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August 25, 2017

Mr. Jon L. Black
Manager, Major New Source Review
Utah Department of Environmental Quality
Division of Air Quality
801-536-4047
jlblack@utah.gov

RE: Supplement to Lhoist North America Grantsville Facility BACT Analysis
Title V Operating Permit #4500005003

Dear Mr. Black:

In response to a letter from the Utah Division of Air Quality (UDAQ) to Lhoist North America (LNA), dated January 23, 2017, Stantec Consulting Services Inc. (Stantec) prepared a Best Available Control Technology (BACT) Analysis for the LNA Grantsville facility in support of UDAQ's serious nonattainment control plan for particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$). The BACT Analysis was submitted to UDAQ on April 6, 2017. On July 13, 2017, LNA and Stantec received an email from UDAQ requesting additional information to complete the assessment of the LNA Grantsville facility. This letter provides the information requested by the email.

1. Evaluation of ceramic/fiberglass high temperature bags for $PM_{2.5}$ emissions from the Rotary Kiln System. (vendor data preferred)

Ceramic filters are effective across a range of particle sizes, but are most often used when there is a large fraction of $PM_{2.5}$ and submicron particulates and/or high temperatures. They have the same efficiency as fabric filter bags but are designed to withstand much higher temperatures. The typical operating temperature for ceramic filters is within the range of 300 degrees Fahrenheit (°F) to 1,650°F. For applications with temperatures below 400°F, fabric filters are less costly than ceramic filters with no loss in control efficiency.

It should be noted that ceramic filters can be designed with catalyst embedded in the filter walls to provide control of both PM and nitrogen oxides (NO_X) emissions. However, ammonia/urea injection and possible temperature adjustments would still be necessary upstream of the ceramic filters. The operating range for NO_x removal is 350˚F to 950˚F, with the best results occurring at temperatures of 450°F and above.

In the lime manufacturing industry, the use of ceramic filters to control $PM_{2.5}$ emissions is unproven technology for kilns. There are operational unknowns including if the lime will have a coating effect on the ceramic filters and what the frequency and costs are for replacement/regeneration of the catalyst (when also controlling NO_x). Because the ceramic filters have the same control efficiency as fabric filter bags, LNA Grantsville opts to retain the conclusion of the original BACT Analysis (i.e., use of a type of fabric filter baghouse).

Fiberglass is a thermally stable fabric that can be used in fabric filter baghouses. LNA Grantsville will consider fiberglass as a type of fabric during the design of the fabric filter baghouse.

2. ***Evaluation of ceramic/fiberglass high temperature bags for the $PM_{2.5}$ emission associated with miscellaneous baghouses throughout the facility. If this option is not feasible please provide an explanation or associated cost analysis. (vendor data preferred)***

As stated above, ceramic filters have the same efficiency as fabric filter bags but are designed to withstand much higher temperatures than those observed in the non-kiln process lines at the LNA Grantsville facility. Additionally, ceramic filters must operate above the condensation temperature of water vapor or else the liquid water can inhibit the filter operation. The remaining baghouses located throughout the Grantville facility receive exhaust flow that is below the minimum 300°F typical operating temperature for ceramic filters (as mentioned above) and some processes may, at times, operate below the condensation temperature of water vapor. Furthermore, complete modification of the baghouse tube sheet would be necessary to allow for installation of the ceramic filters and the same air-to-cloth ratio may not be maintained. Due to unsuitable operating conditions, no increase in control efficiency, and necessary modification, ceramic filters are not suitable for the remaining processes currently controlled by baghouses at the LNA Grantsville facility.

The conclusion of the original BACT Analysis (i.e., use of the current fabric filter baghouses) will be retained. Due to the low temperatures of the non-kiln process lines, it is unnecessary to consider fiberglass as a type of fabric to be used in the baghouses.

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3. ***Evaluation of all crushing/screening/conveying processes. Please include evaluation of enclosures, baghouse/binvent capture devices and covered conveyors. This evaluation is necessary as these sources are not considered grandfathered under the $PM_{2.5}$ Serious Nonattainment Demonstration. (include vendor quotes where appropriate)***

UDAQ agreed that it was acceptable to analyze the crusher, screen, or conveying process with the greatest uncontrolled $PM_{2.5}$ emissions and apply the results to the remaining processes. It was decided, instead, to analyze the process with the greatest uncontrolled $PM_{2.5}$ emissions in each process category (crusher, screen, and conveying process) and apply the results to the remaining processes in that category.

Identification of the crushing, screening, and conveying processes at the LNA Grantsville facility are provided in Attachment A. Table A.1 lists only those processes that were considered for this BACT analysis and highlights the crusher, screen, and conveying process with the highest uncontrolled potential emissions. Processes that are sealed or located in tunnels beneath stockpiles were not included in the analysis because they already achieve maximum control (assumed 99% control efficiency for the purpose of potential emission calculations).

The potential and actual annual emissions from the crusher, screen, and conveying process with the highest uncontrolled potential emissions (i.e., Crusher CP-JCrush as controlled by water sprays, Screen CP-Screen as controlled by a cover, and conveying process K-Belt/K-Screen to K-Elev1 as controlled by water sprays) are presented in Table A.2.

Top-Down Approach

Identification of All Available Control Technologies

The practices/technologies available to control $PM_{2.5}$ emissions from the crusher, screen, and conveying process with the highest uncontrolled potential emissions are presented in Tables A.3 through A.5.

Elimination of Technically Infeasible Control Options

All the control practices/technologies identified in Tables A.3 through A.5 are technically feasible for the crusher, screen, and conveying process with the highest uncontrolled potential emissions. However, please note that water sprays are not an option for controlling processes following the kiln. The addition of water to lime starts a chemical reaction with the potential for combustion and destruction of the end product.

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Ranking of Remaining Control Technologies

The ranking of the control practices/technologies from top to bottom by control effectiveness is presented in Tables A.6 through A.8.

Evaluation of Most Effective Controls

Because uncontrolled $PM_{2.5}$ emissions from the crusher, screen, and conveying processes are low, the potential reduction in $PM_{2.5}$ emissions is also low resulting in cost effectiveness values that exceed any known agency thresholds (the highest known BACT cost effectiveness threshold for PM_{10} is from the Sacramento Metropolitan Air Quality Management District (SMAQMD) at \$11,400/ton of PM_{10}). Each control practices/technology evaluated as part of this BACT analysis had a cost effectiveness value in excess of \$259,000/ton of $PM_{2.5}$ reduced.

Furthermore, because emissions from the crusher, screen, and conveying processes are already controlled by either water sprays or covers, the additional reduction in $PM_{2.5}$ emissions that would be realized for a change in control technology would be insignificant compared to the cost of a new system. For instance, Crusher CP-JCrush is currently controlled by water sprays. Potential emissions from this process as currently controlled are 0.0144 tons/yr. Replacing the water spray system with a pulse-jet fabric filter would further reduce potential emissions from this process to 0.00062 tons/yr. The economic impact of installing and operating a pulse-jet fabric filter to reduce $PM_{2.5}$ emissions by an additional 0.0138 tons/yr (27.6 pounds) is unreasonable.

Selection of BACT

Due to the economic impacts of all other remaining control practices/technologies, LNA Grantsville proposes the existing controls of water sprays and covers as BACT for the crushing, screening, and conveying processes with the highest uncontrolled potential emissions. As previously explained, this conclusion extends to the remaining crushing, screening, and conveying processes at the LNA Grantsville facility that are not already sealed or located in tunnels beneath stockpiles. Continued operation of the water sprays and covers meets the proposed BACT.

Proposed Emission Limits

Because the proposed BACT is the practice/technology currently used at the LNA Grantsville facility, it is not necessary to establish a new limitation. Additionally, opacity from the crushers, screens, and conveying processes are currently limited by Title V Operating Permit #4500005003. Because opacity is a surrogate for $PM_{2.5}$, the existing opacity limitation in Title V Operating Permit #4500005003 is sufficient to enforce the proposed BACT.

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Proposed Monitoring Requirements

Monitoring requirements for the opacity limitation are already established in Title V Operating Permit #4500005003 and consist of visual observations every month. No other monitoring requirements are necessary.

Consideration of Startup and Shutdown Operations

The crushing, screening, and conveying processes at the LNA Grantsville facility that are not already sealed or located in tunnels beneath stockpiles will be controlled by water spray systems and covers during startup and shutdown. Consequently, no unique startup and shutdown provisions are necessary.

Control Technology Implementation Schedule

Continued use of water sprays and covers can begin immediately upon start-up of the LNA Grantsville facility.

4. *Provide justification as to why EPA CoST Equations Document dated 2013 was used in the BACT determination versus the current version dated March 2016.*

The latest version of the Environmental Protection Agency (EPA) Control Strategy Tool (CoST) System was published on March 20, 2017 (rather than in March 2016 as stated above). Most of the work for the original BACT Analysis, including the emission reduction estimates and associated costs, was completed by March 8, 2017, at which time the 2013 version was still the current version. The final BACT Analysis wasn't submitted to UDAQ until April 6, 2017 due to the time required to prepare the draft document, complete internal and external reviews, and finalize the document.

Nevertheless, Stantec installed the March 2017 version of the EPA CoST System and the costs associated with the different control technologies/practices for the rotary kiln system, pressure hydrator, and baghouse DC-3HB were re-evaluated. Revised tables for each source in the original BACT Analysis that was previously analyzed using EPA's CoST System are provided in Attachment C. The tables provide the average cost effectiveness values for each control technology/ practice in terms of 2016 dollars. Additional revised tables provide the ranking of the control technologies/practices from top to bottom, taking into account control effectiveness, economic impacts, environmental impacts, and energy impacts. The revised analysis results in increases in the economic impacts associated with each control technology/practice with no increase in the expected emission reductions (i.e., control efficiencies remain the same). Consequently, the conclusions from the original BACT Analysis remain the same.

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The EPA CoST System contains a normalized version of the cost per ton for each control measure converted to reference year 2013. The desired cost year can be specified as an input to the strategy. The EPA CoST System, however, only includes conversion options up to cost year 2014. The cost effectiveness value for each control option was converted to the 2016 cost year by applying the same methodology used in CoST and the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

5. ***Provide vendor data to support Appendix A "Site-Specific Cost Effectiveness and Economic Impact Calculations from Dry Sorbent Injection."***

Attachment D contains the quote for two dry sorbent injection (DSI) systems to control sulfur dioxide (SO_2) emissions from the rotary kiln systems at the LNA Nelson facility. Because the LNA Grantsville facility only has one kiln, the equipment costs provided in the original BACT Analysis for the DSI system are based on 50% of the quoted cost for the two systems at LNA Nelson facility.

Although the kilns at the LNA Nelson facility have capacities greater than the LNA Grantsville kiln (approximately 800 tons/day and 1,100 tons/day for the LNA Nelson kilns compared to approximately 260 tons/day for the LNA Grantsville kiln), the costs associated with DSI systems are not expected to be significantly dependent on capacity. Additionally, it is noted that:

- Any financial benefit provided for the purchase of two systems would not be available for the purchase of one system; and
- The equipment costs for a DSI system purchased today are anticipated to exceed the amount provided in the original BACT Analysis because the vendor quote is based on pricing available on May 22, 2013.

Furthermore, the site-specific cost effectiveness evaluation presented in Appendix A of the original BACT Analysis calculated $/ton of SO_2 reduced assuming 6.19 tons/year of SO_2 would be reduced solely as a result of the use of a DSI system. However, the fabric filter baghouse proposed as BACT for $PM_{2.5}$ emission control (for the kiln) will also reduce SO_2 emissions a minimum of 80%. Consequently, the additional benefit of the use of a DSI system would only reduce SO_2 emissions an insignificant amount compared to the cost of installing and operating the system. If necessary, an additional cost analysis can be provided upon request to demonstrate the true cost effectiveness in $/ton of SO_2 reduced for the DSI system.

Please feel free to contact Ed Barry of LNA (edward.barry@lhoist.com, 602-321-6752) or me if you have any questions or need any additional information.

RE: Supplement to Lhoist North America Grantsville Facility BACT Analysis

Sincerely,

STANTEC CONSULTING SERVICES INC.

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Engineering Project Specialist
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Attachments:

Attachment A: BACT Evaluation Tables for Crushing/Screening/Conveying Processes
Attachment B: Cost Effectiveness Evaluation Using the EPA Cost Control Manual
Attachment C: Revised BACT Evaluation Tables for the Rotary Kiln System, Pressure Hydrator, and Baghouse DC-3HB
Attachment D: Quote for Two Dry Sorbent Injection Systems for LNA Nelson Facility

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ATTACHMENT A: BACT EVALUATION TABLES FOR THE CRUSHING/ SCREENING/CONVEYING PROCESSES

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Table A.1 Crushing, Screening, and Conveyor Processes Located at the LNA Grantsville Facility

Emission Unit Description	Type of Process	Current Control Type	$PM_{10}/PM_{2.5}$ Control Efficiency	PM_{10} Emissions (tpy)		$PM_{2.5}$ Emissions (tpy)	
				Uncontrolled	Controlled	Uncontrolled	Controlled
Limestone Processing System							
CP-JCrush	Crushing	Water Spray	82.5%	0.42	0.07	0.082	0.014
CP-JCrush to CP-Belt1	Conveying	Cover	70%	0.03	0.01	0.0052	0.0015
CP-Screen	Screening	Cover	70%	2.28	0.69	0.15	0.046
CP-Screen to CP-Belt5	Conveying	Cover	70%	0.009	0.003	0.0013	0.00039
CP-Belt 5 to CP-CBin	Conveying	Cover	70%	0.009	0.003	0.0013	0.00039
Temp Feed Hopper to Temp Tube Screw	Conveying	Cover	70%	0.04	0.01	0.0066	0.0020
CP-GCrush	Crushing	Water Spray	82.5%	0.21	0.04	0.041	0.0072
CP-GCrush to CP-Belt3	Conveying	Cover	70%	0.35	0.10	0.052	0.016
CP-Belt 3 to CP-Belt2	Conveying	Cover	70%	0.02	0.005	0.0026	0.00077
CP-Screen to CP-Belt4	Conveying	Cover	70%	0.03	0.01	0.0052	0.0015

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Table A.1 Crushing, Screening, and Conveyor Processes Located at the LNA Grantsville Facility

Emission Unit Description	Type of Process	Current Control Type	$PM_{10}/PM_{2.5}$ Control Efficiency	PM_{10} Emissions (tpy)		$PM_{2.5}$ Emissions (tpy)	
				Uncontrolled	Controlled	Uncontrolled	Controlled
Rotary Kiln System							
K-Screen	Screening	Water Spray	82.5%	0.20	0.04	0.014	0.0024
K-Screen to Dump Truck	Conveying	Cover	70%	0.02	0.007	0.0033	0.0010
K-Belt/K-Screen to K-Elev1	Conveying	Water Spray	82.5%	0.44	0.08	0.066	0.012
Back Lime Handling System							
BL-WCrush	Crushing	Cover	70%	0.52	0.16	0.030	0.0091
BL-Screen	Screening	Cover	70%	0.18	0.05	0.027	0.0081

* The process with the greatest uncontrolled $PM_{2.5}$ emissions from each category that was used for the BACT analysis is highlighted yellow.

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Table A.2 Annual $PM_{2.5}$ Emissions from Crusher CP-JCrush, Screen CP-Screen, and Conveying Process K-Belt/K-Screen to K-Elev1

Emission Category	Controlled or Uncontrolled	Annual Emissions (tons/year)		
		CP-JCrush	CP-Screen	K-Belt/K-Screen to K-Elev1
Potential Emissions	Controlled	0.014	0.046	0.012
	Uncontrolled [a]	0.082	0.15	0.066
2013 Actual Emissions	Controlled	0	0	0
	Uncontrolled [a]	0	0	0
2011 Actual Emissions	Controlled	0	0	0
	Uncontrolled [a]	0	0	0
2008 Actual Emissions	Controlled [b]	0.0068	0.015	0.0067
	Uncontrolled [a]	0.039	0.048	0.038
2005 Actual Emissions	Controlled [b]	0.0087	0.019	0.0090
	Uncontrolled [a]	0.050	0.062	0.051

[a] Uncontrolled emissions of $PM_{2.5}$ are back calculated using a control efficiency of 82.5% for CP-JCrush and K-Belt/K-Screen to K-Elev1 (i.e., the control efficiency for water sprays) and 70% for CP-Screen (i.e., the control efficiency for a cover).

[b] For consistency, 2005 and 2008 $PM_{2.5}$ emissions are calculated using the same emission factors from LNA Grantsville's 2014 renewal application.

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Table A.3 $PM_{2.5}$ Control Technologies for Crusher CP-JCrush

Control Technology	Control Efficiency [a]		Average Cost Effectiveness [b]	
	Percent Controlled	Reference	$/Ton $PM_{2.5}$ Reduced	Reference
Fabric Filter - Pulse Jet Type	99-99.5%	EPA CoST System	1,124,363	EPA Cost Control Manual
Fabric Filter - Mechanical Shaker Type	99-99.5%	EPA CoST System	891,196	EPA Cost Control Manual
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	EPA CoST System	860,088	EPA Cost Control Manual
Paper/Nonwoven Filters - Cartridge Collector Type	99%	EPA CoST System	2,174,580	EPA Cost Control Manual
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	EPA CoST System	3,944,297	EPA Cost Control Manual
Dry Electrostatic Precipitator - Wire Plate Type	95%	EPA CoST System	4,726,436	EPA Cost Control Manual
Wet Scrubber	20-90%	AP-42, Table B.2-3 for Wet Scrubber	831,123	EPA Cost Control Manual
Water Sprays (current control technology used at LNA Grantsville)	82.5%	Average value from AP-42, page 11.19.1-5 (11/95)	No Additional Costs	Assumed
Cover	70%	Assumed Value	--	Less effective than current control so no need to pursue

[a] Control efficiencies are for filterable emissions only.

[b] Average cost effectiveness is calculated using the economic impacts presented in Table A.6 and dividing by the expected $PM_{2.5}$ emission reductions presented in Table A.6.

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Table A.4 PM$_{2.5}$ Control Technologies for Screen CP-Screen

Control Technology	Control Efficiency [a]		Average Cost Effectiveness [b]	
	Percent Controlled	Reference	$/Ton PM$_{2.5}$ Reduced	Reference
Fabric Filter - Pulse Jet Type	99-99.5%	EPA CoST System	1,458,706	EPA Cost Control Manual
Fabric Filter - Mechanical Shaker Type	99-99.5%	EPA CoST System	1,055,048	EPA Cost Control Manual
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	EPA CoST System	1,019,060	EPA Cost Control Manual
Paper/Nonwoven Filters - Cartridge Collector Type	99%	EPA CoST System	3,151,954	EPA Cost Control Manual
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	EPA CoST System	5,830,676	EPA Cost Control Manual
Dry Electrostatic Precipitator - Wire Plate Type	95%	EPA CoST System	4,171,220	EPA Cost Control Manual
Wet Scrubber	20-90%	AP-42, Table B.2-3 for Wet Scrubber	272,689	EPA Cost Control Manual
Water Sprays	82.5%	Average value from AP-42, page 11.19.1-5 (11/95)	259,816	Engineering Judgement and Information from the EPA Cost Control Manual
Cover (current control technology used at LNA Grantsville)	70%	Assumed Value	No Additional Costs	Assumed

[a] Control efficiencies are for filterable emissions only.

[b] Average cost effectiveness is calculated using the economic impacts presented in Table A.7 and dividing by the expected PM$_{2.5}$ emission reductions presented in Table A.7.

Table A.5 $PM_{2.5}$ Control Technologies for Conveyor Process K-Belt /K-Screen to K-Elev1

Control Technology	Control Efficiency [a]		Average Cost Effectiveness [b]	
	Percent Controlled	Reference	$/Ton $PM_{2.5}$ Reduced	Reference
Fabric Filter - Pulse Jet Type	99-99.5%	EPA CoST System	804,193	EPA Cost Control Manual
Fabric Filter - Mechanical Shaker Type	99-99.5%	EPA CoST System	736,064	EPA Cost Control Manual
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	EPA CoST System	712,689	EPA Cost Control Manual
Paper/Nonwoven Filters - Cartridge Collector Type	99%	EPA CoST System	1,211,118	EPA Cost Control Manual
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	EPA CoST System	2,037,880	EPA Cost Control Manual
Dry Electrostatic Precipitator - Wire Plate Type	95%	EPA CoST System	4,677,516	EPA Cost Control Manual
Wet Scrubber	20-90%	AP-42, Table B.2-3 for Wet Scrubber	632,881	EPA Cost Control Manual
Water Sprays (current control technology used at LNA Grantsville)	82.5%	Average value from AP-42, page 11.19.1-5 (11/95)	No Additional Costs	Assumed
Cover	70%	Assumed Value	--	Less effective than current control so no need to pursue

[a] Control efficiencies are for filterable emissions only.

[b] Average cost effectiveness is calculated using the economic impacts presented in Table A.8 and dividing by the expected $PM_{2.5}$ emission reductions presented in Table A.8.

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Table A.6 Ranking of Remaining $PM_{2.5}$ Control Efficiencies for Crusher CP-JCrush

Control Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Fabric Filter - Pulse Jet Type	99-99.5%	0.0006	0.082	91,900	Waste disposal may be necessary	Additional electricity demand
Fabric Filter - Mechanical Shaker Type	99-99.5%	0.0006	0.082	72,842	Waste disposal may be necessary	Additional electricity demand
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	0.0006	0.082	70,300	Waste disposal may be necessary	Additional electricity demand
Paper/Nonwoven Filters - Cartridge Collector Type	99%	0.0008	0.082	177,292	Waste disposal may be necessary	Additional electricity demand
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	0.0023	0.080	315,892	Waste disposal may be necessary	Additional electricity demand
Dry Electrostatic Precipitator - Wire Plate Type	95%	0.0041	0.078	369,774	Waste disposal may be necessary	Additional electricity demand
Wet Scrubber	20-90%	0.0082	0.074	37,608	Wastewater	Additional electricity demand

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Table A.6 Ranking of Remaining $PM_{2.5}$ Control Efficiencies for Crusher CP-JCrush

Control Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Water Sprays (current control technology used at LNA Grantsville)	82.5%	0.0144	0.068	No Additional Costs	None	No additional energy use

[a] Control efficiencies are for filterable emissions only.

[b] Calculated using the uncontrolled potential emission rates in Table A.2 and expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies except for a wet scrubber, where it is assumed that a high efficiency system (90% control) would be available.

[c] Calculated by subtracting the expected controlled $PM_{2.5}$ emission rate from the uncontrolled potential emission rates in Table A.2.

[d] Calculated using the EPA Air Pollution Cost Control Manual (see Attachment B). Values were converted from the 1998 to 2016 cost year by applying the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

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Table A.7 Ranking of Remaining $PM_{2.5}$ Control Efficiencies for Screen CP-Screen

Control Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Fabric Filter - Pulse Jet Type	99-99.5%	0.0012	0.15	223,401	Waste disposal may be necessary	Additional electricity demand
Fabric Filter - Mechanical Shaker Type	99-99.5%	0.0012	0.15	161,581	Waste disposal may be necessary	Additional electricity demand
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	0.0012	0.15	156,069	Waste disposal may be necessary	Additional electricity demand
Paper/Nonwoven Filters - Cartridge Collector Type	99%	0.0015	0.15	481,506	Waste disposal may be necessary	Additional electricity demand
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	0.0042	0.15	874,974	Waste disposal may be necessary	Additional electricity demand
Dry Electrostatic Precipitator - Wire Plate Type	95%	0.0077	0.15	611,468	Waste disposal may be necessary	Additional electricity demand
Wet Scrubber	20-90%	0.015	0.14	37,870	Wastewater	Additional electricity demand

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Table A.7 Ranking of Remaining $PM_{2.5}$ Control Efficiencies for Screen CP-Screen

Control Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Water Sprays	82.5%	0.027	0.13	33,076	None	Additional electricity demand
Cover (current control technology used at LNA Grantsville)	70%	0.046	0.11	No Additional Costs	None	No additional energy use

[a] Control efficiencies are for filterable emissions only.

[b] Calculated using the uncontrolled potential emission rates in Table A.2 and expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies except for a wet scrubber, where it is assumed that a high efficiency system (90% control) would be available.

[c] Calculated by subtracting the expected controlled $PM_{2.5}$ emission rate from the uncontrolled potential emission rates in Table A.2.

[d] Calculated using engineering judgement and the EPA Air Pollution Cost Control Manual (see Attachment B). Values were converted from the 1998 to 2016 cost year by applying the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

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Table A.8 Ranking of Remaining $PM_{2.5}$ Control Efficiencies for Conveyor Process K-Belt /K-Screen to K-Elev1

Control Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Fabric Filter - Pulse Jet Type	99-99.5%	0.00049	0.065	52,601	Waste disposal may be necessary	Additional electricity demand
Fabric Filter - Mechanical Shaker Type	99-99.5%	0.00049	0.065	48,145	Waste disposal may be necessary	Additional electricity demand
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	0.00049	0.065	46,616	Waste disposal may be necessary	Additional electricity demand
Paper/Nonwoven Filters - Cartridge Collector Type	99%	0.00066	0.065	79,018	Waste disposal may be necessary	Additional electricity demand
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	0.0018	0.064	130,609	Waste disposal may be necessary	Additional electricity demand
Dry Electrostatic Precipitator - Wire Plate Type	95%	0.0033	0.063	292,848	Waste disposal may be necessary	Additional electricity demand
Wet Scrubber	20-90%	0.0066	0.059	37,538	Wastewater	Additional electricity demand

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Table A.8 Ranking of Remaining $PM_{2.5}$ Control Efficiencies for Conveyor Process K-Belt /K-Screen to K-Elev1

Control Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Water Sprays (current control technology used at LNA Grantsville)	82.5%	0.012	0.054	No Additional Costs	None	No additional energy use

[a] Control efficiencies are for filterable emissions only.

[b] Calculated using the uncontrolled potential emission rates in Table A.2 and expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies except for a wet scrubber, where it is assumed that a high efficiency system (90% control) would be available.

[c] Calculated by subtracting the expected controlled $PM_{2.5}$ emission rate from the uncontrolled potential emission rates in Table A.2.

[d] Calculated using the EPA Air Pollution Cost Control Manual (see Attachment B). Values were converted from the 1998 to 2016 cost year by applying the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

ATTACHMENT B: COST EFFECTIVENESS EVALUATION USING THE EPA COST CONTROL MANUAL

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Table B.1 Cost Effectiveness Evaluation for Controlling $PM_{2.5}$ Emissions from Crusher CP-JCrush

Cost Item	Control Option						
	Fabric Filter - Pulse Jet Type	Fabric Filter - Mechanical Shaker Type	Fabric Filter - Reverse Air Cleaned Type	Paper/ Nonwoven Filters - Cartridge Collector Type	Wet Electrostatic Precipitator - Wire Plate Type	Dry Electrostatic Precipitator - Wire Plate Type	Wet Scrubber
Purchased Equipment Costs							
Purchased Equipment (PE)	$ 192,493	$ 122,608	$ 91,204	$ 202,820	$ 713,036	$ 950,000	$ 37,438
Instrumentation (I)	$ 19,249	$ 12,261	$ 9,120	$ 20,282	$ 71,304	$ 95,000	$ 3,744
Sales Tax	$ 16,939	$ 10,790	$ 8,026	$ 17,848	$ 62,747	$ 83,600	$ 3,295
Freight	$ 21,174	$ 13,487	$ 10,032	$ 22,310	$ 78,434	$ 104,500	$ 4,118
Total Purchased Equipment Costs (TPE)	***$ 249,855***	***$ 159,145***	***$ 118,382***	***$ 263,261***	***$ 925,521***	***$ 1,233,100***	***$ 48,595***
Direct Installation Costs							
Foundations and Supports	$ 9,994	$ 6,366	$ 4,735	$ 10,530	$ 37,021	$ 49,324	$ 2,916
Handling and Erection	$ 124,928	$ 79,573	$ 59,191	$ 131,630	$ 462,761	$ 616,550	$ 19,438
Electrical	$ 19,988	$ 12,732	$ 9,471	$ 21,061	$ 74,042	$ 98,648	$ 486
Piping	$ 2,499	$ 1,591	$ 1,184	$ 2,633	$ 9,255	$ 12,331	$ 2,430
Insulation	$ 17,490	$ 11,140	$ 8,287	$ 18,428	$ 18,510	$ 24,662	$ 1,458
Painting	$ 9,994	$ 6,366	$ 4,735	$ 10,530	$ 18,510	$ 24,662	$ 486
Total Direct Installation Costs	***$ 184,893***	***$ 117,768***	***$ 87,603***	***$ 194,813***	***$ 620,099***	***$ 826,177***	***$ 27,213***
Total Direct Capital Costs (TDC)	***$ 434,748***	***$ 276,913***	***$ 205,985***	***$ 458,074***	***$ 1,545,620***	***$ 2,059,277***	***$ 75,808***
Indirect Installation Costs							
Engineering	$ 24,986	$ 15,915	$ 11,838	$ 26,326	$ 185,104	$ 246,620	$ 4,859
Construction and Field Expense	$ 49,971	$ 31,829	$ 23,676	$ 52,652	$ 185,104	$ 246,620	$ 4,859
Contractor Fees	$ 24,986	$ 15,915	$ 11,838	$ 26,326	$ 92,552	$ 123,310	$ 4,859
Start-up	$ 2,499	$ 1,591	$ 1,184	$ 2,633	$ 9,255	$ 12,331	$ 486
Performance Test	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000
Contingencies	$ 7,496	$ 4,774	$ 3,551	$ 7,898	$ 27,766	$ 36,993	$ 1,458
Total Indirect Installation Costs (TII)	***$ 115,936***	***$ 76,024***	***$ 58,088***	***$ 121,835***	***$ 505,781***	***$ 671,874***	***$ 22,522***
Total Capital Investment (TCI)	***$ 550,685***	***$ 352,937***	***$ 264,074***	***$ 579,909***	***$ 2,051,402***	***$ 2,731,151***	***$ 98,330***
Direct Annual Costs							
Operating and Supervisory Labor	$ 20,988	$ 20,988	$ 20,988	$ 20,988	$ 31,481	$ 31,481	$ 20,988
Maintenance	$ 9,125	$ 9,125	$ 9,125	$ 9,125	$ 16,930	$ 20,006	$ 9,125
Replacement Bags/Cartridges and Labor	$ 10,792	$ 10,415	$ 14,862	$ 83,874	$ -	$ -	$ -
Water	$ -	$ -	$ -	$ -	$ 105	$ -	$ 105
Electricity	$ 6,659	$ 6,659	$ 6,659	$ 6,659	$ 113,726	$ 113,724	$ 26
Compressed Air	$ 3,899	$ -	$ -	$ 19,493	$ -	$ -	$ -
Total Direct Annual Costs	***$ 51,462***	***$ 47,187***	***$ 51,634***	***$ 140,139***	***$ 162,242***	***$ 165,211***	***$ 30,243***
Indirect Annual Costs							
Capital Recovery - TCI	$ 40,438	$ 25,655	$ 18,666	$ 37,153	$ 153,650	$ 204,563	$ 7,365
Total Indirect Annual Costs	***$ 40,438***	***$ 25,655***	***$ 18,666***	***$ 37,153***	***$ 153,650***	***$ 204,563***	***$ 7,365***
Total Annual Costs	***$ 91,900***	***$ 72,842***	***$ 70,300***	***$ 177,292***	***$ 315,892***	***$ 369,774***	***$ 37,608***

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Table B.2 Cost Effectiveness Evaluation for Controlling $PM_{2.5}$ Emissions from Screen CP-Screen

Cost Item	Control Option							
	Fabric Filter - Pulse Jet Type	Fabric Filter - Mechanical Shaker Type	Fabric Filter - Reverse Air Cleaned Type	Paper/ Nonwoven Filters - Cartridge Collector Type	Wet Electrostatic Precipitator - Wire Plate Type	Dry Electrostatic Precipitator - Wire Plate Type	Wet Scrubber	Water Spray System
Purchased Equipment Costs								
Purchased Equipment (PE)	$ 530,962	$ 298,432	$ 215,129	$ 589,742	$ 2,105,155	$ 950,000	$ 37,438	$ 15,000
Instrumentation (I)	$ 53,096	$ 29,843	$ 21,513	$ 58,974	$ 210,515	$ 95,000	$ 3,744	$ 1,500
Sales Tax	$ 46,725	$ 26,262	$ 18,931	$ 51,897	$ 185,254	$ 83,600	$ 3,295	$ 1,320
Freight	$ 58,406	$ 32,827	$ 23,664	$ 64,872	$ 231,567	$ 104,500	$ 4,118	$ 1,650
Total Purchased Equipment Costs (TPE)	***$ 689,189***	***$ 387,364***	***$ 279,237***	***$ 765,485***	***$ 2,732,491***	***$ 1,233,100***	***$ 48,595***	***$ 19,470***
Direct Installation Costs								
Foundations and Supports	$ 27,568	$ 15,495	$ 11,169	$ 30,619	$ 109,300	$ 49,324	$ 2,916	$ -
Handling and Erection	$ 344,595	$ 193,682	$ 139,619	$ 382,742	$ 1,366,246	$ 616,550	$ 19,438	$ -
Electrical	$ 55,135	$ 30,989	$ 22,339	$ 61,239	$ 218,599	$ 98,648	$ 486	$ 195
Piping	$ 6,892	$ 3,874	$ 2,792	$ 7,655	$ 27,325	$ 12,331	$ 2,430	$ 974
Insulation	$ 48,243	$ 27,116	$ 19,547	$ 53,584	$ 54,650	$ 24,662	$ 1,458	$ 584
Painting	$ 27,568	$ 15,495	$ 11,169	$ 30,619	$ 54,650	$ 24,662	$ 486	$ -
Total Direct Installation Costs	***$ 510,000***	***$ 286,650***	***$ 206,635***	***$ 566,459***	***$ 1,830,769***	***$ 826,177***	***$ 27,213***	***$ 1,752***
Total Direct Capital Costs (TDC)	***$ 1,199,189***	***$ 674,014***	***$ 485,872***	***$ 1,331,943***	***$ 4,563,260***	***$ 2,059,277***	***$ 75,808***	***$ 21,222***
Indirect Installation Costs								
Engineering	$ 68,919	$ 38,736	$ 27,924	$ 76,548	$ 546,498	$ 246,620	$ 4,859	$ 1,947
Construction and Field Expense	$ 137,838	$ 77,473	$ 55,847	$ 153,097	$ 546,498	$ 246,620	$ 4,859	$ 3,894
Contractor Fees	$ 68,919	$ 38,736	$ 27,924	$ 76,548	$ 273,249	$ 123,310	$ 4,859	$ 1,947
Start-up	$ 6,892	$ 3,874	$ 2,792	$ 7,655	$ 27,325	$ 12,331	$ 486	$ 195
Performance Test	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ -
Contingencies	$ 20,676	$ 11,621	$ 8,377	$ 22,965	$ 81,975	$ 36,993	$ 1,458	$ 584
Total Indirect Installation Costs (TII)	***$ 309,243***	***$ 176,440***	***$ 128,864***	***$ 342,813***	***$ 1,481,545***	***$ 671,874***	***$ 22,522***	***$ 8,567***
Total Capital Investment (TCI)	***$ 1,508,433***	***$ 850,454***	***$ 614,737***	***$ 1,674,757***	***$ 6,044,805***	***$ 2,731,151***	***$ 98,330***	***$ 29,789***
Direct Annual Costs								
Operating and Supervisory Labor	$ 20,988	$ 20,988	$ 20,988	$ 20,988	$ 31,481	$ 31,481	$ 20,988	$ 20,988
Maintenance	$ 9,125	$ 9,125	$ 9,125	$ 9,125	$ 34,999	$ 20,006	$ 9,125	$ 9,125
Replacement Bags/Cartridges and Labor	$ 31,861	$ 30,750	$ 43,877	$ 247,629	$ -	$ -	$ -	$ -
Water	$ -	$ -	$ -	$ -	$ 315	$ -	$ 315	$ 526
Electricity	$ 39,322	$ 39,322	$ 39,322	$ 39,322	$ 355,422	$ 355,418	$ 77	$ 206
Compressed Air	$ 11,510	$ -	$ -	$ 57,551	$ -	$ -	$ -	$ -
Total Direct Annual Costs	***$ 112,806***	***$ 100,185***	***$ 113,312***	***$ 374,614***	***$ 422,218***	***$ 406,905***	***$ 30,505***	***$ 30,844***
Indirect Annual Costs								
Capital Recovery - TCI	$ 110,595	$ 61,396	$ 42,757	$ 106,892	$ 452,756	$ 204,563	$ 7,365	$ 2,231
Total Indirect Annual Costs	***$ 110,595***	***$ 61,396***	***$ 42,757***	***$ 106,892***	***$ 452,756***	***$ 204,563***	***$ 7,365***	***$ 2,231***
Total Annual Costs	***$ 223,401***	***$ 161,581***	***$ 156,069***	***$ 481,506***	***$ 874,974***	***$ 611,468***	***$ 37,870***	***$ 33,076***

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Table B.3 Cost Effectiveness Evaluation for Controlling $PM_{2.5}$ Emissions from Conveyor Process K-Belt/K-Screen to K-Elev1

Cost Item	Control Option						
	Fabric Filter - Pulse Jet Type	Fabric Filter - Mechanical Shaker Type	Fabric Filter - Reverse Air Cleaned Type	Paper/ Nonwoven Filters - Cartridge Collector Type	Wet Electrostatic Precipitator - Wire Plate Type	Dry Electrostatic Precipitator - Wire Plate Type	Wet Scrubber
Purchased Equipment Costs							
Purchased Equipment (PE)	$ 76,918	$ 62,571	$ 48,888	$ 70,701	$ 237,679	$ 950,000	$ 37,438
Instrumentation (I)	$ 7,692	$ 6,257	$ 4,889	$ 7,070	$ 23,768	$ 95,000	$ 3,744
Sales Tax	$ 6,769	$ 5,506	$ 4,302	$ 6,222	$ 20,916	$ 83,600	$ 3,295
Freight	$ 8,461	$ 6,883	$ 5,378	$ 7,777	$ 26,145	$ 104,500	$ 4,118
Total Purchased Equipment Costs (TPE)	***$ 99,839***	***$ 81,217***	***$ 63,457***	***$ 91,770***	***$ 308,507***	***$ 1,233,100***	***$ 48,595***
Direct Installation Costs							
Foundations and Supports	$ 3,994	$ 3,249	$ 2,538	$ 3,671	$ 12,340	$ 49,324	$ 2,916
Handling and Erection	$ 49,919	$ 40,608	$ 31,728	$ 45,885	$ 154,254	$ 616,550	$ 19,438
Electrical	$ 7,987	$ 6,497	$ 5,077	$ 7,342	$ 24,681	$ 98,648	$ 486
Piping	$ 998	$ 812	$ 635	$ 918	$ 3,085	$ 12,331	$ 2,430
Insulation	$ 6,989	$ 5,685	$ 4,442	$ 6,424	$ 6,170	$ 24,662	$ 1,458
Painting	$ 3,994	$ 3,249	$ 2,538	$ 3,671	$ 6,170	$ 24,662	$ 486
Total Direct Installation Costs	***$ 73,881***	***$ 60,100***	***$ 46,958***	***$ 67,910***	***$ 206,700***	***$ 826,177***	***$ 27,213***
Total Direct Capital Costs (TDC)	***$ 173,720***	***$ 141,317***	***$ 110,414***	***$ 159,679***	***$ 515,207***	***$ 2,059,277***	***$ 75,808***
Indirect Installation Costs							
Engineering	$ 9,984	$ 8,122	$ 6,346	$ 9,177	$ 61,701	$ 246,620	$ 4,859
Construction and Field Expense	$ 19,968	$ 16,243	$ 12,691	$ 18,354	$ 61,701	$ 246,620	$ 4,859
Contractor Fees	$ 9,984	$ 8,122	$ 6,346	$ 9,177	$ 30,851	$ 123,310	$ 4,859
Start-up	$ 998	$ 812	$ 635	$ 918	$ 3,085	$ 12,331	$ 486
Performance Test	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000
Contingencies	$ 2,995	$ 2,437	$ 1,904	$ 2,753	$ 9,255	$ 36,993	$ 1,458
Total Indirect Installation Costs (TII)	***$ 49,929***	***$ 41,735***	***$ 33,921***	***$ 46,379***	***$ 172,594***	***$ 671,874***	***$ 22,522***
Total Capital Investment (TCI)	***$ 223,649***	***$ 183,053***	***$ 144,335***	***$ 206,058***	***$ 687,801***	***$ 2,731,151***	***$ 98,330***
Direct Annual Costs							
Operating and Supervisory Labor	$ 20,988	$ 20,988	$ 20,988	$ 20,988	$ 31,481	$ 31,481	$ 20,988
Maintenance	$ 9,125	$ 9,125	$ 9,125	$ 9,125	$ 10,760	$ 20,006	$ 9,125
Replacement Bags/Cartridges and Labor	$ 3,597	$ 3,472	$ 4,954	$ 27,958	$ -	$ -	$ -
Water	$ -	$ -	$ -	$ -	$ 53	$ -	$ 53
Electricity	$ 1,110	$ 1,110	$ 1,110	$ 1,110	$ 36,799	$ 36,798	$ 8
Compressed Air	$ 1,300	$ -	$ -	$ 6,498	$ -	$ -	$ -
Total Direct Annual Costs	***$ 36,119***	***$ 34,694***	***$ 36,176***	***$ 65,678***	***$ 79,092***	***$ 88,285***	***$ 30,173***
Indirect Annual Costs							
Capital Recovery - TCI	$ 16,482	$ 13,451	$ 10,440	$ 13,340	$ 51,516	$ 204,563	$ 7,365
Total Indirect Annual Costs	***$ 16,482***	***$ 13,451***	***$ 10,440***	***$ 13,340***	***$ 51,516***	***$ 204,563***	***$ 7,365***
Total Annual Costs	***$ 52,601***	***$ 48,145***	***$ 46,616***	***$ 79,018***	***$ 130,609***	***$ 292,848***	***$ 37,538***

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ATTACHMENT C: REVISED BACT EVALUATION TABLES FOR THE ROTARY KILN SYSTEM, PRESSURE HYDRATOR, AND BAGHOUSE DC-3HB

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Revised Table 3.2 PM2.5 Control Technologies for the Rotary Kiln System

Control Practice/Technology	Control Efficiency [a]		Average Cost Effectiveness	
	Percent Controlled	Reference	$/Ton $PM_{2.5}$ Reduced	Reference
Fabric Filter - Pulse Jet Type	99-99.5%	EPA CoST [b] System	283.95 [d]	EPA CoST System [c]
Fabric Filter - Mechanical Shaker Type	99-99.5%	EPA CoST System	306.55 [d]	EPA CoST System [c]
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	EPA CoST System	360.23 [d]	EPA CoST System [c]
Paper/Nonwoven Filters - Cartridge Collector Type	99%	EPA CoST System	344.68	EPA CoST System [c]
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	EPA CoST System	588.61	EPA CoST System [c]
Dry Electrostatic Precipitator - Wire Plate Type	95%	EPA CoST System	291.35	EPA CoST System [c]
Electro Dry Scrubber (current control technology used at LNA Grantsville)	70%	Estimated from AP-42, Table B.2-3 for Low Efficiency Electrostatic Precipitator	Not included in the EPA CoST System	
Wet Scrubber	20-90%	AP-42, Table B.2-3 for Wet Scrubber	Not included in the EPA CoST System [d]	
Cyclone Separator	10-80%	AP-42, Table B.2-3 for Centrifugal Collector	Not included in the EPA CoST System	

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Revised Table 3.2 $PM_{2.5}$ Control Technologies for the Rotary Kiln System

Control Practice/Technology	Control Efficiency [a]		Average Cost Effectiveness	
	Percent Controlled	Reference	$/Ton $PM_{2.5}$ Reduced	Reference
Gravel Bed Filter	0%	AP-42, Table B.2-3 for Gravel Bed Filter	Not included in the EPA CoST System	
Good Combustion Practices and Burner/Process Optimization	0%	Assumed	No Additional Costs	Assumed

[a] Control efficiencies are for filterable emissions only.

[b] CoST: The Control Strategy Tool

[c] Average cost effectiveness provided by CoST is for Reference Year 2013. The cost effectiveness value was converted to the 2016 cost year by applying the same methodology used in CoST and the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

[d] The cost effectiveness values presented in the EPA CoST system are average values. Site-specific cost effectiveness values for fabric filter baghouses and wet scrubbers are discussed in Section 2.1.3 of LNA Grantsville's previous RACT Analysis dated August 2013. A fabric filter baghouse was determined to have a site-specific cost effectiveness value of $91,642/ton of $PM_{2.5}$ reduced. A wet scrubber was determined to have a site-specific cost effectiveness value of $71,617/ton of $PM_{2.5}$ reduced. Site-specific cost effectiveness values for the remaining $PM_{2.5}$ control practices/technologies are also expected to be similarly greater than the average values in EPA's CoST System.

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Revised Table 3.3 Ranking of Remaining $PM_{2.5}$ Control Efficiencies

Control Practice/Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Fabric Filter - Pulse Jet Type	99-99.5%	0.81	107.72	30,587.25 [e]	Not Applicable (top option is chosen)	Not Applicable (top option is chosen)
Fabric Filter - Mechanical Shaker Type	99-99.5%	0.81	107.72	33,021.79 [e]		
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	0.81	107.72	38,804.54 [e]		
Paper/Nonwoven Filters - Cartridge Collector Type	99%	1.09	107.45	37,036.35		
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	2.98	105.55	62,129.28		
Dry Electrostatic Precipitator - Wire Plate Type	95%	5.43	103.11	30,041.34		
Electro Dry Scrubber (current control technology used at LNA Grantsville)	70%	32.56	75.98	Not Determined		
Wet Scrubber	20-90%	48.84	59.70	Not Determined [e]		

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Revised Table 3.3 Ranking of Remaining $PM_{2.5}$ Control Efficiencies

Control Practice/Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Cyclone Separator	10-80%	59.70	48.84	Not Determined	Not Applicable (top option is chosen)	Not Applicable (top option is chosen)
Gravel Bed Filter	0%	108.54	0	Not Determined		
Good Combustion Practices and Burner/Process Optimization	0%	108.54	0	No Additional Costs		

[a] Control efficiencies are for filterable emissions only.

[b] Calculated using the uncontrolled potential $PM_{2.5}$ emission rate in Table 3.1 and the expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies. The uncontrolled potential $PM_{2.5}$ emission rate in Table 3.1 includes only filterable emissions.

[c] Calculated by subtracting the expected controlled $PM_{2.5}$ emission rates from the uncontrolled potential $PM_{2.5}$ emission rate in Table 3.1.

[d] Calculated by multiplying the average cost effectiveness presented in Revised Table 3.2 by the amount of $PM_{2.5}$ reduced per year.

[e] The economic impacts are based on cost effectiveness values presented in the EPA CoST system, which are average values. Site-specific economic impacts for fabric filter baghouses and wet scrubbers are discussed in Section 2.1.3 of LNA Grantsville's previous RACT Analysis dated August 2013. A fabric filter baghouse was determined to have a site-specific economic impact of $996,145/year. A wet scrubber was determined to have a site-specific economic impact of $534,627/year. Site-specific economic impacts for the remaining $PM_{2.5}$ control practices/technologies are also expected to be similarly greater than the average values in EPA's CoST System.

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Revised Table 3.4 SO_2 Control Technologies for the Rotary Kiln System

Control Practice/Technology	Control Efficiency		Average Cost Effectiveness	
	Percent Controlled	Reference	$/Ton SO_2 Reduced	Reference
Flue Gas Desulfurization [a]	50-90%	EPA CoST System	665-6,651	EPA Air Pollution Control Fact Sheet for Flue Gas Desulfurization [b]
Good Combustion Practices, Burner/Process Optimization, Inherent Control (current control practice used at LNA Grantsville)	0%	Assumed	No Additional Costs	Assumed

[a] LNA conducted a cost effectiveness analysis for dry sorbent injection (i.e., a type of flue gas desulfurization) for kilns located at one of their other facilities that are fired by coal and petroleum coke. The cost effectiveness of dry sorbent injection on the coal/coke kilns was determined to be approximately $5,000-$5,500/tons of SO_2 reduced. Assuming the same equipment, installation, and operational costs (adjusted for sorbent usage), a dry sorbent injection system installed on the LNA Grantsville Rotary Kiln System would have a cost effectiveness of approximately $80,000/tons of SO_2 reduced (see Appendix A). The higher cost effectiveness value is due to the minimal amount of SO_2 emitted by the LNA Grantsville Rotary Kiln System and, therefore, the limited available reduction in SO_2 emissions. Furthermore, because dry sorbent injection systems are known to have significantly lower capital and annual costs compared to wet systems, the cost effectiveness values for wet systems installed on the LNA Grantsville Rotary Kiln System are expected to be greater than the $80,000/ton of SO_2 determined for dry sorbent injection.

[b] Average cost effectiveness value presented in the EPA Air Pollution Control Fact Sheet for Flue Gas Desulfurization is for Reference Year 2001. The cost effectiveness value was converted to the 2016 cost year by applying the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis. Because the EPA Air Pollution Control Fact Sheet for Flue Gas Desulfurization is primarily applicable to stationary coal and oil-fired combustion units, the average cost effectiveness values are lower than what would be expected for LNA Grantsville's Rotary Kiln System, which has an uncontrolled potential to emit of only 8.85 tons/year.

Revised Table 3.5 Ranking of Remaining SO_2 Control Efficiencies

Control Practice/Technology	Control Efficiency	Expected Controlled SO_2 Emission Rate (tons/year) [a]	Expected SO_2 Emission Reduction (tons/year) [b]	Economic Impacts ($/year) [c]	Environmental Impacts	Energy Impacts
Flue Gas Desulfurization [d]	50-90%	2.65	6.19	22,655.16	Waste disposal would be necessary	Additional electricity demand
Good Combustion Practices, Burner/Process Optimization, Inherent Control (current control practice used at LNA Grantsville)	0%	8.85	0	No Additional Costs	None	No additional energy use

[a] Calculated using the uncontrolled potential SO_2 emission rate in Table 3.1 and the expected SO_2 control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies.

[b] Calculated by subtracting the expected controlled SO_2 emission rates from the uncontrolled potential SO_2 emission rate in Table 3.1.

[c] Calculated by multiplying the average cost effectiveness presented in Revised Table 3.4 by the amount of SO_2 reduced per year. When there is a range of cost effectiveness, economic impacts are calculated using the median of the cost effectiveness.

[d] As previously described, LNA conducted a cost effectiveness analysis for dry sorbent injection (i.e., a type of flue gas desulfurization) for coal/coke kilns located at one of their other facilities. The corresponding economic impacts of dry sorbent injection on the coal/coke kilns was determined to be approximately $3,350,000-$5,076,000/year. Assuming the same equipment, installation, and operational costs (adjusted for sorbent usage), a dry sorbent injection system installed on the LNA Grantsville Rotary Kiln System would have an economic impact of approximately $495,000/year (see Appendix A). The lower economic impact is due to the lower amount of sorbent needed to reduce the minimal amount of SO_2 emitted by the LNA Grantsville Rotary Kiln System. Because dry sorbent injection systems are known to have significantly lower capital and annual costs compared to wet systems, the economic impacts of wet systems installed on the LNA Grantsville Rotary Kiln System are expected to be greater than the $495,000/year determined for dry sorbent injection.

Revised Table 3.6 NOx Control Technologies for the Rotary Kiln System

Control Practice/Technology	Control Efficiency		Average Cost Effectiveness	
	Percent Controlled	Reference	$/Ton NO_x Reduced	Reference
Low NO_x Burner Systems [c]	30%	EPA CoST System	934.27	EPA CoST System [a]
Selective Catalytic Reduction [c]	90%	EPA CoST System	2,948.30	EPA CoST System [a]
Selective Non-Catalytic Reduction	25-50%	EPA CoST System and Data from a Different LNA Facility	1,284.61 [b]	EPA CoST System [a]
Good Combustion Practices and Burner/Process Optimization (current control practice used at LNA Grantsville)	0%	Assumed	No Additional Costs	Assumed

[a] Average cost effectiveness provided by CoST is for Reference Year 2013. The cost effectiveness value was converted to the 2016 cost year by applying the same methodology used in CoST and the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

[b] The cost effectiveness value presented in the EPA CoST system is an average value. A site-specific cost effectiveness value for selective non-catalytic reduction is discussed in Section 3.1.3 of LNA Grantsville's previous RACT Analysis dated August 2013. Selective non-catalytic reduction was determined to have a site-specific cost effectiveness value of $3,977/ton of NO_x reduced. Site-specific cost effectiveness values for low NO_x burner systems and selective catalytic reduction (although determined to be infeasible for the LNA Grantsville facility) are also expected to be similarly greater than the average values in EPA's CoST System.

[c] Determined in the original BACT Analysis to be technically infeasible.

Revised Table 3.7 Ranking of Remaining NO_x Control Efficiencies

Control Practice/Technology	Control Efficiency	Expected Controlled NO_x Emission Rate (tons/year) [a]	Expected NO_x Emission Reduction (tons/year) [b]	Economic Impacts ($/year) [c]	Environmental Impacts	Energy Impacts
Selective Non-Catalytic Reduction	25-50%	205.31	123.19	158,248.47 [d]	Not Applicable (top option is chosen)	Not Applicable (top option is chosen)
Good Combustion Practices and Burner/Process Optimization (current control practice used at LNA Grantsville)	0%	328.50	0	No Additional Costs		

[a] Calculated using the uncontrolled potential NO_x emission rate in Table 3.1 and the expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies.

[b] Calculated by subtracting the expected controlled NO_x emission rates from the uncontrolled potential NO_x emission rate in Table 3.1.

[c] Calculated by multiplying the average cost effectiveness presented in Revised Table 3.6 by the amount of NO_x reduced per year.

[d] The economic impact is based on a cost effectiveness value presented in the EPA CoST system, which is an average value. A site-specific economic impact for selective non-catalytic reduction is discussed in Section 3.1.3 of LNA Grantsville's previous RACT Analysis dated August 2013. Selective non-catalytic reduction was determined to have a site-specific economic impact of $163,324/year. Site-specific economic impacts for low NO_x burner systems and selective catalytic reduction (although determined to be infeasible for the LNA Grantsville facility) are also expected to be similarly greater than the average values in EPA's CoST System.

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Revised Table 4.2 PM$_{2.5}$ Control Technologies for the Pressure Hydrator

Control Practice/Technology	Control Efficiency [a]		Average Cost Effectiveness	
	Percent Controlled	Reference	$/Ton PM$_{2.5}$ Reduced	Reference
Fabric Filter - Pulse Jet Type (current control technology used at LNA Grantsville)	99-99.5%	EPA CoST System	283.95	EPA CoST System [b]
Fabric Filter - Mechanical Shaker Type	99-99.5%	EPA CoST System	306.55	EPA CoST System [b]
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	EPA CoST System	360.23	EPA CoST System [b]
Paper/Nonwoven Filters - Cartridge Collector Type	99%	EPA CoST System	344.68	EPA CoST System [b]
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	EPA CoST System	588.61	EPA CoST System [b]
Dry Electrostatic Precipitator - Wire Plate Type	95%	EPA CoST System	291.35	EPA CoST System [b]
Best Combustion/ Management Practices	0%	Assumed	No Additional Costs	Assumed

[a] Control efficiencies are for filterable emissions only.

[b] Average cost effectiveness provided by CoST is for Reference Year 2013. The cost effectiveness value was converted to the 2016 cost year by applying the same methodology used in CoST and the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

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Revised Table 4.3 Ranking of Remaining $PM_{2.5}$ Control Efficiencies

Control Practice/Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Fabric Filter - Pulse Jet Type (current control technology used at LNA Grantsville)	99-99.5%	1.74	229.83	65,259.64	Not Applicable (top option is chosen)	Not Applicable (top option is chosen)
Fabric Filter - Mechanical Shaker Type	99-99.5%	1.74	229.83	70,453.88		
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	1.74	229.83	82,791.69		
Paper/Nonwoven Filters - Cartridge Collector Type	99%	2.32	229.25	79,019.16		
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	6.37	225.20	132,556.37		
Dry Electrostatic Precipitator - Wire Plate Type	95%	11.58	219.99	64,094.91		
Best Combustion/ Management Practices	0%	231.57	0	No Additional Costs		

[a] Control efficiencies are for filterable emissions only.

[b] Calculated using the uncontrolled potential $PM_{2.5}$ emission rate in Table 4.1 and the expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies. The uncontrolled potential $PM_{2.5}$ emission rate in Table 4.1 includes only filterable emissions.

[c] Calculated by subtracting the expected controlled $PM_{2.5}$ emission rates from the uncontrolled potential $PM_{2.5}$ emission rate in Table 4.1.

[d] Calculated by multiplying the average cost effectiveness presented in Revised Table 4.2 by the amount of $PM_{2.5}$ reduced per year.

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Revised Table 5.2 PM$_{2.5}$ Control Technologies for Baghouse DC-3HB

Control Practice/Technology	Control Efficiency [a]		Average Cost Effectiveness	
	Percent Controlled	Reference	$/Ton PM$_{2.5}$ Reduced	Reference
Fabric Filter - Pulse Jet Type (current control technology used at LNA Grantsville)	99-99.5%	EPA CoST System	283.95	EPA CoST System [b]
Fabric Filter - Mechanical Shaker Type	99-99.5%	EPA CoST System	306.55	EPA CoST System [b]
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	EPA CoST System	360.23	EPA CoST System [b]
Paper/Nonwoven Filters - Cartridge Collector Type	99%	EPA CoST System	344.68	EPA CoST System [b]
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	EPA CoST System	588.61	EPA CoST System [b]
Dry Electrostatic Precipitator - Wire Plate Type	95%	EPA CoST System	291.35	EPA CoST System [b]
Best Combustion/ Management Practices	0%	Assumed	No Additional Costs	Assumed

[a] Control efficiencies are for filterable emissions only.

[b] Average cost effectiveness provided by CoST is for Reference Year 2013. The cost effectiveness value was converted to the 2016 cost year by applying the same methodology used in CoST and the Gross Domestic Product: Implicit Price Deflator (GDP IPD) for 2016 available from the United States Department of Commerce Bureau of Economic Analysis.

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Revised Table 5.3 Ranking of Remaining $PM_{2.5}$ Control Efficiencies

Control Practice/Technology	Control Efficiency [a]	Expected Controlled $PM_{2.5}$ Emission Rate (tons/year) [b]	Expected $PM_{2.5}$ Emission Reduction (tons/year) [c]	Economic Impacts ($/year) [d]	Environmental Impacts	Energy Impacts
Fabric Filter - Pulse Jet Type (current control technology used at LNA Grantsville)	99-99.5%	1.10	145.28	41,251.52	Not Applicable (top option is chosen)	Not Applicable (top option is chosen)
Fabric Filter - Mechanical Shaker Type	99-99.5%	1.10	145.28	44,534.87		
Fabric Filter - Reverse Air Cleaned Type	99-99.5%	1.10	145.28	52,333.78		
Paper/Nonwoven Filters - Cartridge Collector Type	99%	1.46	144.91	49,949.11		
Wet Electrostatic Precipitator - Wire Plate Type	95-99.5%	4.03	142.35	83,790.72		
Dry Electrostatic Precipitator - Wire Plate Type	95%	7.32	139.06	40,515.28		
Best Combustion/ Management Practices	0%	146.38	0	No Additional Costs		

[a] Control efficiencies are for filterable emissions only.

[b] Calculated using the uncontrolled potential $PM_{2.5}$ emission rate in Table 5.1 and the expected control efficiencies. When there is a range of control efficiencies, emissions are calculated using the median of the control efficiencies. The uncontrolled potential $PM_{2.5}$ emission rate in Table 5.1 includes only filterable emissions.

[c] Calculated by subtracting the expected controlled $PM_{2.5}$ emission rates from the uncontrolled potential $PM_{2.5}$ emission rates in Table 5.1.

[d] Calculated by multiplying the average cost effectiveness presented in Revised Table 5.2 by the amount of $PM_{2.5}$ reduced per year.

ATTACHMENT D: QUOTE FOR TWO DRY SORBENT INJECTION SYSTEMS FOR THE LNA NELSON FACILITY

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NOL-TEC SYSTEMS

SORB-N-JECT® Technology

www.nol-tec.com

May 22, 2013

LHOIST NORTH AMERICA
Hulen Street 3700
PO Box 985004
Fort Worth, TX 76185

Attention: Mr. Gideon Siringi
Email: Gideon.Siringi@Lhoist.com
Phone: 817-732-8164

Subject: Hydrated Lime Injection System at Nelson Plant
NOL-TEC SYSTEMS®, INC. Proposal 13767

Mr. Siringi,

We are pleased to submit for your review our ***budgetary (±20%)*** proposal for a Nol-Tec Sorb-N-Ject® Technology system in accordance with the following:

SYSTEM CONCEPT:

Hydrated Lime will be delivered on site in PD Blower trucks. Trucks will unload to one (1) of four (4) storage silos. Each kiln will have two (2) dedicated silos. Silo will discharge to a Loss-In-Weight Feeder, which consists of a hopper on load cells and a drop thru rotary airlock with a VFD. Material will be conveyed via PD Blower to an injection point with two injection lances per kiln. Injection location on kiln duct work TBD.

TRUCK UNLOAD DESIGN CRITERIA:

(Note that the following design criteria are based upon information that is either assumed or known to us at the time of quoting. Customer verification of this data is required to ensure proper system and equipment sizing.)

Product:	Lhoist Sorbacal Hydrated Lime
Bulk Density:	22 Lbs./Cu. Ft.
Particle Size:	Fine
Moisture:	Dry
Temperature:	Ambient
Abrasiveness:	Slight
System Capacity:	Expected 20 TPH ~ Due to the amount of manual adjustments on PD Blower Trucks, NTS can not guarantee this rate.

Conveyed Distance;

Horizontal:	100 Ft.
Vertical:	10 Ft.
No 90° Bends:	1

EQUIPMENT:

Truck Unload Blowers:

1. Two (2) Blower packages, positive displacement rotary blower, driven by a 75 HP, TEFC, 1750 RPM, 230/460/3/60 motor, mounted on a structural base with motor slide rails and the following accessories:
   - Belt drive and guard
   - Intake cartridge air filter
   - Intake and discharge silencers
   - Check valve.
   - Relief valve.
   - Pressure gauge.
   - Pressure switch.
   - Sound enclosure with integral exhaust.

2. Two (2) Air-to-Air heat exchangers, designed to cool conveying air to within 10 °F of ambient temperature.

Clean Air Line:

3. Two (2) Lots of clean air line. Each includes:
   - Forty (40) Ft. 4" sch. 40 mild steel pipe, shipped with a standard mill finish in 20-foot random lengths.
   - Two (2) Elbows, 4" sch. 40, mild steel, 90° with 12" radius and 8" tangents.
   - One (1) Material handling hose, 4" diameter, 240" long.
   - One (1) 4" Pipe adapter.
   - One (1) 4" Bracket limit switch.
   - Seven (7) 4" compression couplings with black gasket.

Silo Fill Line:

4. Four (4) Lots of silo fill lines. Each includes:
   - One (1) 4" Pipe adapter.
   - One (1) 4" Bracket limit switch
   - One (1) Material handling hose, 4" diameter, 240" long.
   - One hundred (100) Ft. 4" sch. 40 mild steel pipe, shipped with a standard mill finish in 20-foot random lengths.
   - One (1) 4" Inline screener.
   - One (1) Silo receiver, Model 232, 4" sch. 40, mild steel welded construction with internal wear shield.
   - Seven (7) 4" compression couplings with black gasket.

Storage Silos:

5. Two (2) Storage silos, welded mild steel construction, having a usable capacity of 9165 cu. ft., for the storage of Hydrated Lime with a bulk density of 22 lbs/cu.ft. Silos are sized for 8 days of storage of sorbent for kiln one. Silo is constructed with the following features:
   - 14'-0" diameter.
   - 66'-0" cylinder height.
   - 85'-0" overall height.
   - 60° cone to a 24" discharge diameter at a height of 15'-0" above grade.
   - Full enclosed skirt support with 3'-6" wide door.
   - 20" top deck manway with pressure/vacuum relief valve.
   - Vent filter mounting flange on top deck.
   - Four (4) level control mounts.
   - Fill line support brackets.
   - Top perimeter guard rail.
   - Ladder with safety cage and step-off platform (as required).
   - 80 MPH wind load design.
   - 30 PSF roof load.
   - Seismic II design.
   - Interior is unpainted.
   - Exterior painted finish is enamel (white).
   - Silo is shipped F.O.B. shipping point. (Freight and erection not included.)

6. Two (2) Storage silos, welded mild steel construction, having a usable capacity of 7000 cu. ft., for the storage of Hydrated Lime with a bulk density of 22 lbs/cu.ft. Silos are sized for 8 days of storage of sorbent for kiln two. Silo is constructed with the following features:
   - 14'-0" diameter.
   - 53'-0" cylinder height.
   - 60'-0" overall height.
   - 60° cone to a 24" discharge diameter at a height of 15'-0" above grade.
   - Full enclosed skirt support with 3'-6" wide door.
   - 20" top deck manway with pressure/vacuum relief valve.
   - Vent filter mounting flange on top deck.
   - Four (4) level control mounts.
   - Fill line support brackets.
   - Top perimeter guard rail.
   - Ladder with safety cage and step-off platform (as required).
   - 80 MPH wind load design.
   - 30 PSF roof load.
   - Seismic II design.
   - Interior is unpainted.
   - Exterior painted finish is enamel (white).
   - Silo is shipped F.O.B. shipping point. (Freight and erection not included.)

NOTE: Ladders, safety cages, platforms, and handrails are shipped loose, in sections, to be field assembled and installed by installation contractor.

Silo Accessories:

7. Four (4) Lots of HVAC for the silo skirts. Each includes:
   - One (1) Wall mounted exhaust fan, with thermostat and guard.
   - One (1) Rain hood.
   - One (1) Aluminum louver.
   - One (1) Heating unit, 10 kW, with thermostat.

8. Four (4) Lots of lighting for the silo skirt. Each includes:
   - Eight (8) Wall mounted lights, 100 W.
   - Two (2) Light switches.
   - Two (2) 120V Receptacles.
   - Two (2) Emergency exit LEDs.
   - One (1) Light control enclosure.

9. Two (2) Jib cranes with electric hoist.

10. Four (4) Lots of silo level control. Each includes:
    - Four (4) Proximity level controls. Low level, mid level, high level, and emergency high level control.
    - One (1) Continuous guided radar level control.

Silo Dust Collection:

11. Four (4) Dust collectors Model 238, 60NT25, fabricated of 12 ga. mild steel, capable of 17" w.g. pressure, with access door, air manifold and valves for reverse pulse cleaning. Each includes:
    - One (1) Weather hood, 10" dia., mild steel.
    - One (1) Control enclosure, dust collector, 5 bank, NEMA 4, mild steel junction box with timer board, 110V.
    - One (1) Magnehelic differential gauge, indoor/outdoor.
    - Twenty-five (25) Cartridges, spun bond polyester, 5.75" dia. x 43" long, 30 sq. ft. each.
    - Twenty-five (25) Clamps, ½" wide, 301 stainless steel with quick release.

Silo Discharge:

12. Four (4) Fluidizing bin bottoms, Model 328, fabricated of mild steel, 24" diameter flanged inlet, 70° cone to a 12" diameter flanged discharge, complete with three individual air injection valve assemblies, having ceramic seats and abrasion resistant clear urethane cone seals. Also included is a single coil solenoid valve for aeration valve sequencing, with hoses and fittings. Each also includes:
    - One (1) Butterfly valve, 12" with carbon steel disc and 416 stainless steel shaft, has a manual handwheel.
    - One (1) 12" Spool section, mild steel.

- One (1) Butterfly valve, 12" with carbon steel disc and 416 stainless steel shaft, has rack and pinion double-acting air operator, solenoid valve and limit switches. Valve is factory assembled, pre-piped, and pre-wired to a NEMA 4 limit switch housing.
- One (1) Flex connection.
- Four (4) Clamps, ½" wide, 301 stainless steel with quick release.

Weigh Hoppers:

13. Four (4) Weigh Hoppers, 45 cu. ft. capacity fabricated of mild steel with a 12" dia. inlet, a 60° cone to a 10" dia. discharge, and six (6) tangential aeration jets, with controls. Each also includes:
    - Two (2) Single cartridge dust filters, Model 279, 9" dia., mild steel fabricated for mounting direct to hopper top. Complete with 30 square feet of cartridge filter media, 36" long top removal mild steel cartridge, ½" dia. air hose. (Plumbing shipped loose for field assembly.)
    - One (1) Load cell, mild steel, 3 module kit, 5,000 lb. per cell. Includes stainless steel summing box, mounts, load cells and cable.

Airlock Packages:

14. Four (4) Airlock packages, Model 257, 10 X 10, with 0.18 CFR displacement. Cast iron, housing construction with 8-vane welded steel rotor with fixed blade tips. Driven by a 1 HP, 1750 RPM, TEFC motor and gear drive which is side-mounted from the valve housing. Package includes:
    - Roller chain & sprocket drive with enclosed guard.
    - Outboard bearings.
    - Packing gland seal with air purge connection. Requires compressed air service (by customer).
    - Zero speed switch.
    - One (1) Butterfly valve, 10" with carbon steel disc and 416 stainless steel shaft, has rack and pinion double-acting air operator, solenoid valve and limit switches. Valve is factory assembled, pre-piped, and pre-wired to a NEMA 4 limit switch housing. For automatic isolation of rotary valve.
    - One (1) Spool section, 10" mild steel.
    - 3" convey line adapter.

DESIGN CRITERIA-HYDRATED LIME INJECTION:

(Note that the following design criteria are based upon information that is either assumed or known to us at the time of quoting. Customer verification of this data is required to ensure proper system and equipment sizing.)

Product:	Hydrated Lime
Bulk Density:	22 Lbs./Cu. Ft.
Particle Size:	Fine
Moisture:	Dry
Temperature:	Ambient
Abrasiveness:	Slight
System Capacity:	2100 PPH Kiln One, 1600 PPH Kiln Two
Conveyed Distance;	
Horizontal:	150 Ft.
Vertical:	50 Ft.
No 90° Bends:	6
Convey Line Dia:	3" Sch 40

ESTIMATED SYSTEM OPERATING CONDITIONS:

Air Flow:	200 CFM

EQUIPMENT:

Convey Line Blowers:

15. Four (4) Blower packages, positive displacement rotary blower, driven by a 15 HP, TEFC, 1750 RPM, 230/460/3/60 motor, mounted on a structural base with motor slide rails and the following accessories:
    - Belt drive and guard
    - Intake cartridge air filter
    - Intake and discharge silencers
    - Check valve.
    - Relief valve.
    - Pressure gauge.
    - Pressure switch.
    - Sound Enclosure with integral exhaust.

16. Four (4) Air-to-Air heat exchangers, designed to cool conveying air to within 10 °F of ambient temperature.

Clean Air Line:

17. Two (2) Lots of clean air line. Each includes:
    - Sixty (60) Ft. 3" sch. 40 mild steel pipe, shipped with a standard mill finish in 20-foot random lengths.
    - One (1) Tee bend, 3" sch 40 mild steel.
    - Four (4) Flanged adapter, 3" mild steel construction.

- Two (2) Butterfly valves, 3" with carbon steel disc and 416 stainless steel shaft, has rack and pinion double-acting air operator, solenoid valve and limit switches. Valve is factory assembled, pre-piped, and pre-wired to a NEMA 4 limit switch housing.
- Four (4) Elbows, 3" sch. 40, mild steel, 90° with 6" radius and 6" tangents.
- Thirteen (13) 3" Compression couplings with black gasket.

Convey Line:

18. Two (2) Lots of convey line. Each includes:
    - Two hundred (200) Ft. 3" sch. 40 mild steel pipe, shipped with a standard mill finish in 20-foot random lengths.
    - Six (6) Bends, Model 207, 4" sch. 40, wear back, 90°, 40" centerline radius and 12" tangents.
    - Twenty-four (24) 3" Compression couplings with black gasket.

Splitters and Injection Lances:

19. Two (2) Lots of convey line splitters and injection lances. Each includes:
    - One (1) Flanged adapter, 3" mild steel construction.
    - One (1) Convey line splitter, 3" sch 40 inlet to two (2) 2 ½" sch 40 outlets. Splitter is designed to create back pressure to ensure an even split of material to each injection point.
    - Forty (40) Ft. 2 ½" sch. 40 mild steel pipe, shipped with a standard mill finish in 20-foot random lengths.
    - Four (4) Tee bends, 2 ½" sch 40 mild steel. End capped.
    - Two (2) Full port air operated ball valves.
    - Two (2) Full port manual ball valves.
    - Two (2) 2 ½" Spool sections.
    - Four (4) Flanged adapters, 2 ½" mild steel construction.
    - Two (2) 2 ½" Lance injectors, 304 stainless steel construction.
    - Two (2) Blow port assemblies, with Chicago fitting. For manual compressed air cleaning of lances.
    - Two (2) Pressure transmitters, -250 to 250 in.w.c.
    - Two (2) Pressure transmitter air manifolds.

Electrical Equipment:

20. One (1) Motor control panel with PLC.

21. Two (2) Remote I/O Panels.

22. Four (4) Silo scale panels.

BUDGETARY SYSTEM PRICE, (Items 1-22)..$2,045,000.00

UTILITIES: Please note, it is required the customer provide clean, dry, compressed air at 80 PSIG minimum to 100 PSIG maximum for the above Nol-Tec system to insure optimum operation. Through the pressure controller, the system will be regulated to the proper conveying pressure. Electrical power is to be furnished as specified in the item descriptions.

TEST CLAUSE: Please note that certain assumptions have been made with regard to material characteristics in the design of this system. Nol-Tec reserves the right to test a representative sample of the material to verify these assumptions. If the outcome of the testing results in changes to the design of the system, we will adjust our proposal accordingly. Any resultant pricing changes will be submitted to the customer for approval prior to implementation. Tests will be performed at Nol-Tec's facility in Lino Lakes, MN. Charges for testing (if applicable) are to be determined on an individual case basis. Test material freight costs (to and from Nol-Tec) are the responsibility of the customer. Any additional costs for testing are to be based upon specific testing requirements. We require an MSDS for all materials prior to testing. Tested materials must be returned to the customer after trials. Nol-Tec **cannot** dispose of tested materials.

FREIGHT: All prices are FCA Lino Lakes, Minnesota (and shipping points), freight pre-paid and added. Fuel surcharges may apply. Export crating is not included.

DELIVERY: To be determined at time of order. Current schedule is ten to twelve (10-12) weeks after drawing approval. Drawings will be issued for approval approximately six to eight (6-8) weeks after receipt of purchase order and all necessary engineering information.

TERMS:

20% invoiced upon receipt of purchase order (verbal or written).
70% progressive payments monthly (based on timeline of job).
10% invoiced upon acceptance of equipment, not to exceed 90 days after shipment.
All invoices are due net 30 days.

PRICING VALIDITY AND RISING STEEL COSTS:
Due to current volatility in the steel market, material escalation (if any) will be based on current market costs. Pricing in this proposal is based on today's market cost. Any increase in steel cost, between the purchase order placement date and material procurement date (above this benchmark) will be to the customer's account.

If awarded a contract, Nol-Tec reserves the right to revise and resubmit our proposal (based on current market conditions) for final customer acceptance. All pricing will be based on maintaining a predetermined delivery schedule. Any delays, related to the agreed upon delivery time line, could delay equipment procurement and may result in an overall system and/or component price increase.

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ENGINEERING: Two (2) sets of engineered drawings and a maintenance manual provided in digital format are included in the above prices. The documentation provides sufficient detail to insure the proper installation of the components proposed. Additional sets of drawings or hard copies of manuals are available at an additional cost. Approval drawings will be submitted via e-mail or U.S. Postal Service. Manuals are delivered to one location via UPS ground service. Alternate or express delivery services can be provided upon request and will be charged to the customer.

SPARE PARTS: Spare parts pricing is not included. A detailed spare parts list is provided after approval of engineered drawings.

START-UP: Start-up service is at an additional cost, and as stated in the enclosed Terms and Conditions.

EXCEPTIONS: Unless stated above, we do not include state and local taxes, freight, installation labor and materials, motor controls, explosion relief devices, foundations and footings, pits and pit steel, tubing supports, structural steel work, fasteners, compressed air source, compressed air piping, air assist pilot line piping, or anything not specified in the item descriptions. Drilling and welding of air assist fittings to conveying line is by others. Above system and piping component quantities are estimated based on information in our possession at time of quoting. Nol-Tec reserves the right to adjust design, quantities, and pricing if actual layout necessitates. To ensure proper operation, it is the responsibility of the customer to provide uninterrupted material flow out of feed vessels that are not supplied by Nol-Tec such as silos, hoppers, railcars and trucks. Due to the varying condition of pressure differential railcars/trucks and the number of manual adjustments possible on these vessels, Nol-Tec cannot guarantee an unloading rate.

EQUIPMENT TAGGING: Major equipment components provided by Nol-Tec are identified with laminated or sticker tags that include the line item of the shipping schedule, job number, customer name, quantity ordered and customer P.O. number. Special equipment tags or additional information can be provided at an additional cost.

PAINT: The above proposed equipment is provided with one coat of Nol-Tec standard silicone modified alkyd paint with a gloss finish on external (non-product contact) steel surfaces, unless noted otherwise. Equipment is not prepared to prevent overspray onto interior (product contact) surfaces. If interior overspray is not acceptable, there will be an additional charge. Stainless steel, aluminum, and non-ferrous surfaces are unpainted. Pipe, tubing and bends are supplied with a standard mill finish, unpainted. Purchased components from Nol-Tec suppliers are to be painted manufacturer's standard paint. If other than the standard paint is required, it can be furnished at an extra cost.

This proposal, including the specifications, drawings, manuals, and any other information submitted, are considered proprietary and are disclosed in confidence upon condition they are not to be reproduced or disclosed to anyone, other than personnel in the company to whom the proposal is addressed, without written permission of Nol-Tec Systems, Inc.

Thank you for your interest in Nol-Tec Systems, Inc. Should you have any questions on this proposal, please contact us.

Respectfully,

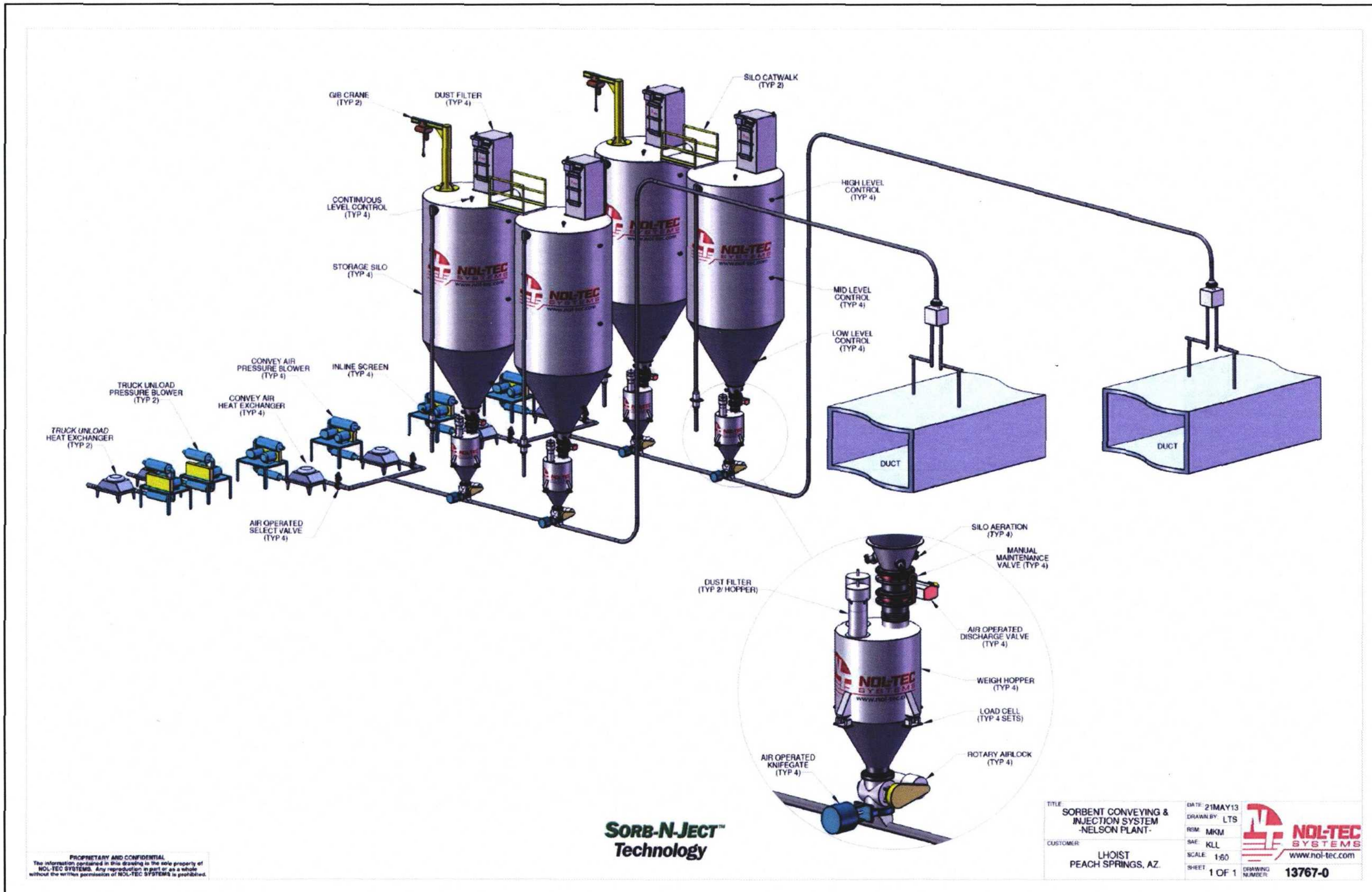
NOL-TEC SYSTEMS®, INC.

Mike Manning
Regional Sales Manager
mikemanning@nol-tec.com
Ph: 651-203-2561
Cell: 651-308-9209

MM:kl

Enclosure: Terms & Conditions 042407-Q
Drawing: 13767-0

Copy to: Dave Luzan – Luzan & Company


GIB CRANE (TYP 2)
DUST FILTER (TYP 4)
SILO CATWALK (TYP 2)
CONTINUOUS LEVEL CONTROL (TYP 4)
STORAGE SILO (TYP 4)
HIGH LEVEL CONTROL (TYP 4)
MID LEVEL CONTROL (TYP 4)
LOW LEVEL CONTROL (TYP 4)
CONVEY AIR PRESSURE BLOWER (TYP 4)
INLINE SCREEN (TYP 4)
TRUCK UNLOAD PRESSURE BLOWER (TYP 2)
CONVEY AIR HEAT EXCHANGER (TYP 4)
TRUCK UNLOAD HEAT EXCHANGER (TYP 2)
AIR OPERATED SELECT VALVE (TYP 4)
DUCT
DUCT
SILO AERATION (TYP 4)
MANUAL MAINTENANCE VALVE (TYP 4)
DUST FILTER (TYP 2/ HOPPER)
AIR OPERATED DISCHARGE VALVE (TYP 4)
WEIGH HOPPER (TYP 4)
LOAD CELL (TYP 4 SETS)
ROTARY AIRLOCK (TYP 4)
AIR OPERATED KNIFEGATE (TYP 4)
SORB-N-JECT™ Technology
PROPRIETARY AND CONFIDENTIAL
TITLE: SORBENT CONVEYING & INJECTION SYSTEM -NELSON PLANT-
CUSTOMER: LHOIST PEACH SPRINGS, AZ.
DATE: 21MAY13
DRAWN BY: LTS
RSM: MKM
SAE: KLL
SCALE: 1:60
SHEET: 1 OF 1
NOL-TEC SYSTEMS
www.nol-tec.com
DRAWING NUMBER: 13767-0

Stantec

NOL-TEC SYSTEMS, INC.
GENERAL TERMS AND CONDITIONS OF SALE

This Quotation is subject to all instructions, terms and conditions on the face hereof and also the following terms and conditions:

1. Warranty. Nol-Tec Systems, Inc. (hereinafter called "Nol-Tec") makes the following limited warranty:

Nol-Tec warrants to the original purchaser only (hereinafter referred to as "Buyer") that the parts manufactured by Nol-Tec of each new and unused system purchased from or through Nol-Tec under these Terms and Conditions, which parts have not been altered, changed or repaired in any manner, will be free from defects in material and workmanship for a period of one (1) year from the date of delivery. If any such part is not as warranted and if the Buyer notifies Nol-Tec of such defects in writing within one year of delivery, Nol-Tec will repair or replace, at its option, such defective part, provided that full information is furnished to Nol-Tec of the nature of the defect. Labor in removing and replacing parts at the installation site under this warranty, and return of defective parts to Nol-Tec's factory, shall be paid for by Buyer. This warranty by Nol-Tec does not cover any part of the system manufactured by third persons whether or not such third persons are subcontractors to Nol-Tec for this system.

If after inspection of the returned products, Nol-Tec determines that the defect is a result of misuse, mishandling, installation, abnormal conditions of operation, unauthorized repair or modification, or due to the Buyer's failure to install, maintain or operate the product in compliance with written instructions, all expenses incurred by Nol-Tec in connection with the replacement or repair of the product shall be for the account of the Buyer. Any product returned to Nol-Tec for replacement shall become the property of Nol-Tec.

EXCEPT AS EXPRESSLY PROVIDED IN THIS SECTION 1, ALL PRODUCTS AND SERVICES PROVIDED UNDER THESE TERMS AND CONDITIONS ARE PROVIDED "AS IS". ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARE HEREBY DISCLAIMED AND EXCLUDED BY NOL-TEC, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR USE, OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS, AND ALL OBLIGATIONS OR LIABILITIES ON THE PART OF NOL-TEC FOR DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE, MAINTENANCE OR PERFORMANCE OF THE PRODUCTS AND SERVICES PROVIDED HEREUNDER (INCLUDING LIABILITY FOR NEGLIGENCE), OTHER THAN LIABILITY BASED UPON THE GROSS NEGLIGENCE OR INTENTIONAL MISCONDUCT OF NOL-TEC

REPLACEMENT OR REPAIR OF THE NOL-TEC PRODUCTS AS PROVIDED ABOVE IS THE BUYER'S EXCLUSIVE REMEDY AND NOL-TEC'S SOLE OBLIGATION FOR ANY BREACH OF THE FOREGOING WARRANTY.

2. **LIMITATIONS OF LIABILITY. NOL-TEC WILL NOT BE LIABLE FOR ANY LOSS OR DAMAGE CAUSED BY DELAY IN FURNISHING PRODUCTS, OR BY DELAY IN ANY OTHER PERFORMANCE UNDER OR PURSUANT TO THIS AGREEMENT.**

IN NO EVENT WILL NOL-TEC'S LIABILITY OF ANY KIND INCLUDE ANY LOST PROFITS, LOST REVENUE, SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSSES OR DAMAGES, EVEN IF NOL-TEC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH POTENTIAL LOSS OR DAMAGE.

Nol-Tec shall not be liable to the Buyer for any claims, demands, injuries, damages, actions, or causes of action whatsoever based on negligence or strict liability.

No claim or cause of action arising from, or related to the products and services provided under these Terms and Conditions, whether based in tort, contract or otherwise, may be asserted (i) by any party but the original purchaser, or (ii) any time later than the date one year after the claim cause of action has accrued.

3. Acceptance/Agreement. Any acceptance of this Quotation is subject to acceptance of these Terms and Conditions. These Terms and Conditions (i) constitute the entire agreement between the parties with respect to the subject matter hereof, (ii) supersede any and all other agreements between the parties related thereto, as well as all proposals, oral or written, and all negotiations, conversations or discussions between the parties related to this Agreement, (iii) may not be altered, amended or otherwise modified without the written agreement signed by the parties hereto, and (iv) may be executed in two or more counterparts, each of which will be deemed an original hereof. No product or service specifications, or terms and conditions that are additional or contrary to the terms of this Agreement, whether contained in any purchase order or other communication from Buyer or any third party, will be construed as, or constitute a waiver of these terms and conditions, or acceptance of any such additional terms, conditions or specifications. Nol-Tec hereby rejects and objects to such additional or contrary terms, conditions or specifications

4. Orders. All orders are subject to acceptance by Nol-Tec, in its sole discretion, at its general offices in Lino Lakes, Minnesota, USA, even if such order are taken elsewhere by any sales representative or other agent of Nol-Tec.

5. Terms and Payment. The written price quotation listed herein shall be payable in current funds of the United States, at par, at 425 Apollo Drive, Lino Lakes, Minnesota 55014, according to the "Terms" as quoted herein. No other understanding or agreements, verbal or otherwise, with respect to the price and terms of payment shall be binding on either party, except as expressly stated herein. The foregoing terms of payment apply whether or not Nol-Tec has agreed to erect said system and whether or not there is delay in erection by any person, regardless of cause of delay.

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Prices on the goods covered by this Quotation are firm for 30 days from the date of this Quotation. If there is a delay in the completion of shipment of the order due to any change requested by the Buyer, or as the result of any delay on the Buyer's part in furnishing information required for completion of the order, the price agreed upon at the time of acceptance of the order is subject to change. Prices are F.O.B. carrier's equipment at Nol-Tec's factory and are exclusive of all federal, state or local taxes, and any present or future sales, use or other tax or duty that Nol-Tec may be required to collect or pay shall be added to the sales prices and paid by the Buyer.

6. Increase to Price. In the event changes by Buyer in concept to the proposed system should require additional, or modification to existing mechanical equipment hardware or software, the price to Purchaser shall be revised accordingly.

7. Installation/Start-Up/Field Service. The above price does not include installation of the system, system start-up, or any field service, unless otherwise specifically provided elsewhere herein or in our contract.

8. Installation Supervision Upon written request by Buyer to Nol-Tec, at any reasonable time prior to installation of the system provided by Nol-Tec, Nol-Tec agrees to supply to the installation site one installation supervisor qualified to instruct as to the proper installation of the system. The Buyer cost for this service is charged in accordance with current published rate schedule.

8A. Start-Up/Field Service and Training. Upon written request by Buyer to Nol-Tec, Nol-Tec agrees to supply to the job site, one start-up/field service technician qualified to instruct as to the proper troubleshooting and start-up of the system. The Buyer cost for this service is charged in accordance with current published rate schedule.

9. Drawings. Nol-Tec will deliver drawings to Buyer for approval of system prior to ordering materials and supplies, and prior to fabrication of system by Nol-Tec. Buyer agrees to either approve or correct such drawings, in writing, within 10 days after receipt thereof and return same to Nol-Tec for further processing. Nol-Tec reserves the right to give Buyer notice of delay caused Nol-Tec by Buyer's failure to promptly sign and return said drawings as aforesaid.

10. Cancellations, Countermand, and Return of Goods. Orders accepted by Nol-Tec cannot be cancelled or countermanded, or shipments deferred or goods returned except with the prior written consent from Nol-Tec's office in Lino Lakes, Minnesota, and upon terms that will indemnify Nol-Tec against all losses resulting there from, including the profit on any part of the order that is cancelled. When Nol-Tec authorizes the return of goods, Buyer shall prepay the shipping charges on such returned goods unless otherwise expressly stated by Nol-Tec in its written return authorization.

11. Patents. Nol-Tec shall indemnify and save the Buyer harmless from any judgments for damages and costs which may be rendered against the Buyer in any suit brought against the Buyer on account of the infringement of any United States patent by any goods supplied by Nol-Tec hereunder (as such and not incorporated into any other device), provided that the Buyer promptly notifies Nol-Tec of the commencement of any such suit and authorizes Nol-Tec to settle or defend such suit as Nol-Tec may see fit, and provided further that the Buyer renders every reasonable assistance which Nol-Tec may require in defending any such suit. This provision shall not apply if Buyer has furnished Nol-Tec with the specifications for such goods, and in that event, the Buyer shall indemnify and hold Nol-Tec harmless from any claim of patent infringement. If the goods supplied by Nol-Tec are found to be infringing, Nol-Tec's liability to the Buyer shall be limited to any one of the following, at Nol-Tec's election:

a. Procuring for the Buyer the right to use the goods; or
b. Modifying the goods so that such goods become non-infringing; or
c. Replacing the goods with non-infringing goods; or
d. Removing the goods and refunding the purchased price to the Buyer.

In consideration of Nol-Tec's covenants hereunder, Buyer waives all other claims or potential claims for damages against Nol-Tec for any alleged or established patent infringement, and agrees to indemnify and save Nol-Tec harmless there from.

12. Delivery. Shipping dates are approximate and are based upon current and anticipated manufacturing capabilities and upon prompt receipt of all necessary information from Buyer. Delivery shall also be contingent upon receipt of materials from subcontractors. Unless otherwise agreed in writing by Nol-Tec, delivery shall occur and risk of loss shall pass to the Buyer upon delivery of the goods to the carrier at Nol-Tec's factory. Transportation shall be at the Buyer's sole risk and expense, and any claim for loss of damage in transit shall be against the carrier only. Buyer agrees to accurately check shipment upon arrival and file claim with the common carrier for any damage or loss. Risk of damage or loss to the system from any cause shall pass from Nol-Tec to Buyer upon delivery to the common carrier, notwithstanding the fact that Nol-Tec reserves the right of possession and title in the property until the above price is paid in full, all as provided elsewhere herein.

13. Force Majeure. Fulfillment of this order is contingent upon the availability of materials. Nol-Tec shall not be liable for any delays in delivery, or for nondelivery or nonperformance, in whole or in part, caused by the occurrence of any contingency beyond the control of either Nol-Tec or suppliers to Nol-Tec, including but not limited to war, sabotage, acts of civil disobedience, failure or delay in transportation, acts of any government or agency or subdivision thereof, judicial actions, labor disputes, fires, accidents, explosions, epidemics, guaranties, restrictions, storms, floods, earthquakes or acts of God, shortage of labor, fuel, raw material or machinery or technical failure where Nol-Tec has exercised ordinary care in the prevention thereof. If any contingency occurs, Nol-Tec may allocate production and deliveries among its customers.

14. Titles and Possession. Title and right of possession of the property furnished to Buyer pursuant to the terms of the contract shall remain in Nol-Tec until full payment of the price according to the above terms has been made, notwithstanding the delivery of the property to Nol-Tec or to a common carrier or to other bailee for the purpose of transmission to the Buyer.

The property furnished under this contract shall not become a part of any real estate by reason of being attached thereto or installed therein or thereon. If Buyer shall default in payment, Nol-Tec shall elect to exercise its lien upon said property as provided by this paragraph and the Minnesota Uniform Commercial Code and Buyer shall be responsible for all costs and expenses associated therewith. Buyer hereby grants unto Nol-Tec a license irrevocable to enter upon any real estate owned or leased by Buyer for the purpose of removing said property, and Buyer shall be responsible for the resulting damage, if any, to real and personal property to which it is affixed.

15. Inspection. Buyer shall inspect and test the goods shipped hereunder immediately upon installation thereof and shall, within 15 days of the substantial completion of installation, give notice in writing to Nol-Tec of any matter or thing by reason whereof he may allege that the system is not in accordance with this contract.

If Buyer fails to give such written notice, said system shall be deemed accepted by Buyer. Notwithstanding this right of inspection by Buyer, Buyer agrees to pay the above price according to the above terms whether or not a right of inspection and testing exists pursuant to the terms of this paragraph.

16. Applicability of United Nations Convention. With regard to international sales, the United Nations Convention on Contracts for the International Sale of Goods shall not apply to the purchase and sale of products hereunder.

17. General Provisions. The Buyer may not assign any rights to, or delegate any performance owed under this Agreement without the consent of Nol-Tec. Nol-Tec shall have the right to credit toward the payment of any monies that may become due Nol-Tec hereunder and any sums which may now or hereafter be owed to the Buyer by Nol-Tec. **THE VALIDITY AND PERFORMANCE IN ALL MATTERS RELATING TO THE INTERPRETATION AND EFFECT OF THIS AGREEMENT, ANY PROVISION HEREIN AND ANY AMENDMENT HERETO SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE INTERNAL LAWS (AND NOT THE LAWS OF CONFLICT) OF THE STATE OF MINNESOTA. ALL DISPUTES ARISING IN CONNECTION WITH THIS AGREEMENT SHALL BE RESOLVED, IF NOT SOONER SETTLED, BY A COURT OF COMPETENT JURISDICTION LOCATED IN THE STATE OF MINNESOTA.** The Buyer shall pay Nol-Tec all fees, costs and expenses of Nol-Tec reasonably incurred in the enforcement of Nol-Tec's right under or with respect to this Agreement, including, without limitation, reasonable attorneys' fees.

18. Acceptance. The foregoing offer is accepted and the undersigned acknowledges receipt of a true and complete copy.

By:

____
(Name and Title)

For:

____
Buyer Name/Contract Number

Seller:
NOL-TEC SYSTEMS, INC.
A Minnesota Corporation

By:

____
(Name and Title)

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