included new B620 annual leak test requirements |
| C2       | Transport Vessel Valves, Piping and Gauges   | No substantive changes made                     |
| C2.1     | Valves on Transport Vessel Liquid and Vapour Lines   | No substantive changes made                     |



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| C2.2            | Transport Vessel Excess Flow Valves  | No substantive changes made   |
| C2.3            | Transport Vessel Valves  | No substantive changes made   |
| C2.4            | Transport Vessel Hose-end Valves   | No substantive changes made   |
| C2.5            | Transport Vessel Safety Relief Valves  | No substantive changes made   |
| C2.6            | Transport Vessel Hydrostatic Relief Valves   | No substantive changes made   |
| <del>C2.7</del> | Former C2.7 from 2017 Code was:<br><br>The transport vessel must have a means of securing discharge valves when left unattended. | Protocol Removed. With the change in Protocol A4.1 where fencing at all sites is mandatory, Former C2.7 is redundant. |
| C2.7            | Transport Vessel Piping  | Former C2.8.<br>No substantive changes made   |
| C2.8            | Transport Vessel Fittings  | Former C2.9.<br>No substantive changes made   |
| C2.9            | Transport Vessel Colour Coding   | Former C2.10.<br>Protocol is now mandatory  |
| C2.10           | Transport Vessel Flex Connector  | Former C2.11.<br>Protocol is now mandatory  |
| C2.11           | Gauges on Transport Vessel   | Former C2.12.<br>No substantive changes made  |
| C2.12           | Transport Vessel Level Gauge   | Former C2.13.<br>No substantive changes made  |
| C2.13           | Transport Vessel Pressure Gauge  | Former C2.14.<br>No substantive changes made  |
| C3              | <b>Transport Vessel Hoses</b>  |   |
| C3.1            | Transport Vessel Hoses   | No substantive changes made   |
| C3.2            | MAWP Transport Vessel Hose Marking   | No substantive changes made   |
| C3.3            | Transport Vessel Hose Expiry   | No substantive changes made   |
| C3.4            | Transport Vessel Hose Couplings  | No substantive changes made   |

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| C3.5           | Transport Vessel Hose Testing   | No substantive changes made  |
| C4             | <b>Transfer Vessel Transfer Pumps</b>   |  |
| C4.1           | <p>Transport Vessel Transfer Pump for Anhydrous Ammonia:</p> <p>The transfer pump must be approved by the manufacturer for anhydrous ammonia service.<br/><i>Compliance will be based on documentation of the transfer pump type.</i></p>   | Clarification that documentation is required.  |
| C4.2           | Transport Vessel Transfer Pump Guards   | No substantive changes made  |
| C4.3           | Transport Vessel Transfer Pump Mounting   | No substantive changes made  |
| C5             | <b>Transport Vessel Labels and Markings</b>   |  |
| C5.1           | <p>Transport Vessel Labels:</p> <p>The anhydrous ammonia storage vessel has been clearly labelled with “ANHYDROUS AMMONIA INHALATION HAZARD” in a colour contrasting from the white background of the pressure vessel. Letters must be a minimum of two (2) inches (50 mm) inches in height. Labelling must appear on the two long sides of the vessel.</p> | <p>Merged with Protocol C5.2 to incorporate “INHALATION HAZARD”. Minimum lettering size changed to align with code requirements.</p> <p>INHALATION HAZARD statement is now mandatory</p> |
| C5.2           | Transport Vessel Placards   | Former C5.3.<br>No substantive changes made  |
| C5.3           | Transport Vessel Pressure Test Labels   | Former C5.4.<br>No substantive changes made  |
| C5.4           | Transport Vessel Safe Handling Procedures   | Former C5.5.<br>Protocol is now mandatory  |
| C5.5           | Transport Vessel Emergency First Aid Procedures   | Former C5.6.<br>Protocol is now mandatory  |
| C5.6           | Transport Vessel Emergency Contact  | Former C5.7.<br>No substantive changes made  |
| C6             | <b>Transport Vehicle Emergency and Personal Protective Equipment</b>  |  |
| C6.1-<br>C6.10 | <p>The anhydrous ammonia transport vessel is equipped with the required emergency and personal protective equipment.</p> <p>(a) Each transport vehicle must have the following:</p> <p>C6.1 First Aid kit</p>   | Emergency equipment requirements are the same.   |

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|      | <p>C6.2 At minimum, 3A 10BC (5 lb) fire extinguisher with nozzle</p> <p>C6.3 Minimum of 20 liters (5 gallons) of clean, fresh emergency water</p> <p>C6.4 Road side emergency kit</p> <p>C6.5 Communication device (e.g. cell phone or two-way radio)</p> <p>(b) Each transport operator must be supplied their own Personal Protective Equipment (PPE) as follows and be instructed on its use, limitations, inspection, and maintenance.</p> <p>C6.6 Full-face cartridge style respirator complete with extra cartridges</p> <p>C6.7 One- or two-piece anhydrous ammonia resistant suit (for example, neoprene)</p> <p>C6.8 Gauntlet style anhydrous ammonia resistant gloves (for example, neoprene)</p> <p>C6.9 CSA approved safety boot with a minimum six inch upper</p> <p>C.6.10 Individual emergency water bottle filled with clean, fresh water</p> <p>(c) Transport Operators are required to wear PPE when handling, transferring and or repairing equipment that has potential for ammonia release that could cause injury from anhydrous ammonia. PPE is required to be worn</p> <ul style="list-style-type: none"> <li>• Any time a valve is being actuated (being turned on or off)</li> <li>• When a hose is being handled</li> <li>• When performing a connection or disconnection and/or performing any bleed down of connections</li> <li>• When troubleshooting or conducting maintenance operations on pressurized or potentially pressurized equipment such as meters or flow meters on application equipment.</li> </ul> <p>(Note: After connection and while filling there is no requirement for the operator to be fully dressed, for example while monitoring the transferring process, completing an inspection of the unit being filled, or updating documentation.)</p> | <p>PPE requirements are the same.</p> <p>Addition of description to clarify when PPE is to be worn.</p> |
| C7   | Transport Vehicle Certification   | No substantive changes made   |
| C8   | <b>Security for Transport Vessels</b>   |   |
| C8.1 | Securing While in Transport   | No substantive changes made   |

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| C8.2     | Parking Near Evacuation-Sensitive Occupancies   | No substantive changes made  |
| C8.3     | Off-site storage of Transport Vessels   | No substantive changes made  |
| C8.4     | <p>Mobile Ammonia Vessels:</p> <p>Delivery units must be stored at a certified site within a locked, fenced area that complies with the Code fencing requirements (see Section A.4.1) or they have been emptied and de-pressurized. Storing vessels inside a roofed structure is prohibited unless the vessel has been emptied and depressurized.</p>   | <p>Clarified that transport equipment must be stored within the fenced area (as per Protocol A4.1.</p> <p>Clarified that pressurized vessels cannot be stored within a roof structure.</p> |
| <b>C</b> | <b>TRANSPORT AND APPLICATION EQUIPMENT<br/>PART 2 – NURSE OR APPLICATOR TANKS</b>   |  |
| C9       | <b>Nurse and Applicator Tank Design and Construction</b>  |  |
| C9.1     | Nurse and Applicator Tank Design, Construction, Operation and Maintenance   | No substantive changes made  |
| C9.2     | Nurse and Applicator Tank Specification   | No substantive changes made  |
| C9.3     | <p>Nurse and Applicator Tank Maintenance and Testing:</p> <p>All nurse and applicator tanks have received scheduled maintenance and testing in accordance with regulatory requirements.</p> <p><i>Compliance will be indicated through a visual inspection of vessel markings and through documentation. Inspection frequency is determined by CSA B620 Table 7.1. Tank pressure and leak testing is determined as per B620 requirements.</i></p> | Included new B620 annual leak test requirements  |
| C10      | <b>Nurse and Applicator Tank Valves, Piping and Gauges</b>  |  |
| C10.1    | Valves on Nurse and Applicator Tank Excess Flow Valve   | No substantive changes made  |
| C10.2    | Nurse and Applicator Tank Valves Suitability  | No substantive changes made  |
| C10.3    | Nurse and Applicator Tank Safety Relief Valve   | No substantive changes made  |
| C10.4    | Nurse and Applicator Tank Hydrostatic Relief Valves   | No substantive changes made  |
| C10.5    | Nurse and Applicator Tank Emergency Discharge Control:  | Clarified language in protocol. Previous version stated:   |

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|        | <p>a) All single nurse tanks with a capacity of 10,000 litres (2,642 USWG) or more, and</p> <p>b) all multiple nurse tank configurations, and</p> <p>c) all tanks manufactured on or after January 1, 2017,</p> <p>must be equipped with emergency discharge control as per CSA B620.</p> <p><i>Compliance will be indicated by inspection of the equipment and demonstration of functionality. Documentation Certificate of Compliance must be referenced for compliance.</i></p> | <p><i>Effective January 1, 2022, all existing nurse tanks (single with capacity of 10, 000 litres (2, 642 USWG) or more, or any multiple nurse tank configurations purchased before January 1, 2017, must be equipped with pull-away protection; unless regulations them require sooner.</i></p> |
| C10.6  | Nurse and Applicator Tank Piping   | No substantive changes made  |
| C10.7  | Nurse and Applicator Tank Fittings   | No substantive changes made  |
| C10.8  | Nurse and Applicator Tank Colour Coding  | Protocol is now mandatory  |
| C10.9  | Nurse and Applicator Tank Hose Used for Piping   | No substantive changes made  |
| C10.10 | Nurse and Applicator Tank Gauges   | No substantive changes made  |
| C10.11 | Nurse and Applicator Tank Liquid Level   | No substantive changes made  |
| C10.12 | Nurse and Applicator Tank Pressure Gauge   | No substantive changes made  |
| C11    | <b>Nurse and Applicator Tank Hoses</b>   |  |
| C11.1  | Nurse and Applicator Tank Approved Hoses   | No substantive changes made  |
| C11.2  | MAWP Nurse and Applicator Tank Hose Marking  | No substantive changes made  |
| C11.3  | Nurse and Applicator Tank Hose Expiry  | No substantive changes made  |
| C11.4  | Nurse and Applicator Tank Hose-end Valve   | No substantive changes made  |
| C11.5  | Nurse and Applicator Tank Hose Couplings   | No substantive changes made  |
| C11.6  | Nurse and Applicator Tank Hose Testing   | No substantive changes made  |
| C11.7  | Nurse and Applicator Tank Breakaway Coupler  | No substantive changes made  |
| C12    | <b>Nurse and Applicator Tank Vessel Labels and Markings</b>  |  |

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| C12.1         | <p>Nurse and Applicator Tank Labels:</p> <p>The anhydrous ammonia storage vessel has been clearly labelled with “ANHYDROUS AMMONIA INHALATION HAZARD” in a colour contrasting from the white background of the pressure vessel. Letters must be a minimum of two (2) inches (50 mm) inches in height. Labelling must appear on the two long sides of the vessel.</p>   | <p>Merged with Protocol C12.2 to incorporate “INHALATION HAZARD”. Minimum lettering size changed to aligned with code requirements.</p> <p>INHALATION HAZARD statement is now mandatory</p> |
| C12.2         | Nurse and Applicator Tank Placards   | <p>Former C12.3.</p> <p>No substantive changes made</p>   |
| C12.3         | Nurse and Applicator Tank Pressure Test Labels   | <p>Former C12.4.</p> <p>No substantive changes made</p>   |
| C12.4         | Nurse and Applicator Tank Safe Handling Procedures   | <p>Former C12.5.</p> <p>Protocol is now mandatory</p>   |
| C12.5         | Nurse and Applicator Tank Emergency First Aid Procedures   | <p>Former C12.6.</p> <p>Protocol is now mandatory</p>   |
| C12.6         | Nurse and Applicator Tank Emergency Contact  | <p>Former C12.7.</p> <p>Protocol is now mandatory</p>   |
| C13           | <b>Nurse and Applicator Tank Personal Protective Equipment</b>   |   |
| C13.1 – C13.4 | Nurse and Applicator Tank Personal Protective Equipment  | No substantive changes made   |
| C14           | <p>Nurse and Applicator Tank Tow Vehicle Requirements:</p> <p>All vehicles used for towing anhydrous ammonia nurse wagons to and from the point of application of the product must meet minimum capacity requirements in accordance with the size of nurse tank they are towing.</p> <p>In addition to regulatory requirements, tow vehicles used for transporting anhydrous ammonia nurse wagons must be rated for the size and weight of the nurse tank they are towing. Refer to requirements specified in the applicable Highway Traffic Act.</p> <p>Commercial licenced vehicles transporting anhydrous ammonia requiring Commercial Vehicle Safety Alliance (CVSA) inspection must have current certification. Other vehicles must pass an annual safety inspection.</p> | <p>Protocol is now mandatory</p> <p>Clarified that Commercial licenced vehicles must have CVSA certification.</p>   |
| C15           | Lighting Requirements for Towing Nurse and Applicator Tanks:   | <p>Protocol is now mandatory</p> <p>Addition of (d) Reflectors.</p>   |

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|       | <p>All anhydrous ammonia tanks or applicators being towed by licenced vehicles on roads must be equipped with lighting in accordance with the applicable Highway Traffic Act or Transport Regulation.</p> <p>If the size or configuration of the tanks or applicators being towed prevents following drivers from seeing the signal and/or brake lights of the towing vehicle, the tank or applicator must have the following equipment to provide warning to following drivers (either permanently or temporarily mounted):</p> <ul style="list-style-type: none"> <li>(a) Stop lights</li> <li>(b) Turn signal lights</li> <li>(c) Tail lights</li> <li>(d) Reflectors</li> </ul> <p><i>Compliance will be indicated through visual inspection and functional demonstration of the equipment by the current Owner / Operator or person responsible indicating that all tow vehicles have been equipped with lighting (stop lights, turn signal lights, taillights) if following drivers cannot see tow vehicle signal and brake lights.</i></p> | Compliance requirement includes functional demonstration of equipment.   |
| C16   | <b>Security for Nurse and Applicator Tanks</b>  |  |
| C16.1 | Security for Nurse and Applicator Tanks While in Transport  | No substantive changes made  |
| C16.2 | Nurse and Applicator Tank Parking near Evacuation-Sensitive Occupancies   | No substantive changes made  |
| C16.3 | Storage of Nurse and Applicator Tanks   | No substantive changes made  |
| C16.4 | <p>Securing of nurse and applicator tanks at farm locations:</p> <p>Farmers must be instructed on the proper measures to take to secure nurse and applicator tanks at farm locations. These instructions must include:</p> <ul style="list-style-type: none"> <li>a) Nurse or applicator tanks must have their main access valves secured while they are being stored overnight at a farm location or in the field. Storing the vessels inside a roofed structure is prohibited unless the vessel has been emptied and de-pressurized.</li> <li>b) Nurse or applicator tanks that remain in the field overnight should be positioned to discourage tampering.</li> </ul>  | <p>Protocol is now mandatory</p> <p>Clarified that pressurized vessels cannot be stored within a roofed structure.</p> |
| C17   | <b>Nurse and Applicator Tanks Running Gear Inspection and Maintenance Protocol</b>  |  |
| C17.1 | Nurse and Applicator Running Gear Inspection:   | Protocol is now mandatory  |

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|        | All nurse and applicator running gear shall be inspected and maintained to prevent running gear failures.  | Clarified running gear inspections  |
| C17.2  | Nurse and Applicator Running Gear Preventative Maintenance Program:<br>A preventive maintenance program shall be in place for nurse and applicator running gear. Preventive maintenance programs shall include detailed visual inspection of tires, wheel bearings, frames, reaches, hitches and tank mountings. Inspections shall be completed seasonally, and records kept.                        | Clarified that the seasonal inspections do not include kingpins and piping assemblies |
| C17.3  | Physical Inspection of Undercarriage:<br>A preventive maintenance program shall include a physical inspection including disassembly of wheel bearings, kingpins, frames, reaches, hitches and tank mountings. Inspections shall be completed every five (5) years and records kept.  | No substantive changes made   |
| C18    | Mobile Tank Database:<br>All sites are required to submit data electronically to Fertilizer Canada on all nurse and applicator tanks and transport delivery unit tanks owned by the retail site operator and for all producer-owned nurse and applicator tanks. Data is to be submitted every two years in advance of being audited/re-audited for certification under the Ammonia Code of Practice. |   |
| C18.1  | Retail-Owned Nurse Tanks/Applicator Tanks:<br>Data has been submitted to Fertilizer Canada for all retail-owned nurse tanks/applicator tanks within the current calendar year.<br><i>Compliance will be verified by checking the online reporting system for a submission by the site within the current calendar year.</i>  | This is a new protocol and a mandatory requirement.                                   |
| C18.2  | Producer-Owned Nurse Tanks/Applicator Tanks:<br>Data has been submitted to Fertilizer Canada for all producer-owned nurse tanks/applicator tanks within the current calendar year.<br><i>Compliance will be verified by checking the online reporting system for a submission by the site within the current calendar year.</i>  | This is a new protocol and a mandatory requirement.                                   |
| C.18.3 | Retail-Owned Transport Delivery Tanks:   | This is a new protocol and a mandatory requirement.                                   |



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|             | Data has been submitted to Fertilizer Canada for all retail-owned transport-delivery tanks within the current calendar year.<br><i>Compliance will be verified by checking the online reporting system for a submission by the site within the current calendar year.</i>   |  |
| <b>D</b>    | <b>TRAINING</b>   |  |
| D1          | Facility General Safety Rules   | Protocol is now mandatory                                      |
| D2          | Safe Operating Procedures   | No substantive changes made                                    |
| D3          | TDG Training  | No substantive changes made                                    |
| D4.1        | Driver Certification:<br>Driver licensing in accordance with applicable Provincial regulations is mandatory.<br><i>Compliance will be indicated through an examination of driver licences to indicate that staff required to operate transport vehicles have a current and appropriate license as required by provincial authorities.</i> | Clarified compliance to include examination of driver licences |
| D4.2        | Driver Abstracts  | Protocol is now mandatory                                      |
| D5          | WHMIS Training  | No substantive changes made                                    |
| D6          | <b>Occupational Health and Safety Training Programs</b>   |  |
| D6.1 – D6.3 | Occupational Health and Safety Training Programs  | Protocols are now mandatory                                    |
| D7          | <b>Emergency Training</b>   |  |
| D7.1        | First Aid   | No substantive changes made                                    |
| D7.2        | Cardiopulmonary Resuscitation (CPR)   | No substantive changes made                                    |
| D7.3        | Fire Extinguisher Training  | Protocol is now mandatory                                      |
| D7.4        | Respiratory Protection  | No substantive changes made                                    |
| D7.5        | Respirator Fit Testing Requirements:<br>Respirator fit testing frequency is determined by CSA Z94.4 requirements or more frequently if required by the respirator protection manufacturer. As per CSA requirements, fit testing is required <u>at least</u> every 24 months.  | New protocol addressing respiratory equipment fit testing.     |

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|          | <i>Compliance will be indicated through an examination of training records to indicate that a respirator fit test was conducted within the last 24 months.</i>   |   |
| D8       | <b>Emergency Response Training</b>   |   |
| D8.1     | Employee Emergency Response Training   | No substantive changes made   |
| D8.2     | Emergency Responder Training   | No substantive changes made   |
| D8.3     | Transportation Emergency   | No substantive changes made   |
| D9       | Security   | Protocol is now mandatory   |
| D10      | Contractor Safety  | Protocol is now mandatory   |
| D11      | <p>End User Education:</p> <p>End users transporting and using anhydrous ammonia have been instructed on the proper safety and emergency response procedures every three years at minimum.</p> <p><i>Compliance will be indicated through inspection of documentation demonstrating end users transporting and using anhydrous ammonia have been instructed on the proper safety and emergency response procedures at least every three years.</i></p> | Clarified compliance verification. A signed and dated letter is insufficient. |
| <b>E</b> | <b>DOCUMENTATION</b>   |   |
| E1       | Employee Training Records  | Protocol is now mandatory   |
| E2       | <b>Safe Operating Procedures</b>   |   |
| E2.1     | Transfer operations  | No substantive changes made   |
| E2.2     | Confined Workspace Entry, Lockouts and Elevated Work   | Protocol is now mandatory   |
| E2.3     | Use and Maintenance of PPE   | Protocol is now mandatory   |
| E3       | <b>Maintenance Records</b>   |   |
| E3.1     | Annual Safety Inspection Records   | No substantive changes made   |
| E3.2     | Hydrostatic Pressure Test  | Protocol is now mandatory   |
| E3.3     | Running Gear Maintenance   | No substantive changes made   |
| E3.4     | Pressure Vessel  | Protocol is now mandatory   |
| E4       | Transfer of Product to Certified Sites   | No substantive changes made   |
| <b>F</b> | <b>EMPLOYEE KNOWLEDGE</b>  |   |

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| F1.1-1.3    | Safe Operating Procedures Knowledge   | Protocols are now mandatory   |
| F2.1 - F2.3 | TDG Knowledge   | Protocols are now mandatory   |
| F3.1-3.5    | Site Emergency Response Plan Knowledge  | Protocols are now mandatory   |
| F4          | Care of Emergency Equipment Knowledge   | Protocol is now mandatory   |
| F5          | WHMIS Knowledge   | Protocol is now mandatory   |
| F6.1- F6.2  | Security Procedures Knowledge   | Protocols are now mandatory   |
| F7          | Inspection of Equipment Knowledge   | Protocol is now mandatory   |
| <b>G</b>    | <b>EMERGENCY RESPONSE</b>   |   |
| G1          | Written Emergency Response Plan   | Collapsed G1.1-G1.13 into 1 protocol G1.<br><br>Moved former G1.7 ERAP to G10 |
| G2          | Communication of Emergency Response Plan  | No substantive changes made   |
| G3          | Risk Assessment   | Protocol is now mandatory   |
| G4          | <b>Copies of the Emergency Response Plan</b>  |   |
| G4.1        | A copy of the emergency response plan is kept at the anhydrous ammonia operation.   | No substantive changes made   |
| G4.2        | A copy of the emergency response plan is kept at a secure off-site location.  | Protocol is now mandatory   |
| G4.3        | A current hard copy of the emergency response plan must be in a blue weather-proof container near the entrance to the ammonia operation   | No substantive changes made   |
| G5          | The emergency response plan for the anhydrous ammonia operation has been reviewed, had its contents verified and updated within the past 12 months  | No substantive changes made   |
| G6.1- G6.3  | Emergency Contact List<br>A current list of emergency contact numbers for local emergency responders, operation management and employees has been prepared and is located at: <ul style="list-style-type: none"> <li>All land line phones throughout the Site.</li> </ul> | Collapsed G6.1-G6.3 into 1 protocol G6.<br><br>Protocols are now mandatory    |

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|               | <p><i>Compliance will be indicated through examination of the posted emergency response contact list at the operation.</i></p> <ul style="list-style-type: none"> <li>• Each vehicle that transports anhydrous ammonia.</li> </ul> <p><i>Compliance will be indicated through examination of the emergency response contact list in each anhydrous ammonia transport vehicle.</i></p> <p>Within the last 12 months the emergency contacts phone lists have been verified and updated.</p> |   |
| G7            | <b>Emergency Response Drill</b>   |   |
| G7.1          | An exercise has been conducted on the emergency response plan in order to enhance the plan, familiarize participants with their duties and identify any gaps in the plan within the past 12 months.   | No substantive changes made   |
| G7.2          | <p>Emergency Response Simulation:</p> <p>If applicable, a full-scale Emergency Response simulation exercise has been conducted within the past five (5) years.</p>  | Added as per Bulletin # 04-2019 incorporating 2019 Environmental Emergency Regulations. |
| G8.1-<br>G8.4 | Contaminated Run Off Water  | Protocols are now mandatory   |
| G9            | Incident Reporting Program  | <p>Collapsed 91.1 and G9.2 into 1 protocol G9.</p> <p>Protocols are now mandatory</p>   |
| G10           | Environmental Emergency Requirements  |   |
| G10.1         | All Retail Anhydrous Ammonia sites with fixed storage facilities in quantities of 4.5 tonnes or more must have a process to comply with the Environmental Emergency (E2) Regulations of the Canadian Environmental Protection Act (CEPA 1999).  | Added as per Bulletin # 04-2019 incorporating 2019 Environmental Emergency Regulations. |
| G10.2         | <p>Emergency Response Assistance Plan (ERAP)</p> <p>All Anhydrous Ammonia Sites/Locations that have Delivery Units must apply for and have a valid Transport Canada Approved Emergency Response Assistance Plan (ERAP).</p> <p>All Anhydrous Ammonia Sites/Locations that have Nurse Wagons that exceed 10,000 litres in capacity must apply for and have a valid Transport Canada Approved Emergency Response Assistance Plan (ERAP).</p>  | Added as per Bulletin # 04-2019 incorporating 2019 Environmental Emergency Regulations. |

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|          | (Note: ERAP number will be the same for locations with Delivery Units and Nurse Wagons.)                          |   |
| <b>H</b> | <b>RAILCARS AND EQUIPMENT</b>   |   |
| H1       | Railcar Design and Construction   |   |
| H2       | <b>Railcar Loading and Unloading Operations</b>   |   |
| H2.1     | Railcar Loading / Unloading   | No substantive changes made   |
| H2.2     | Hose Valves   | No substantive changes made   |
| H2.3     | Hose-end Valves   | Protocol is now mandatory   |
| H2.4     | Fall Protection System  | No substantive changes made   |
| H3       | <b>Railcar Vessel Hoses</b>   |   |
| H3.1     | Hoses marked for NH3  | No substantive changes made   |
| H3.2     | Hose Maximum Allowable Working Pressure   | No substantive changes made   |
| H3.3     | Hose Expiration   | No substantive changes made   |
| H3.4     | Hose Couplings  | No substantive changes made   |
| H3.5     | Hose Testing  | No substantive changes made   |
| H4       | <b>Transfer Pumps or Compressors</b>  |   |
| H4.1     | Transfer Pump Suitable for NH3  | Clarify that documentation is required.   |
| H4.2     | Transfer Pump Guards  | No substantive changes made   |
| H4.3     | Transfer Pump Securely Mounted  | No substantive changes made   |
| H5       | <b>Railcar Labels and Markings</b>  |   |
| H5.1     | Railcar Marking – Anhydrous Ammonia   | No substantive changes made   |
| H5.2     | Railcar Marking – Inhalation Hazard   | No substantive changes made   |
| H5.3     | TGD Placards  | No substantive changes made   |
| H5.4     | Pressure Test and Retest Dates  | No substantive changes made   |
| H6       | The anhydrous ammonia storage and handling operation is equipped with the required personal protective equipment. | PPE requirements are the same. Addition of description to clarify when PPE is to be worn. |

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|             | <p>When handling, transferring and or repairing equipment that has potential for release that could cause injury from anhydrous ammonia, all required Personal Protective Equipment (PPE) must be worn. Examples where PPE is required to be worn include:</p> <ul style="list-style-type: none"> <li>• While connecting and disconnecting hoses for transfer (Note: when transfer operations are being completed (i.e. pumping is taking place) the operator can remove the PPE when in a safe area).</li> <li>• While bleeding equipment for transfer and after transfer operations are completed.</li> <li>• While personnel are performing maintenance, until all anhydrous ammonia has been evacuated from the equipment that is being maintained.</li> </ul> <p>Each employee working with ammonia at an anhydrous ammonia operation must have the following:</p> <ul style="list-style-type: none"> <li>• Full-face cartridge style respirator complete with extra cartridges.</li> <li>• One- or two-piece anhydrous ammonia resistant suit (neoprene).</li> <li>• Gauntlet style anhydrous ammonia resistant gloves (neoprene).</li> <li>• CSA approved safety boot with a minimum six inch upper.</li> <li>• Individual emergency water bottle filled with clean, fresh water.</li> </ul> | Collapsed H6.1-H6.5 into one protocol H6.                               |
| H7.1 – H7.8 | Emergency Equipment   | No substantive changes made. H7.5 – Fire extinguisher is now mandatory. |
| H8          | <b>Railcar Security</b>   |   |
| H8.1        | Railcar Seals   | No substantive changes made   |
| H8.2        | Pre-Release Inspection  | No substantive changes made   |
| I           | <b>INSURANCE</b>  |   |
| I1          | Insurance Requirements  | No substantive changes made   |