#### Ammonium Carbonate Facilities

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| Safety - PPE | Ammonium carbonate chips or solution release ammonia vapor which is irritating to the skin, eyes and nose.  When performing tasks in the ammonium carbonate facilities, please refer to the PTFE PPE Matrix when selecting proper PPE.  To perform tasks in the Ammonium Carbonate facilities:   * Ensure the ventilation system is operating correctly. This should operate at all times. * Wear a full-face breathing air mask if standing on the ammonium carbonate platform. Mask must be tested and approved for user.   Tasks that involve exposure are:   * Preparing Ammonium Carbonate solution in the mix tank * Changing filter in the system (Record date/time of filter change in DCS using  button.) * Performing system maintenance * Immediately wash any areas contacted by solution or chips with water. * Dispose of all used gloves, coveralls and coats after working on or cleaning system. * Keep steps, platforms and floors free of material. There are many steps and visibility is reduced when wearing breathing air. * Immediately clean up any spillage. |

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| Safety – Chemical Compatibility | Ammonium Carbonate is not compatible with nitrile or copper materials of construction. Avoid using nitrile gaskets and o-rings in the ammonium carbonate system. Do not use copper pipe, copper tubing, or copper based anti-seize compound in this system. Similarly, do not use copper alloys of brass or bronze in this system. |

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| Safety – Lockout, Mixer and Housekeeping | * The pump lockout switch is located in ECR 2A, MCC 10. * The portable mixer must not be handled while connected to power supply. Leather gloves are needed to remove mixer from tote, since mixer motor can become hot after mixing. * Tools and equipment must be stored on the racks and cabinets provided. * Platform chains must be in place at all times except when placing totes on platform or when removing totes from platform. |

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#### Ammonium Carbonate Facilities, Continued

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| General | The ammonium carbonate system consists of plastic totes, exhaust hood and fan, mix tank, transfer pump, pressurized head tank, piping, and valves to meter the carbonate into the coagulators.  The mixing and storage part of this system is on the first floor. Returnable totes are used for mixing. Each tote contains 550 lbs of ammonium carbonate chips. Warm demineralized water is added to each tote and mixed to completion. Totes are drained into the mix tank. Ammonium Carbonate solution is held until the head tank level drops to 10%; then the transfer pump automatically adds 200 gallons to the head tank. The first-floor system provides a constant pressurized supply of ammonium carbonate solution to the valves at the coagulators on the second floor.  Information regarding ammonium carbonate addition to the coagulators may be found in OD 33F Section 3E1, 2, 3 in the 'Add CO3' step descriptions. |

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| Storage and Handling | Ammonium carbonate decomposes to ammonium carbamate (a salt), water, carbon dioxide and free ammonia. This decomposition is accelerated by heat and can cause the contents of the containers to fuse into a solid lump.  In order to avoid the problems associated with handling lumped material, rotate stock on a first in/first out basis and store the containers in an area where the temperature does not exceed 90°F. |

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#### Ammonium Carbonate Facilities, Continued

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| **Ammonium Carbonate Make-Up to Mix Tank** | When  appears on Coagulator DCS screens, i.e. Amm Carb Mix Tank level 112LT < 62%, an Amm Carb tote can be added to the Amm Carb Mix Tank.  Locate a tote containing 550 lbs of ammonium carbonate chips in middle warehouse and load onto the ammonium carbonate platform.   1. Record the lot number and bin number from the tote tag. 2. Inspect tote for damage around the bottom of tote for fork truck holes. If damage found, stop using tote and notify supervision before continuing. 3. Hook up the flexible unloading hose from the tote to the mix tank. 4. Don appropriate PPE, per Safety Section above. 5. Check for proper operation of the ventilation system. If the system is not functioning correctly notify supervision before continuing. 6. Remove the 14" diameter white lid from the tote. Insert the water fill hose into this opening. Open the manual demineralized water valve. 7. Push green pushbutton 101PB on the ammonium carbonate tote/mix tank platform. The DCS automatically (via the Am\_Carb\_Loading procedure) opens the water valve and closes it after the TARGET gallons have been batched in. (Ordinarily the TARGET is 255 gallons.) 8. If it is desired to stop water flow before TARGET gallons have been batched in, press 101PB. To resume batching (without resetting the totalizer), press 101PB again. Only if the process variable (PV) exceeds the TARGET is the totalizer reset to 0.0 when 101PB is pushed. 9. After the meter cuts off, remove the water hose and insert the agitator bracket into the lid opening. 10. Insert the agitator onto the bracket and clamp tightly. Connect power supply. 11. The agitator must not be handled once it is connected to power supply. 12. Flip motor switch to "ON" position to begin mixing. 13. The ammonium carbonate chips should dissolve within 30 minutes.   **CAUTION:** PPE should be donned anytime operator is exposed to Ammonium Carbonate solution.   1. Flip motor switch to "OFF" position and disconnect power supply from receptacle. Inspect the interior of the tote. If all ammonium carbonate chips have dissolved, remove the agitator and bracket. |
|  | **NOTE:** Motor may be hot after mixing. Use leather gloves when removing.   1. Take a specific gravity reading of the tote contents. Record hydrometer reading to three decimal places.   Insert the digital thermometer (located on the back wall of the platform) into the tote. Record temperature to one decimal place. |

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#### Ammonium Carbonate Facilities, Continued

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| **Ammonium Carbonate Make-Up to Mix Tank (Continued)** | 1. Using Fig. 2 of this procedure, ensure that the concentration of solution is between 19% and 21%. An exact value is not necessary at this point.   **NOTE:** Contact supervision if measurement is not 19-21%.   1. Open the manual valve at the bottom of the full bin of Ammonium Carbonate solution and check for leaks. 2. Open the mix tank manual valve and allow gravity flow to the mix tank. 3. When the tote is empty, close the mix tank and tote manual valves. Remove the flexible unloading hose. 4. Place the lid back on the tote and attach an "EMPTY" tag.   Remove the empty tote to the warehouse and set another tote of ammonium carbonate chips on the platform.   1. Enter the tote lot number, the tote bin number into DCS.   Hit  button.   1. Enter SpG and temperature values into the DCS. Within a few seconds, the ammonium carbonate solution concentration is calculated and displayed below the temperature. 2. The SpG and temperature values are cleared from the DCS screen when the water valve opens and may be updated only when the valve is closed and PV is greater than TARGET. |

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#### Ammonium Carbonate Facilities, Continued

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| Charging Solution to Head Tank | **Manual transfer:** **This procedure must be used if the head tank "lo lo" alarm is activated.** The transfer pump is not able to transfer unless the head tank pressure is relieved per the following procedure.   * Close the 40 psig supply air valve to the head tank, valve (e) per Figure 1. * Slowly open valve (d) per Figure 1 to relieve the head tank pressure. * Close valve (d) when the head tank pressure is below 5 psig. * Start transfer pump and open automatic transfer valve and set on automatic transfer. * When the "lo lo" level alarm turns off, reopen valve (e).   **Automatic Transfer:** The solution is automatically charged to the pressurized head tank as needed to assure a continuous supply for coagulator addition. This transfer takes 20 minutes.  **Automatic cycle description:** Providing that the mix tank level is not low, the head tank "lo" level (10%) signals the pump to start. When the pump starts, the transfer valve is energized open. When the head tank "hi" level is reached (80%), the transfer valve closes and the pump shuts off simultaneously. Solution is consumed until "lo" level on the head tank is reached again and the cycle is repeated. This cycle is activated four times for every full mix tank batch that is prepared. After the fourth transfer, approximately 150 gallons (15%) of solution will remain in the tank. **Equipment must be in PROGRAM (not OPERATOR) for this to function properly.** |

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| Adding Ammonium Carbonate Solution to Coagulators | The Honeywell DCS controls additions to the coagulators. See 33F Section 3E1, 2 & 3, ‘Add CO3' step, for further information. |

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#### Ammonium Carbonate Facilities, Continued

**Software Control Parameters**

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| **Parameter Name** | **Loop No.** | **Descrption** | **Set Point** | **Description** |
| 102LT.DACA.PVLOALM.FL | 102LT | Amm Carb Mix Tank Level Lo | 62% | Amm Carb Mix Tank level at which DCS prompts operator to add Amm Carb tote to Amm Carb Mix Tk.  Prompt  is displayed on Coag DCS screens. |
| 102LT.DACA.PVLLALM.FL | 102LT | Amm Carb Mix Tank Level Lo Lo | 17% | Amm Carb Mix Tank level at which transfer to Amm Carb Head Tank is stopped. |
| 112LG.DACA.PVHIALM.FL | 112LT | Amm Carb Head Tk Level Full | 80% | Amm Carb Head Tank level at which transfer from Amm Carb Mix Tank is stopped. |
| 112LG.DACA.PVLOALM.FL | 112LT | Amm Carb Head Tk Level Re-fill | 10% | Amm Carb Head Tk level at which transfer to from Amm Carb Mix Tank is initiated.  NOTE: Amm Carb Mix Tank level (102LG) must also be greater than lo lo level, 17% (102LT.DACA.PVLLALM.FL). |
| $min\_NH4CO3\_lvl | 112LT | Amm Carb Head Tk Lo Lo Level | 5% | Minimum Amm Carb Head Tk level to start ammonium carbonate addition to a coagulator. |
| $min\_NH4CO3\_press | 119PT | Amm Carb Head Tk Lo Press | 30 psig | Minimum Amm Carb Head Tk pressure to start ammonium carbonate addition to a coagulator. |

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#### Ammonium Carbonate Facilities, Continued

**Alarm Summary**

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| **Loop No.** | **Description** | **Set Point** | **Purpose** | **Operator Action** |
| 102LG | Amm Carb Mix Tk Hi Level | 92 % | Alert operator of hi level in Amm Carb Mix Tank and possible impending overfill. | Determine reason for Hi Level and correct. |
| 112LT | Amm Carb Head Tk Hi Level | 90 % | Alert operator of hi level in Amm Carb Head Tank and possible impending overfill. | Determine reason for Hi Level and correct. |

**Interlocks**

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| 106HS1  Ammonium Carbonate Xfer Pump | INTERLOCKS ON  Hi Hi Level in the Ammonium Carbonate Head Tank. (90% on 112LT)  Greater than 200 gallons totalized on any coagulator ammonium carbonate flow meter (10138FQI, 114FQI, 115FQI). |
| 107HS  Ammonium Carbonate Xfer to Head Tk Bv | INTERLOCKS ON  Hi Hi Level in the Ammonium Carbonate Head Tank. (90% on 112LT)  Greater than 200 gallons totalized on any coagulator ammonium carbonate flow meter (10138FQI, 114FQI, 115FQI). |

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#### Ammonium Carbonate Facilities, Continued

FIG. 1. AMMONIUM CARBONATE FACILITIES



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#### Ammonium Carbonate Facilities, Continued

FIG. 2. AMMONIUM CARBONATE SOLUTION CONCENTRATION

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| **Example:** | If hydrometer reading is 1.065 and solution temperature is 60°C, the concentration is 20%. Report to supervision if not between 19% and 21%. |

End of topic