pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

MEMO

FROM: Rick Millard
Air Quality Permitting
Air Quality

TO: William Weaver 11/7/23
Regional Manager
Air Quality

THRU: Tom Hanlon, Environmental Engineering Manager ***TJH 11/7/23***
Air Quality Permitting
Air Quality

DATE: June 7, 2023

RE: RACT 3 Review Memo
Mars Chocolate North America, LLC
Title V Operating Permit No. 36-05142
Elizabethtown Plant
Elizabethtown Borough, Lancaster County

Introduction/Facility Description

On December 27, 2022, Mars Chocolate North America, LLC (Mars) submitted a RACT 3 proposal regarding sources at their Elizabethtown Plant in Elizabethtown Borough, Lancaster County. The facility is a major source of VOCs that has been in operation prior to August 3, 2018, and therefore, in in accordance with 25 Pa. Code Section 129.111, the facility is subject to DEP's RACT 3 requirements cited in 25 Pa. Code Sections 129.111 thru 129.115. Per Section C, Condition 005 of the facility's current Title V permit, "*The facility shall limit NOx emissions to less than 100 tpy based on a 12-month consecutive period*." Therefore, the facility does not trigger major status for nitrogen oxides (NOx) for RACT 3. The facility's RACT 3 submission states that four sources at the facility have VOC PTE greater than 2.7 tpy, as follows:

Jetzone #1 Cocoa Bean Roaster & Cooler (Source 402)
Jetzone #2 Cocoa Bean Roaster & Cooler (Source 502)
Jetzone #2 Pregrind Operations (Source 504)
Buhler Cocoa Bean Roaster (Source 600).

The facility's RACT 3 submission evaluates RACT 3 for VOC emissions from these sources in accordance with 25 PA Code 129.114 because they are not subject to any of the presumptive RACT requirements in Section 112.

RACT 3 Applicability

Exempt RACT 3 Sources

The facility has several small space heaters, emergency engines, an R&D dryer, and process operations that include Source IDs #403 and #503 – Jetzone #1 and Jetzone #2 Winnowing operations, respectively, and

Source ID #601- Winnower. Each of these sources has a potential-to-emit of less than 1.0 tpy of VOCs, and therefore, are exempt from RACT 3 requirements in accordance with Section 129.111(c).

Presumptive RACT 3 Sources

The facility includes combustion related sources that are defined in Section 129.112(d) as presumptive RACT 3 sources, as per the following Table. Mars will maintain and operate these sources in accordance with the manufacturer's specifications and with good operating practices. The facility is currently operating and maintaining these sources in accordance with the presumptive RACT 2 requirements in their existing Title V operating permit in Section E, Group 001A and will continue to do so to satisfy the RACT 3 presumptive requirements.

129.112(d) Sources

Source ID	Source Name	RACT 3 Citation
031	Babcock & Wilcox Boiler	129.112(d)
032	Nebraska Boiler	129.112(d)
Miscellaneous	Alkalizer and NG-Fired Dryer- Internal Discharge has a rated heat input of 5.94 MMBtu/hr.	129.112(d)

The following Table represents other sources at the facility that will operate under the presumptive RACT 3 requirement of Section 129.112(c)(2), sources with a VOC PTE < 2.7 tpy. The facility is currently operating and maintaining these sources in accordance with the presumptive RACT 2 requirements in their existing Title V operating permit in Section E, Group 001A and will continue to do so to satisfy the RACT 3 presumptive requirements.

129.112(c)(2) Sources

Source ID	Source Name	RACT2 Citation
602	Nib Grinders (PTE of 1.36 tpy based on the 8500-hour operating restriction)	129.112(c)(2)
Misc	Alkalizer and NG-Fired Dryer- Internal Discharge has a rated heat input of 5.94 MMBtu/hr.	129.112(c)(2)
Misc	R&D Pilot Plant Operations	129.112(c)(2)
Misc	R & D Micronizer	129.112(c)(2)
Misc	R & D Roaster	129.112(c)(2)
Misc	Liquor Milling Areas	129.112(c)(2)
Misc	Liquor Storage	129.112(c)(2)
Misc.	NG-Fired Warehouse Space Heater	129.112(c)(2)
Misc.	R & D Fryer Hood	129.112(c)(2)

Case-by-Case RACT 3 Evaluation

Per 25 Pa. Code Section 129.114, Alternative RACT proposal and petition for alternative compliance schedule, in Section (i), "*An owner or operator subject to subsection (a), (b) or (c) and § 129.99 that has not modified or changed a source that commenced operation on or before October 24, 2016, and has not installed*

and commenced operation of a new source after October 24, 2016, may, in place of the alternative RACT requirement or RACT emission limitation required under subsection (d), submit an analysis, certified by the responsible official, in writing or electronically to the Department or appropriate approved local air pollution control agency on or before December 31, 2022, that demonstrates that compliance with the alternative RACT requirement or RACT emission limitation approved by the Department or appropriate approved local air pollution Control agency under § 129.99(e) (relating to alternative RACT proposal and petition for alternative compliance schedule) assures compliance with the provisions in subsections (a)—(c) and (e)—(h), except for sources subject to § 129.112(c)(11) or (i)—(k)."

After accounting for all exempt VOC sources (PTE <1.0 tpy) and those sources that are subject to the presumptive RACT 3 requirements of Section 129.112(c)(2) or (d), the following sources are required to be analyzed on a case-by-case basis as per Section 129.114(c):

Alternative Case-by Case RACT 3 Analysis

Source ID	Source Name	VOC PTE (tpy)	VOC PTE basis
402	Jetzone #1 Bean Roaster and Cooler	17.04	T5 D 204 002
502	Jetzone #2 Cocoa Bean Roaster and Cooler *	48.9	T5 D 502 002; T5 D 504 002
504	Jetzone #2 Pregrind Operations *		
600	Buhler Cocoa Bean Roaster *	24.4	T5 D 600 003

Note*: Sources 502, 504 and 600 use wet impingement scrubber technology to control particulate matter. The scrubber systems also remove some VOCs.

As a review, DEP's 2/23/2016 RACT 2 review memo assessed the technical feasibility in using various control options in the reduction of VOCs from the chocolate/candy manufacturing processes. Those technologies presented by Mars included the following:

- Recuperative Oxidation
- Regenerative Oxidation
- Catalytic Oxidation
- Wet Impingement Gas Scrubber
- Carbon Adsorption
- Wet Electrostatic Precipitator
- Condensation
- Flares
- Bio-filtration

[begin quote from RACT 2 memo]

Carbon adsorption was determined to be technically infeasible because of the reduced effectiveness at higher temperatures and high particulate loading associated with the facility's operations. Likewise, Bio-filtration was determined to be technically infeasible due to the reduced effectiveness at higher temperatures, reduced efficiency at cold winter temperatures, and high particulate loading associated with the facility's operations. The use of flares was deemed to be not practical due to the possible explosiveness of the inlet air stream, and condensers were ruled out because the wet VOC inlet stream could cause icing, and the high particulate loading would not be compatible with the operation of this type of control. Since a wet scrubber and a wet electrostatic precipitator have the same control efficiency of about 60%, Mars chose to evaluate only the wet

scrubber since it has a lower capital cost and would therefore be the more cost-effective solution in addressing RACT2.

Of the three oxidation technologies, the RTO option was selected as the most cost-effective solution in addressing RACT2, due to the high heat recovery and lower fuel usage in comparison to the other oxidation technologies.

In Section 4.5.1 of the RACT2 proposal, Mars notes that it "*considered the installation of one RTO for all of the sources, however it was ruled out for various reasons. For instance, due to the location of the sources, the RTO would have to go on the roof of the building. There is no space or existing infrastructure available to accommodate one large RTO. Additionally, the varying operating schedules of the sources and the different process exhaust streams make the operation of one single RTO technically infeasible. Furthermore, an RTO for all of the sources would require a damper system and a high turndown ratio, which would further increase the cost*."

For the Buhler Cocoa Bean Roaster (600), the Jetzone #2 Roaster and Cooler (502), and the Jetzone #2 Pregrinding Operations (504) that already have a wet scrubber installed, only the analysis of retrofitting these sources with an RTO was evaluated. The Jetzone #1 Bean Roaster and Cooler
(402) was also evaluated for the use of a wet scrubber and an RTO.

Per the company's 8/22/18 technical deficiency response letter, Mars used the EPA Office of Air Quality Planning and Standards (OAQPS) Air Pollution Control Cost Manual, fourth edition from

January 1990 to evaluate the economic feasibility of installing a wet scrubber on Source 402. RTO cost estimates were done using the November 2017 revision of the EPA Cost Manual Section 3.2 - VOC Destruction Controls, Chapter 2 - Incinerators and Oxidizers). The following Table shows the results of the economic analysis that was performed for the RACT2 control options.

Source	Control Technology	PTE TPY	Control Factor	Tons of emissions controlled	Annualized Operating Cost	$/ton control
402 Jetzone 1	RTO	13.31	98%	13.04	$218,443	$16,752
	Wet Scrubber		60%	7.98	$428,928	$53,728
502 & 504 * Jetzone 2	RTO	48.9	98%	47.92	$374,898	$7,823
600 * Buhler Cocoa Bean Roaster	RTO	24.40	98%	23.91	$500,970	$20,955

Note *: Sources currently controlling VOC emissions by wet impingement scrubber technology.

[end quote from RACT 2 memo]

RACT2 Case by Case Determination & Compliance

Based on the feasibility of the control options and the cost analysis, the Department had determined that none of the viable control options above met the criteria of “reasonable” cost effectiveness. Therefore, the facility

was not required to install additional add-on controls in meeting the requirements of RACT 2. In review of the RACT 2 analysis conducted, and the facility's existing controls, the Department had determined RACT 2 to be those emission limits, operating standards, and work practice standards, and record keeping requirements as currently cited in Group 001 of the facility's Title V Operating Permit issued on June 22, 2022.

RACT 3 ANALYSES:

With the preceding RACT 2 case-by-case analyses as background, we now turn to the re-evaluation required under 129.114(i)(1)(i)(A)-(E) and 129.114(i)(1)(i)(A)-(F). The difference between these two sections is that (i) applies to cases where the RACT 2 VOC control cost effectiveness was determined to be >$12,000/ton (this applies to Sources 402 and 600), whereas (ii) applies to cases where the RACT 2 VOC control cost effectiveness was determined to be <$12,000/ton (this applies to Sources 502 and 504) This requires the applicant to include the certain information in the abbreviated RACT 3 case by-case analysis. The information required for scenario (i) vs. scenario (ii) is essentially the same for (A)-(D), and (i)(E) is essentially the same as (ii)(F), with only (ii)(E) being unique. Therefore, the two scenarios are considered in combined fashion below, with explanations as appropriate for the individual sources as they are affected by each scenario.

(A) A statement that explains how the owner or operator determined that there is no new pollutant specific air cleaning device, air pollution control technology or technique available.

The facility conducted reviews of cocoa roaster air permits and identified the following control options as available to this source category: Condensation, carbon adsorption, wet impingement gas scrubbers, wet electrostatic precipitators, oxidation without heat recovery, recuperative oxidation, regenerative oxidation, and catalytic oxidation. This list does not include any control options not previously considered under RACT 2.

(B) A list of the technically feasible air cleaning devices, air pollution control technologies or techniques previously identified and evaluated under § 129.92(b)(1)-(3) included in the written RACT proposal submitted under § 129.99(d) and approved by the Department or appropriate approved local air pollution control agency under § 129.99(e).

In the RACT 3 application the facility has identified wet impingement scrubbers, wet ESPs, oxidation without heat recovery, recuperative oxidation, regenerative oxidation, and catalytic oxidation as technically feasible control options.

(C) A summary of the economic feasibility analysis performed for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (b) and the cost effectiveness of each technically feasible air cleaning device, air pollution control technology or technique as submitted previously under § 129.99(d) or as calculated consistent with the "EPA Air Pollution Control Cost Manual" (sixth edition), EPA/452/b-02-001, January 2002, as amended.

Although the facility's RACT 3 submittal did not include a summary of the economic feasibility analyses conducted under RACT 2, nevertheless, DEP is in possession of those analyses as referenced above. Also, it should be noted that at the conclusion of the RACT 2 process, it was determined that the appropriate VOC PTE to use for Source 402 was 17.04 tons as compared to the 13.3 tons originally used in the RACT 2 cost calculations. This reduces the RACT 2 $/ton for RTO control for this source, with the revised figure being ~13K per ton, based on the RACT 2 RTO costs.

(D) A statement that an evaluation of each economic feasibility analysis summarized in clause (c) demonstrates [whether] the cost effectiveness [is] equal to or greater than $7,500 per ton of NOx emissions reduced or $12,000 per ton of VOC emissions reduced.

The following Table represents the summary of the economic feasibility analysis as provided by the facility in the submittal of the RACT 3 application. The cost analysis for Source ID# 402 was based on an equipment life expectancy of 3-years because Source ID #402 will be replaced by Source ID #702 that is currently being constructed under plan approval 36-05142D that was issued on April 30, 2021. However, DEP assesses that even if a normal 20-year lifespan were used for the equipment, neither the RTO option nor the scrubber option would be cost effective for Source 402.

Also, the VOC PTE of Source 402 is stated in the RACT 3 application as being 26.41 tpy, when it is in fact limited in T5 D 402 002 to only 17.04 tpy. Therefore, the Source 402 cost effectiveness in the table below, calculated by Mars, is an underestimate, and the actual $/ton costs are more than listed in the table below for Source 402. Installation and operating costs were estimated using EPA Air Pollution Control Cost Manual" (sixth edition), EPA/452/b-02-001, updated 9/22. It should be noted that the costs associated with the wet scrubber and RTOs that were part of the economic feasibility analysis were based on actual manufacturer quotes.

As noted in the table below, all of the calculated costs are well in excess of $12,000/ton, indicating that none of these options are cost-effective as RACT 3. Having reviewed aspects of these calculations, DEP notes that there are a few assumptions in them that might be questioned further, if it might make the difference in any of the control options being cost effective for RACT 3. Certain of the calculation inputs such as using lower than 8,760 operating hours and using higher than allowable PTE (for Source 402 only) would only seem to make the applicable control options less cost -effective, were they to be revised. The most significant feature of the calculations involved the use of a 50% retrofit factor for all the scenarios, "*due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems*." However even if this factor were eliminated, the $/ton would still not be even close to being cost effective for any of the scenarios. Similarly, the calculations for Source 402 use a quote for the larger RTO that is sized for Sources 502/504. However even if the EPA cost manual RTO cost equation 2.33 were used instead of the actual quote, both sizes of RTO would appear to have a similar equipment cost (EC) to each other, and neither would appear to be even close to being cost effective for Source 402. Having considered these aspects, DEP concludes that it is appropriate to accept the cost calculations presented by Mars as being sufficient to show that further add-on controls are not reasonably available in the context of RACT 3.

Control Option Cost Effectiveness

Source	Control Technology	PTE TPY	Control Factor	Tons of emissions controlled	Total Annualized Cost	$/ton of VOC controlled
402 Jetzone #1	RTO	26.41	98%	25.88	$1,899,325	$73,385
	Wet Scrubber		60%	15.85	$532,567	$33,609
502 & 504 * Jetzone #2	RTO	48.9	98%	47.92	$933,832	$19,486
600 * Buhler Cocoa Bean Roaster	RTO	24.40	98%	23.91	$933,832	$39,053

Note *: Sources currently controlling VOC emissions by wet impingement scrubber technology.

(ii)(E) A new economic feasibility analysis for each technically feasible air cleaning device, air pollution control technology or technique listed in clause (B) in accordance with § 129.92(b)(4).

As noted above, the facility conducted a new economic feasibility analysis for all of the affected sources, rather than for only Sources 502 and 504 as required in 129.114(i)(1)(ii)(E).

(i)(E) and (ii)(F) Additional information requested by the Department or appropriate approved local air pollution control agency that may be necessary for the evaluation of the analysis.

DEP did not require any additional information regarding the case-by-case aspect of the facility's RACT 3 analysis.

DEP ASSESSMENT:

DEP concurs that the technically feasible add-on-controls for Sources 402, 502, 504 and 600 remain cost-ineffective for RACT 3.

DEP has reviewed the source information, control technologies or measures, and cost analysis performed by the company. The Department also performed an independent analysis which included, the Department's continuous review of permit applications since the applicability date of RACT II, BACT/RACT/LAER Clearinghouse search, knowledge gained from the Department permitting staff participating in technical presentations by several vendors and manufacturers of pollution control technology. Based on review of these materials, along with training and the expertise of the reviewing staff, the Department concludes that there are no new or updated air pollution control technologies or techniques available for the affected sources at this facility and that the current source scrubber controls and emission limits, as well as the good management practices, including an OM&M plan and appropriate monitoring and recordkeeping, provisions imposed as case-by-case RACT 2 for the affected sources, as found Group 001 in the facility's current Title V permit, assure compliance with the requirements of RACT 3 in § 129.111 - § 129.115, for the affected equipment, as follows:

(a) For Source 600, the permittee shall operate and maintain the source and control device such that either the scrubber achieves a minimum of 80.0% destruction efficiency for VOC, reported as propane, or the emission rate coming from the scrubber is less than 5.74 lbs/hr of VOCs.

(b) For each of sources 402, 502, 504 and 600, the permittee shall maintain an O&M Plan, as well as records of any maintenance or modifications performed on the source. The permittee shall maintain written documentation of the current O&M Plan for each source and any maintenance or modifications performed on each source for five years. The records shall be made available to the Department upon written request pursuant to 25 Pa. Code §129.100(d) and (i).

(c) The permittee shall operate the Control C502A [JETZONE #2 ROASTER SCRUBBER ZONE #1 (A101)] and C502B: [JETZONE #2 ROASTER SCRUBBER ZONE #1 (A101)] at all times when either of Sources 502 or 504 are operating.

(d) The permittee shall operate the Control C600 [ROASTER WET SCRUBBER] at all times when Source 600 is operating.

(e) The permittee shall operate and maintain instrumentation to monitor the pressure drop and the water flow rate to the scrubbers C502A, C502B and C600.

(f) The permittee shall keep the following records, which shall be maintained for a minimum of five (5) years and shall be made available to the Department upon request.

(1) a daily record of the pressure drop across and the water flow rate to the scrubbers C502A, C502B and C600.
(2) monthly throughput of cocoa beans.
(3) the VOC emissions for each month and each consecutive 12-month period.

RACT 1

This facility also went through a case-by-case review for RACT 1. However, the RACT1 requirements were never formally made part of Pennsylvania's SIP. Due to this, the case-by-case RACT 2 requirements as stated in the facility's current operating permit superseded the Title V requirements for the relevant sources that were derived from case-by-case RACT1.

Recommendations:

If a source was previously subject to RACT 2 case-by-case determinations, and that source has not been modified or changed, the owner or operator may, in lieu of doing another full case-by-case proposal for RACT III, submit a limited analysis, as specified in 25 Pa. Code Section 129.114(i). Based on the feasibility of the control options and the cost analysis, DEP has determined that none of the viable control options above meet the criteria of being cost effective, and therefore, the facility is not required to install additional add-on controls in meeting the requirements of RACT 3.

Unless otherwise required, the facility's RACT 3 submission does not need to be part of a plan approval or operating permit modification and no fee would be charged. No changes are needed to the facility's Title V permit, as the case-by-case determination for RACT 3 for this facility is the same as for RACT 2.

cc: OnBase

Weaver, William (DEP)

From: Jonathan Wickstrom <jwickstrom@libertyenviro.com>
Sent: Tuesday, December 27, 2022 9:01 AM
To: Weaver, William (DEP)
Cc: King, Andy; Gavin Biebuyck
Subject: [External] Mars Elizabethtown RACT III Notification
Attachments: ELZ RACT III Cover Letter.pdf; Mars RACT III Notification 12-27-22.pdf

Mr. Weaver,

Attached, please find a cover letter and accompanying document that comprise the RACT III notification for the Mars Wrigley US, LLC facility in Elizabethtown, Lancaster County. Should you have any questions concerning the submittal, please do not hesitate to contact me.

Thanks,

Jonathan G. Wickstrom| **Senior Project Manager** | jwickstrom@libertyenviro.com | 610.375.9301

LIBERTY ENVIRONMENTAL, INC.|www.libertyenviro.com
Reading: 505 Penn Street, Suite 400 Reading PA 19601
Lancaster: 315 W. James Street, Suite 205, Lancaster, PA 17603
Philadelphia: Three Westlakes, 1055 Westlakes Drive, 3rd Floor Berwyn, PA 19312
New York: 131 Varick Street, Suite 939 New York, NY 10013

Air Quality|Natural & Water Resources|Regulatory Compliance|Site Assessment & Remediation

December 27, 2022

Mr. William Weaver – Program Manager
Pennsylvania Department of Environmental Protection
Air Quality Program
Southcentral Region
909 Elmerton Avenue
Harrisburg, PA 17110

Re: RACT III Notification for Mars Wrigley US, LLC
Elizabethtown, Lancaster County Facility
Permit No. 36-05142

Dear Mr. Weaver:

Mars Wrigley US, LLC (Mars) operates a chocolate and confectionery manufacturing facility in Elizabethtown Borough, Lancaster County, Pennsylvania. The Elizabethtown facility is classified as a "major VOC emitting facility" because the facility's actual and potential volatile organic compound (VOC) emissions exceed 50 tons per year (tpy). Mars is providing this Reasonably Available Control Technology (RACT) Notification in accordance with 25 PA Code Sections 129.111 and 129.115(a) of the "Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS," which was promulgated as a final rule upon publication in the *Pa. Bulletin* dated November 12, 2022 (hereinafter "RACT III").

The facility is not classified as a "major NOx emitting facility" because the facility's actual and potential nitrogen oxide (NO_X) emissions are below 100 tpy. Title V permit condition C(#005) provides a federally enforceable cap on NOx emissions of 100 tpy on a 12-month rolling basis. Because the Facility is not classified as a "major NOx emitting facility," the NOx requirements of RACT III are not applicable per 25 Pa. Code § 129.111(a).

As a major VOC source, Mars is submitting this RACT Notification prior to December 31, 2022 addressing VOC sources at the facility in accordance with 25 PA Code 129.115(a). The Pennsylvania Department of Environmental Protection (PA DEP) provided a "RACT III written notification" template to major sources and Mars is providing that form in Attachment A of the attached report. Table 3 of that form identifies all VOC sources at the facility and provides potential to emit (PTE) for sources that are "de minimis" (i.e., < 1.0 tpy VOC each) and therefore exempt from RACT III per 25 PA Code 129.111(c). A VOC emissions inventory is provided in Attachment B for these sources.

Several other VOC sources at the facility have PTE rates that are less than 2.7 tpy and are therefore subject to the Presumptive RACT requirement at 25 PA Code 129.112(c)(2) that requires maintenance and operation of the sources in accordance with manufacturer's specifications and good operating practices for control of VOC emissions. These work practice standards are identified in the current Title V permit for Source Group 001A as "Presumptive RACT 2 Requirements". Consequently, Mars does not believe any revisions to the Title V permit are necessary to address the RACT III presumptive RACT requirements.

Mars is providing a "case by case" RACT proposal for VOC emissions associated with the following four sources that have PTE rates in excess of 2.7 tpy and that are not subject to any presumptive RACT requirements: Jetzone #1 Cocoa Bean Roaster & Cooler (Source 402); Jetzone #2 Cocoa Bean Roaster & Cooler (Source 502); Jetzone #2 Pregrind Operations (Source 504); and, Buhler Cocoa Bean Roaster (Source 600). The attached report provides the RACT proposal for these cocoa roaster/cooler operations in accordance with 25 PA Code Section 129.114(d). Mars has evaluated the technical and economic feasibility of installing add-on VOC controls on these sources and has concluded that it is not economically feasible to retrofit the sources with additional VOC controls. This is the same conclusion that was reached for these sources during RACT 2.

Mars proposes that the continued implementation of the work practice standards, including maintaining an O&M Plan, specified in the Title V permit for Source Group 001 ("VOC RACT2 Case Specific Requirements") represents RACT under the RACT III rule. Accordingly, Mars is not requesting any new VOC limitations or requirements to comply with RACT III.

If you have any questions about the notification or need any additional information, please do not hesitate to contact me at (717) 367-0955 or Jonathan Wickstrom (Liberty Environmental, Inc.) at (610) 375-9301.

Sincerely,
Mars Wrigley, LLC

Andy King
HSE Specialist, Elizabethtown

RACT III NOTIFICATION
for
MARS WRIGLEY US, LLC
ELIZABETHTOWN PLANT
ELIZABETHTOWN, PENNSYLVANIA

Submitted to:

Pennsylvania Department of Environmental Protection
Air Quality Control Program
909 Elmerton Avenue
Harrisburg, PA 17110

Submitted by:

Mars Wrigley US, LLC
Elizabethtown Plant
295 South Brown Street
Elizabethtown, PA 17022

Prepared by:

505 Penn Street
Suite 400
Reading, PA 19601

December 2022

TABLE OF CONTENTS

1. OVERVIEW

Mars Wrigley US, LLC ("Mars") operates a chocolate and confectionery manufacturing facility in Elizabethtown Borough, Lancaster County, Pennsylvania (Title V Operating Permit No. 36-05142 issued June 22, 2022 and expiring on June 30, 2027). The Elizabethtown facility is classified as a "major VOC emitting facility" because the facility's actual and potential volatile organic compound (VOC) emissions exceed 50 tons per year (tpy). Mars is providing this Reasonably Available Control Technology (RACT) Notification in accordance with 25 PA Code Sections 129.111 and 129.115(a) of the "Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS," which was promulgated as a final rule upon publication in the *Pa. Bulletin* dated November 12, 2022 (hereinafter "RACT III").

The facility is not classified as a "major NOx emitting facility" because the facility's actual and potential nitrogen oxide (NO_X) emissions are below 100 tpy. Title V permit condition C(#005) provides a federally enforceable cap on NOx emissions of 100 tpy on a 12-month rolling basis. Because the Facility is not classified as a "major NOx emitting facility," the NOx requirements of RACT III are not applicable per 25 Pa. Code § 129.111(a). Consistent with such interpretation, the PA DEP's "Comment and Response Document" prepared as part of the Regulatory Analysis Form submitted to the Pennsylvania Independent Regulatory Review Commission clarified applicability of RACT III as follows:

> *The owner and operator of a source that is a major VOC emitting facility but not a major NOx emitting facility shall comply with the applicable VOC RACT requirements and VOC RACT emission limitations but is not subject to the NOx RACT requirements and NOx RACT emission limitations.* (Comment and Response Document, Response to Comment #62, page 46, *available at* http://www.irrc.state.pa.us/meetings/).

As a major VOC source, Mars is submitting this RACT notification prior to December 31, 2022 addressing VOC sources at the facility in accordance with 25 PA Code 129.115(a). The Pennsylvania Department of Environmental Protection (PA DEP) provided a "RACT III written notification" template to major sources and Mars is providing that form in Attachment A of this report. Table 3 of that form identifies all sources at the facility and provides potential to emit (PTE) for all VOC sources that are "de minimis" (i.e., < 1.0 tpy VOC each) and therefore exempt

from RACT III per 25 PA Code 129.111(c). A VOC emissions inventory is provided in Attachment B for these sources.

Table 3 also lists several VOC sources at the Elizabethtown facility, including several miscellaneous sources identified in Section H of the permit, as having a PTE of VOC less than 2.7 tpy per source. As VOC sources with a PTE less than 2.7 tons, these sources are subject to the presumptive RACT requirements that the sources be installed, maintained, and operated in accordance with the manufacturer's specifications and with good operating practices per 129.112(c)(2). Operating sources according to manufacturer's specifications and good operating practices was identified as RACT for multiple sources at the Elizabethtown facility in 2017 as part of the RACT II case-by-case evaluation provided by Mars pursuant to the requirements of 25 PA Code Section 129.92.

Table 3 also lists four sources at the facility with VOC PTE greater than 2.7 tpy, the Jetzone #1 Cocoa Bean Roaster & Cooler (Source 402), the Jetzone #2 Cocoa Bean Roaster & Cooler (Source 502), the Jetzone #2 Pregrind Operations (Source 504), and the Buhler Cocoa Bean Roaster (Source 600). The remainder of this RACT III report evaluates RACT for VOC emissions from these sources in accordance with 25 PA Code 129.114(c) because the PTE for each of these sources exceed 2.7 TPY and they are not subject to any of the presumptive RACT requirements in Section 112.

Cocoa bean roasting and grinding results in VOC emissions that can be minimized by good operating practices and proper maintenance. In addition, Sources 502, 504, and 600 are equipped with wet scrubbers which provide some control of VOC emissions in addition to particulate matter (PM) emissions control. The RACT II case-by-case evaluation provided by Mars pursuant to the requirements of 25 PA Code Section 129.92 determined RACT to be the preparation and implementation of an operations and maintenance (O&M) plan for these sources as well requiring the operation of the wet scrubbers when sources 502, 504 and 600 are operating. Annual VOC emissions limits were also imposed for these sources. Jetzone #1 (Source 402) is subject to a VOC limit of 26.41 tons/year. The Jetzone #2 Sources 502 and 504 are both exhausted through the same scrubber and are subject to a single VOC limit of 48.90 tons/year. The Buhler (Source 600) is subject to a VOC limit of 24.4 tons/year.

Mars has re-evaluated the feasibility of installing add-on VOC controls on these sources and has concluded that it is not economically feasible. The economic analyses were prepared in accordance with EPA Air Pollution Control Cost Manual and the costs are provided in Attachment C. Air pollution control vendor budgetary quotes for RTO oxidizer systems and a wet impingement scrubber system are provided in Attachment D. The annualized costs associated with installing and operating RTO systems on the roaster and roaster/cooler exhausts is shown to range from $19,486 to $513,221 per ton of VOC abated. The annualized costs associated with installing and operating a wet impingement scrubber on the Jetzone #1 roaster is shown to range from $33,609 to $294,854 per ton of VOC abated.

Mars concludes that RACT for VOC emissions from sources at the facility remain the following requirements identified as RACT during RACT II:

- Operation according to manufacturer's specifications and good operating practices for those sources with a VOC PTE of less than 2.7 tpy as specified in the Title V permit for Source Group 001A and in Section H.

- The continued implementation of the O&M Plan and scrubber requirements for Sources 402, 502, 504, and 600 as specified in the Title V permit for Source Group 001.

Mars is not requesting any new VOC limitations or requirements to comply with RACT III, with the exception of additional miscellaneous sources listed in Section H of the permit being identified as subject to presumptive RACT requirements of Section 112(c)(2).

2. PROCESS DESCRIPTION

2.1 OVERVIEW

Mars operates a chocolate and confectionery manufacturing facility in Elizabethtown Borough, Lancaster County, Pennsylvania. The manufacturing process includes raw cocoa bean receipt, cocoa bean processing, and chocolate production. The produced chocolate is either shipped out as a raw material product to other Mars plants or used to manufacture different confectionery products at the Elizabethtown plant.

The Elizabethtown facility has three cocoa bean roaster lines: the natural gas-fired Jetzone #1 (Source 402) and Jetzone #2 (Source 502), and a Buhler roaster (Source 600) that utilizes steam. Each roaster line has ancillary processes such as bean cleaning, winnowing, grinding and bean transport operations. Source 504 is the Jetzone #2 Pregrind Operations which are exhausted through the wet scrubber that serves the Jetzone #2 roaster.

Other sources of air emissions at the facility include a dual fuel 91.4 MMBtu/hr rated Babcock and Wilcox boiler and a dual fuel 78.5 MMBtu/hr rated Nebraska boiler. The boilers provide steam to various processes at the facility including the Buhler roaster. Both boilers only combust fuel oil during periods of natural gas curtailment.

The facility also has three diesel-fired and two natural gas-fired reciprocating internal combustion engine (RICE) emergency generators and a diesel-fired fire pump.

Miscellaneous sources of air emissions at the facility include various natural gas-fired space heaters, R&D equipment, alcohol used to sanitize equipment, and a 25,000 gallon No. 2 fuel oil aboveground storage tank that supplies the two boilers.

2.2 EMISSION INVENTORY

2.2.1 Actual Emissions

The Mars Elizabethtown 2021 emission inventory (AIMS report) may be found in Attachment B. Facility-wide actual VOC emissions in 2021 were above the major source threshold of 50 tpy.

2.2.2 Potential Emissions

Potential-to-emit (PTE) VOC emissions rates have been calculated for all permitted sources and all permitted and miscellaneous sources with a VOC PTE of less than 1.0 tpy, and are provided in Attachment B. All other miscellaneous VOC sources listed in Section H of the permit each have a VOC PTE of less than 2.7 tpy.

For the Jetzone #1 Roaster & Cooler (Source 402), Jetzone #2 Roaster & Cooler (Source 502), Jetzone #2 Pregrind Operations (Source 504), and the Buhler Cocoa Bean Roaster (Source 600), PTE rates were established in RACT II.

For both permitted and miscellaneous combustion sources, PTE was calculated based on AP-42 emission factors, the maximum rated heat capacity or output power of each source, and a maximum annual operating hours of 8,760, with the exception of all emergency internal combustion engines, which are based on maximum annual operating hours of 500 for each engine. For Sources 031 and 032, the Babcock and Wilcox boiler and Nebraska boiler respectively, PTE was based on the maximum annual heat input limit of 396,000 MMBtu/yr which applies to all fuels combusted in either boiler.

For the 25,000 gallon No. 2 Fuel Oil Aboveground Storage Tank, listed as a miscellaneous source in Section H of the permit, PTE was calculated using a spreadsheet created by the New Jersey Department of Environmental Protection (NJDEP) that calculates emissions based on the approach detailed in AP-42 Chapter 7.1 for organic liquid storage tanks.

NOx PTE rates were not estimated because the facility is subject to a NOx emissions cap (<100 tpy) and is therefore not subject to RACT III for NOx.

2.3 RACT III APPLICABILITY

Pennsylvania promulgated a new RACT regulation in November 2022 (25 PA Code Sections 129.111 - 129.115) titled “Additional RACT Requirements for Major Sources of NOx and VOCs for the 2015 Ozone NAAQS” (hereinafter “RACT III”). As a Major VOC Source, the Mars Elizabethtown facility is submitting this RACT Notification in accordance with 25 PA Code Sections 129.111 and 129.115(a) by 12/31/22.

The RACT III regulation imposes emission limits and/or work practice standards for certain sources of NOx and VOC. It is referred to as "RACT III" because Pennsylvania promulgated similar "RACT I" and "RACT II" regulations in 1995 and 2016 that affected major NOx/VOC sources. The RACT regulations have been promulgated to address ozone nonattainment issues. Both NOx and VOC emissions are regulated as ozone "precursor" pollutants.

Applicability of the RACT III regulation is addressed in 25 PA Code Section 129.111 which specifies that the "NOx requirements of this section" apply to major NOx emitting facilities and the "VOC requirements of this section" apply to major VOC emitting facilities that commenced operation on or before August 3, 2018. The Mars Elizabethtown facility is not classified as a "major NOx emitting facility" because the facility's actual and potential NO_X emissions are below 100 tpy. Title V permit condition C (#005) provides a federally enforceable cap on NOx emissions of 100 tpy on a 12-month rolling basis. Because the facility is not classified as a "major NOx emitting facility," the NOx requirements of RACT III are not applicable per 25 Pa. Code § 129.111(a).

Section 129.111(c) provides a "de minimis" exemption for sources with PTE less than 1.0 tpy VOC at major VOC emitting facilities. Mars has identified these de minimis VOC sources in Table 3 in Appendix A. VOC emissions calculations are provided in Appendix B for each of these sources, which include the following permitted Sources:

- Source 103 – Diesel Fire Pump
- Source 104 – (3) Emergency Generators
- Source 105 – Y2K Emergency Generators
- Source 403 – Jetzone #1 Winnowing Operations
- Source 503 – Jetzone #2 Winnower Operations
- Source 601 – Winnower

And the following sources identified as miscellaneous sources in Section H of the permit:

- NG-fired R&D Dryer
- Natural Gas-fired Space Heater (75,000 btu/hr)

- Natural Gas-fired Space Heater (130,000 btu/hr)
- No. 2 Fuel Oil Storage Tank (25,000 gallons)
- Buhler Building NG-fired Emergency Generator

There are several other permitted sources at the Mars Elizabethtown facility that are sources of particulate matter (PM) only, these sources are listed in Table 1 in Appendix A with "0.0" identified for VOC emissions.

Section 129.112 identifies sources of VOC emissions that are subject to presumptive RACT III requirements including sources with a PTE of less than 2.7 tpy VOC and certain combustion units, and Section 129.112(c)(2) specifies that these sources be installed, maintained, and operated in accordance with the manufacturer's specifications and with good operating practices. Mars has identified these sources in Table 3 in Appendix A. VOC emissions calculations are provided in Appendix B for each of the following permitted Sources:

- Source 031 – Babcock & Wilcox Boiler
- Source 032 – Nebraska Boiler
- Source 602 – Nib Grinders

In addition, the following sources listed as "Miscellaneous Sources" in Section H of the permit are also subject to Section 129.112(c)(2) as they each have a PTE of less than 2.7 tpy VOC:

- Food Flavorings – Various Alcohol Based
- Denatured Alcohol
- Isopropanol Alcohol – 70%
- Alkalizer and NG-fired Dryer
- NG-fired Warehouse Space Heater
- R&D Pilot Plant Operations
- R&D Micronizer
- R&D Roaster
- R&D Fryer Hood

- Liquor Milling Areas (3)
- Liquor Storage

Sources that have a VOC PTE of 2.7 tpy or greater are subject to "Case By Case" VOC RACT requirements as specified in Section 129.114(c). The following sources at the facility meet this criterion:

- Source 402 – Jetzone #1 Bean Roaster and Cooler
- Source 502 – Jetzone #2 Cocoa Bean Roaster & Cooler
- Source 504 – Jetzone #2 Pregrind Operations
- Source 600 – Buhler Cocoa Bean Roaster

Mars has prepared the required RACT analysis for these sources in accordance with the requirements of Section 129.114(d) which specifies that the analysis follow the methodology in RACT II Sections 129.92(a)(1)-(5) and (b). Sections 3-4 of this report provide the required "top down" analysis of VOC control options and Section 5 identifies the proposed RACT requirement. The following information is provided for the sources in accordance with the Section 129.92 RACT Proposal Requirements:

1) A list of each source subject to the RACT Requirements.

   See list above.

2) The size or capacity of each affected source and the types of fuel combusted or the types and quantities of materials processed or produced in each source.

   • *Source 402 – Jetzone #1 Bean Roaster and Cooler: 7,700 lbs Cocoa Beans/hr, 7.2 Mcf Natural Gas/hr*

   • *Source 502 – Jetzone #2 Cocoa Bean Roaster & Cooler: 7,920 lbs Cocoa Beans/hr, 1.78 Mcf Natural Gas/hr*

   • *Source 504 – Jetzone #2 Pregrind Operations: 6,600 lbs Cocoa Beans/hr*

   • *Source 600 – Buhler Cocoa Bean Roaster: 8,000 lbs Cocoa Beans/hr*

3) A physical description of each source and its operating characteristics.

Jetzone #1 Roaster & Cooler (Source 402) is a two-zone, direct natural gas-fired roaster with a maximum rated feed capacity of 7,700 pounds an hour of cocoa beans. After roasting, the cocoa beans are conveyed through a single-zone, one–pass, ambient air fluidized bed cooler. Source 402 is exhausted through cyclone mechanical collectors.

Jetzone #2 Roaster and Cooler (Source 502) is a two-zone, direct natural gas-fired roaster with a maximum rated feed capacity of 7,920 pounds an hour of cocoa beans. After roasting, the cocoa beans are conveyed through a single-zone, one–pass, ambient air fluidized bed cooler. Source 502 is exhausted through a wet scrubber.

Jetzone #2 Pregrind Operations (Source 504) consists of roasted cocoa bean grinding operations with a rated feed capacity of 6,600 pounds an hour of roasted beans. Source 504 is exhausted through the wet scrubber that controls Source 502.

The Buhler Roaster (Source 600) has a rated feed capacity of 8,000 pounds an hour of cocoa beans and uses steam provided by independent boilers located at the Mars Elizabethtown facility rather than integral fuel combustion. The roaster is equipped with and integral cooler. Source 600 is exhausted through a wet scrubber.

4) Estimates of the potential and actual NO_x and VOC emissions from each affected source and associated supporting documentation.

See Appendix B for VOC actual emission rates and PTE calculations. NOx PTE was not estimated because the facility will not be subject to NOx RACT.

5) A RACT analysis which meets the requirements of subsection (b), including technical and economic support documentation for each affected source, Including:

   a. A ranking of the available control options for the affected source in descending order of control effectiveness, and an evaluation of the technical feasibility of the available control options. *See Section 3 of this report.*

   b. A ranking of the technically feasible control options in order of overall control effectiveness for VOC emissions. *See Section 3 of this report.*

c. An evaluation of the cost effectiveness of each technically feasible control option. *See Section 4/Appendix C/D of this report.*

3. VOC CONTROL TECHNOLOGIES

3.1 ADD-ON CONTROL EQUIPMENT

A review of other Pennsylvania cocoa roaster air permits was conducted to identify emission limits and air pollution control requirements. The review identified the use of thermal oxidation as the "top" level of VOC control with three Pennsylvania chocolate manufacturers operating RTOs with a VOC destruction efficiency requirement of 98%. Other VOC controls installed on roasters are wet scrubbers, but no VOC control requirements are specified with the exception of the Mars Buhler roaster and the Cargill Mount Joy roasters, for which the permits specify a VOC control efficiency *or* a VOC mass emission rate. In addition to RTOs and wet scrubber (for Jetzone #1 roaster), Mars has evaluated the following add-on control equipment as part of the RACT III process:

- Condensation
- Carbon Adsorption
- Wet Impingement Gas Scrubbers
- Wet Electrostatic Precipitator (WESP)
- Oxidation without Heat Recovery
- Recuperative Oxidation
- Regenerative Oxidation
- Catalytic Oxidation

The practicality of utilizing these control options depends on the exhaust flowrate, the VOC concentration range, and the constituents of the VOC. A discussion of the control technologies follows.

3.1.1 Condensation

Condensation VOC control systems utilize a temperature change to remove VOC from the exhaust stream as they condense, which allows then to be collected for treatment or disposal. Condensation is typically used for exhaust streams with high VOC concentrations. The exact VOC compounds in the exhaust stream determine the temperature utilized in the process, with VOC with higher volatility requiring lower temperatures.

3.1.2 Carbon Adsorption

Carbon adsorption is commonly used to recover vapor phase solvents from painting and coating operations by passing the exhaust stream through a medium such as activated carbon or zeolite. The VOC is absorbed by the medium and when the medium is saturated the medium is reactivated by using heat to drive off the absorbed VOC where it is thermally destroyed. This can be performed either on-site or the medium can be collected and transported off-site for reactivation. Carbon adsorption is typically not used for exhaust streams with high temperatures or high moisture content. In addition, oils and heavy organics can blind carbon and/or cqan be difficult to desorb.

3.1.3 Wet Impingement Gas Scrubber

VOC control by wet scrubbing can be effective at absorbing certain water soluble compounds. Scrubbing can also remove condensable organic compounds such as fats/oils that condense when cooled in a scrubber. However, scrubbers will not remove light hydrocarbons and any VOC removal achieved by a scrubber results in wastewater containing VOC compounds that may require water treatment. Wet impingement scrubbers are theoretically capable of achieving 50 to 70% control efficiency of VOC, and Sources 502, 504, and 600 are currently equipped with wet scrubbers.

3.1.4 Wet Electrostatic Precipitator

A wet electrostatic precipitator (ESP) operates similarly to a wet impingement scrubber, except that an electrostatic charge is used to attract particulates to the wall of the ESP where it is washed, typically with water, to remove some of the condensed organics. Like a wet impingement scrubber, a wet ESP is theoretically capable of achieving 50 to 70% control efficiency of VOC. Wet ESPs typically have substantially higher costs than a wet scrubber.

3.1.5 Oxidation Without Heat Recovery

Oxidation without heat recovery is rarely applied to industrial applications unless there is a constant high concentration of VOC in the exhaust and volumetric flow rates are minimal. The VOC in the exhaust is directly combusted. Destruction efficiencies between 95% and 99% can be achieved.

3.1.6 Recuperative Oxidation

Recuperative oxidation systems provide a heat exchanger to transfer energy from the treated gas to the untreated process exhaust. Typically, the thermal efficiencies of recuperative heat exchanger designs are limited to 70%. Destruction efficiencies between 95% and 99% can be achieved with recuperative oxidation. Although capital costs for this option are lower than some other oxidation options, the operating and net costs are higher than the costs for regenerative oxidation.

3.1.7 Regenerative Thermal Oxidation (RTO)

Regenerative thermal oxidation (RTO) utilizes a large ceramic bed heat sink to recover energy from the treated gases and reduce energy requirements for the in-coming process exhaust gases. Thermal efficiencies as high as 95% are commonly achieved. Regenerative oxidation typically is more capital cost intensive than recuperative oxidation but has lower operating fuel costs because of its superior thermal efficiency. Regenerative oxidation typically provides the most cost effective control option. Destruction efficiencies between 95% and 99% can be achieved with regenerative oxidation.

3.1.8 Catalytic Oxidation

Catalytic oxidation allows conversion of the process gas contaminants at a lower energy than with non-catalytic oxidation. Catalytic combustion temperatures are typically between 600 F and 800 F whereas thermal oxidation temperature is typically between 1400 F and 1600 F. Although this reduction in combustion temperature provides an energy savings, catalytic oxidation typically relies on recuperative heat recovery rather than regenerative heat recovery. These unit's heat exchangers typically operate with a thermal efficiency of 50% to 70%. Destruction efficiencies between 95% and 99% can be achieved with catalytic oxidation. Capital costs for catalytic oxidation are generally higher than recuperative and thermal oxidation and of equal magnitude or more than regenerative oxidation. Catalysts are susceptible to blinding by oils in exhaust streams.

3.1.9 Technical Feasibility

Control of VOC through condensation is not technically feasible as the exhaust streams from the sources at Mars have low VOC concentrations and high moisture contents.

Carbon adsorption is also not technically feasible as adsorption is not effective at the high temperatures and moisture contents that characterize the process exhausts from the relevant sources at Mars. In addition, the adsorption medium could be blinded by the oils and PM emissions that are present in the exhaust streams.

Both wet impingement scrubbers and wet ESP are technically feasible for the control of VOC from the Mars Jetzone #1 roaster. A wet impingement scrubber has been evaluated due to its significantly lower cost than a wet ESP and the fact that both systems would achieve the same VOC removal efficiency.

Oxidation technologies are technically feasible add-on control technologies to control VOC emissions from the sources. Mars is installing an RTO to control VOC emissions from a new cocoa roaster (Jetzone #3) that is currently being installed at the facility. Accordingly, Mars has evaluated the economic feasibility of installing RTO systems on the existing roaster and cooler exhausts.

4. COST EFFECTIVENESS OF TECHNICALLY FEASIBLE CONTROL OPTIONS

4.1 CONTROL EFFECTIVENESS

Oxidation technologies are considered technically feasible and can achieve VOC control efficiencies of 95 to 99%, and represent the most effective VOC control technology available. Mars has evaluated the cost effectiveness of installing and operating RTO systems with a VOC control efficiency of 98%.

Wet impingement scrubbers are considered capable of achieving 50 to 70% VOC control efficiency, depending on the composition and concentration of the VOC species. Source Group 001 permit requirement #001 states that Source 600 must either demonstrate a VOC control efficiency of 80% through operation of the wet scrubber (Control device C600) or an emission rate of 5.74 lb/hr of VOC or less. Mars has always demonstrated compliance with this requirement through achieving an emission rate of less than 5.74 lb.hr and the actual control efficiency of C600 has not been established. During the permitting process for the Jetzone #3 roaster and cooler that is currently under construction, scrubber vendors were unwilling to provide a guaranteed VOC control efficiency. Nevertheless, to be consistent with previous RACT evaluations, Mars assumes that a wet scrubber can provide 60% VOC control efficiency for the purposes of the evaluation of cost effectiveness in the section below.

4.2 COST EFFECTIVENESS

Mars is providing in Attachment D the RTO vendor (Adwest) quote for the RTO that is currently being installed for the Jetzone #3 roaster. This RTO is rated at 5,000 scfm and could control VOC from each of the Jetzone #1 and #2 roaster exhausts. An additional RTO quote from Adwest for a 28,000 scfm unit is also provided in Attachment D. This RTO is capable of significant turndown and this unit was evaluated for the control of the Buhler roaster and the combination of the Jetzone roaster/cooler exhausts.

Attachment C provides cost analyses that calculate the annualized costs to control VOC emissions for the following sources and exhaust flowrates: Jetzone #1 Roaster & Cooler (Source 402) with an exhaust rate of 17,500 cfm; Jetzone #2 Roaster & Cooler (Source 502) and Jetzone #2 Pregrind Operations (Source 504) with an exhaust rate of 27,000 cfm; and, the Buhler Roaster

Mars also evaluated the costs for a smaller RTO to control the Jetzone #1 and Jetzone #2 roaster exhausts only, not including the larger exhaust rates associated with the roaster coolers.

Mars did not consider the installation of larger RTOs to control multiple sources, such as one large RTO to control all four sources, as it was determined to be not feasible due to extremely high retrofit costs (extensive ductwork and, due to site constraints, a large RTO would have to be installed on the roof of the building) and production related issues (different production schedules and resulting flow variability would require very high turndown ratios).

Costs were estimated based on methodology outlined in the U.S. EPA Office of Air Quality Planning and Standards (OAQPS) Control Cost Manual, Sixth Edition, and budgetary equipment costs provided by the RTO vendor CECO Adwest. For Jetzone #1 (Source 402), an expected equipment life of three years was used to reflect the Mars Elizabethtown facility's plans to discontinue use of the source following installation and operation of the new Jetzone #3 Roaster and Cooler.

The cost to control VOC emissions ranged from $19,486 to $513,221 per ton of VOC abated. As such, Mars concludes that the installation of RTOs on the existing roaster and cooler systems is not cost effective and does not represent RACT.

Wet impingement scrubber costs were analyzed for economic feasibility for control of Source 402. As Sources 502, 504, and 600 are already controlled by wet impingement scrubbers, there is no need to conduct a cost analyses for the installation of a wet scrubber on these sources. For the Jetzone #1 Roaster and Cooler (Source 402), cost analyses were prepared in accordance with the U.S. EPA Office of Air Quality Planning and Standards (OAQPS) Control Cost Manual, Sixth Edition, and budgetary equipment costs provided by a wet scrubber vendor, Sly, Inc., for wet venturi scrubbers, one to control Jetzone #1 roaster and cooler, and one to control the Jetzone #1 roaster exhaust only. As with the cost analyses for the RTO discussed above, an expected equipment life of three years was used. The cost to control VOC emissions was $33,609 per ton controlled to control both the roaster and cooler, and $294,854 per ton controlled to control the roaster exhaust only. As such, Mars asserts that the installation of a wet scrubber system on Jetzone #1 Roaster & Cooler is not cost effective and does not represent RACT.

5. RACT PLAN SUMMARY

5.1 ALTERNATIVE RACT PROPOSAL

The RACT analysis has shown that add-on VOC controls, while technically feasible, are economically infeasible using the existing VOC annual emission limits for Sources 402, 502, 504, and 600. As such, and in as much as there have been no changes to Mars Elizabethtown operations since the establishment of the RACT II requirements, Mars proposes that RACT for Sources 402, 502, 504, and 600 remain those identified in Source Group 001 of the facility's Title V permit. These requirements include:

- For Source 600, the permittee shall operate and maintain the source and control device such that either the scrubber achieves a minimum of 80.0% destruction efficiency for VOC, reported as propane, or the emission rate coming from the scrubber is less than 5.74 lbs/hr of VOCs.
- For each of sources 402, 502, 504 and 600, the permittee shall maintain an O&M Plan, as well as records of any maintenance or modifications performed on the source. The permittee shall maintain written documentation of the current O&M Plan for each source and any maintenance or modifications performed on each source for five years. The records shall be made available to the Department upon written request pursuant to 25 Pa. Code §129.100(d) and (i).
- The permittee shall operate the Control C502A [JETZONE #2 ROASTER SCRUBBER ZONE #1 (A101)] and C502B:[JETZONE #2 ROASTER SCRUBBER ZONE #1 (A101)] at all times when either of Sources 502 or 504 are operating.
- The permittee shall operate the Control C600 [ROASTER WET SCRUBBER] at all times when Source 600 is operating.
- The permittee shall operate and maintain instrumentation to monitor the pressure drop and the water flow rate to the scrubbers C502A, C502B and C600.
- The permittee shall keep the following records, which shall be maintained for a minimum of five (5) years, and shall be made available to the Department upon request.

- A daily record of the pressure drop across and the water flow rate to the scrubbers C502A, C502B and C600.
- Monthly throughput of cocoa beans through each roaster.
- The VOC emissions for each month and each consecutive 12-month period.

5.2 PRESUMPTIVE RACT

For sources with a VOC PTE of less than 2.7 tpy but greater than 1.0 tpy, Mars will operate and maintain them according to manufacturer's specifications, and implement good operating practices, as required by 25 PA Code 129.112(c)(2). These RACT work practice standards are specified in the current Title V permit for Source Group 001A which includes Sources 031, 032, and 602. The following additional sources currently listed in Section H of the permit are now subject to these presumptive RACT standards:

- Food Flavorings – Various Alcohol Based
- Denatured Alcohol
- Isopropanol Alcohol – 70%
- Alkalizer and NG-fired Dryer
- NG-fired Warehouse Space Heater
- R&D Pilot Plant Operations
- R&D Micronizer
- R&D Roaster
- R&D Fryer Hood
- Liquor Milling Areas (3)
- Liquor Storage

5.3 SCHEDULE

The facility will continue to operate and maintain RACT applicable sources in accordance with the work practice standards established in RACT II, including all associated recordkeeping and reporting requirements, by January 1, 2023.

ATTACHMENT A – PA DEP RACT III NOTIFICATION FORM

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

CHAPTER 129. STANDARDS FOR SOURCES ADDITIONAL RACT REQUIREMENTS FOR MAJOR SOURCES OF NOx AND VOCs FOR THE 2015 OZONE NAAQS

Written notification, 25 Pa. Code §§129.111 and 129.115(a)

25 Pa. Code Sections 129.111 and 129.115(a) require that the owner and operator of an air contamination source subject to the final-form RACT III regulations submit a notification describing how you intend to comply with the final-form RACT III requirements, and other information spelled out in subsection 129.115(a). The owner or operator may use this template to notify DEP. Notification must be submitted in writing or electronically to the appropriate Regional Manager located at the appropriate DEP regional office. In addition to the notification required by §§ 129.111 and 129.115(a), you also need to submit an applicable analysis or RACT determination as per § 129.114(a) or (i).

Is the facility major for NOx?	**Yes ☐ No ☒**
Is the facility major for VOC?	**Yes ☒ No ☐**

FACILITY INFORMATION						
Facility Name	Mars Wrigley US LLC/Elizabethtown					
Permit Number	36-05142 **PF ID if known** 20-8940055-1					
Address Line1	295 S. Brown St.					
Address Line2						
City	**Elizabethtown**	**State**	**PA**	**Zip**	**17022-2127**	
Municipality	Elizabethtown Borough		**County**	Lancaster		
OWNER INFORMATION						
Owner	Mars Wrigley US LLC					
Address Line1	295 S. Brown St.					
Address Line2						
City	**Elizabethtown**	**State**	**PA**	**Zip**	17022-2127	
Email	andy.e.king@effem.com		Phone	(717) 367-0955		
CONTACT INFORMATION						
Permit Contact Name	Andy King					
Permit Contact Title	HSE Specialist					
Address Line	295 S. Brown St.					
City	**Elizabethtown**	**State**	**PA**	**Zip**	17022-2127	
Email	**andy.e.king@effem.com**			Phone	(717) 367-0955	

Complete Table 1, including all air contamination sources that commenced operation on or before August 3rd, 2018. Air contamination sources determined to be exempt from permitting requirements also must be included. You may find this information in section A and H of your operating permit.

Table 1 - Source Information

Source ID	Source Name	Make	Model	Physical location of a source (i.e, building#, plant#, etc.)	Was this source subject to RACT II?
031	Babcock & Wilcox Boiler	Babcock & Wilcox	Unknown	Boiler Building	Yes
032	Nebraska Boiler	Nebraska	NS-E-58	Boiler Building	Yes
103	Diesel Fire Pump	Cummins	NT-280-IF	Fire Pump House	No
104	(3) Emergency Generators	Various	Various	Exterior	No
105	Y2K Emergency Generator	Detroit Diesel	Spectrum 450	Exterior	No
220	Dry Milk Process System	Various	Various	Dry Milk Process Area	No
230	Milk Crumb Processing System	Various	Various	Milk Crumb Process Area	No
240	Sugar Storage and Distribution System	Ducon	None	Sugar Storage Area	No
401	Jetzone #1 Bean Cleaner/Seperator	Buhler	MTRA 100/100 AC	Jetzone #1 Roaster Area	No
402	Jetzone #1 Bean Roaster and Cooler	Jetzone	SN 4X 252	Jetzone #1 Roaster Area	Yes
403	Jetzone #1 Winnowing Operations	Bauermeister	B61EH	Jetzone #1 Roaster Area	No
501	Jetzone #2 Cocoa Bean Cleaning	Various	Various	Jetzone #2 Roaster Area	No
502	Jetzone #2 Cocoa Bean Roaster & Cooler	Wolverine	SR40X252 (Roaster), SRC50X121 (Cooler)	Jetzone #2 Roaster Area	Yes
503	Jetzone #2 Winnower Operations	Jetzone	None	Jetzone #2 Roaster Area	No
504	Jetzone #2 Pregrind Operations	Buhler	None	Jetzone #2 Roaster Area	Yes
600	Buhler Cocoa Bean Roaster	Buhler	SST-6	Buhler Roaster Area	Yes
601	Winnower	Various	Various	Buhler Roaster Area	No
602	Nib Grinders	Various	Various	Buhler Roaster Area	Yes

603	Bean Transporter	Various	Various	Buhler Roaster Area	No
604	Fines/Shell Conveying	Various	Various	Buhler Roaster Area	No
MISC	NG-fired R&D Dryer	Unknown	Unknown	R&D Area	No
MISC	Natural Gas-Fired Space Heater (75,000 Btu/hr)	Unknown	Unknown	Plant Interior	No
MISC	Natural Gas-Fired Space Heater (130,000 Btu/hr)	Unknown	Unknown	Plant Interior	No
MISC	R&D Pre-Grind Mill	Unknown	Unknown	R&D Area	No
MISC	Crumb Pilot Plant Dust Collector	Unknown	Unknown	Plant Interior	No
MISC	(3) Cooling Towers	Unknown	Unknown	Exterior	No
MISC	No. 2 Fuel Oil Storage Tank (25,000 gallons)	Unknown	Unknown	Exterior, Boiler House Adjacent	No
MISC	Food Flavorings – Various Alcohol Based	Various	None	Throughout Plant	No
MISC	Denatured Alcohol	Various	None	Throughout Plant	No
MISC	Isopropyl Alcohol – 70%	Various	None	Throughout Plant	No
MISC	Bulk Bean Unloading System – Internal Discharge	Unknown	Unknown	Bean Receiving Area	No
MISC	Fine/Shell Loading	Unknown	Unknown	Multiple Locations in Plant	No
MISC	Cocoa Bean Area Receiving Baghouse Exhaust #2 (No. 11) – Internal Discharge	Unknown	Unknown	Bean Receiving Area	No
MISC	Cocoa Bean Receiving, Cleaning, & Conveying Baghouse #1 Exhaust – Internal Discharge	Unknown	Unknown	Bean Receiving Area	No
MISC	Dark Chocolate Sugar Conveying Baghouse Exhaust – Internal Discharge	Unknown	Unknown	Sugar Storage Area	No
MISC	Cocoa Bean Receiving Area Baghouse #2 (No. 11) – Internal Discharge	Unknown	Unknown	Bean Receiving Area	No
MISC	Cocoa Bean Receiving, Cleaning, & Conveying Baghouse #1 – Internal Discharge	Unknown	Unknown	Bean Receiving Area	No

MISC	Dark Chocolate Conveying Baghouse	Unknown	Unknown	Dark Chocolate Production Area	No
MISC	Lime Storage Silo – Waste Water Treatment Plant	Unknown	Unknown	Waste Water Treatment Plant	No
MISC	Buhler Building NG-fired Emergency Generator	Siemans	ST10054KNSN	Exterior	No
MISC	Winnowing Fines Collector (Silo Area)	Unknown	Unknown	Silo Area	No
MISC	Hull Bin Exhaust Fan	Unknown	Unknown	Roof	No
MISC	Alkalizer and NG-Fired Dryer	Unknown	Unknown	Interior of Plant	Yes
MISC	NG-Fired Warehouse Space Heater	Unknown	Unknown	Warehouse	Yes
MISC	R&D Pilot Plant Operations	Unknown	Unknown	R&D Area	Yes
MISC	R&D Micronizer	Unknown	Unknown	R&D Area	Yes
MISC	R&D Roaster	Unknown	Unknown	R&D Area	Yes
MISC	R&D Fryer Hood	Unknown	Unknown	R&D Area	Yes
MISC	Liquor Milling Areas (3)	Various	None	Liquor Milling Areas	Yes
MISC	Liquor Storage	Various	None	Liquor Storage Area	Yes

Complete Table 2 or 3 if the facility is a major NOx or VOC emitting facility. For the column with the title "How do you intend to comply", compliance options are:

- Presumptive RACT requirement under §129.112 (**PRES**),
- Facility-wide averaging (**FAC**) §129.113,
- System-wide averaging (**SYS**) §129.113, or
- Case by case determination §129.114 (**CbC**).

Please provide the applicable subsection if source will comply with the presumptive requirement under §129.112.

Table 2 – Method of RACT III Compliance, NOx

Source ID	Source Name	NOx PTE TPY	Exempt from RACT III (yes or no)	How do you intend to comply? (PRES, CbC, FAC or SYS)	Specific citation of rule if presumptive option is chosen

Please complete Table 3 if the facility is a major VOC emitting facility. Please provide the applicable section if a source is complying with any RACT regulation listed in 25 Pa Code §§ 129.51, 129.52(a)—(k) and Table I categories 1—11, 129.52a—129.52e, 129.54—129.63a, 129.64—129.69, 129.71—129.73, 129.75 129.71—129.75, 129.77 and 129.101—129.107.

Table 3 – Method of RACT III Compliance, VOC

Source ID	Source Name	VOC PTE TPY	Exempt from RACT III (yes or no)	How do you intend to comply?	Specify citation of rule or subject to 25 Pa Code RACT regulation, (list the applicable sections)
031	Babcock & Wilcox Boiler	1.07	No	PRES 129.112(d)	N/A
032	Nebraska Boiler	1.07	No	PRES 129.112(d)	N/A
103	Diesel Fire Pump	0.02	Yes	N/A	N/A
104	(3) Emergency Generators	0.08	Yes	N/A	N/A
105	Y2K Emergency Generator	0.38	Yes	N/A	N/A
220	Dry Milk Process System	0.0	Yes	N/A	N/A
230	Milk Crumb Processing System	0.0	Yes	N/A	N/A
240	Sugar Storage and Distribution System	0.0	Yes	N/A	N/A
401	Jetzone #1 Bean Cleaner/Separator	0.0	Yes	N/A	N/A
402	Jetzone #1 Bean Roaster and Cooler	26.41	No	CbC	N/A
403	Jetzone #1 Winnowing Operations	0.08	Yes	N/A	N/A
501	Jetzone #2 Cocoa Bean Cleaning	0.0	Yes	N/A	N/A
502	Jetzone #2 Cocoa Bean Roaster & Cooler	48.9	No	CbC	N/A
504	Jetzone #2 Pregrind Operations				
503	Jetzone #2 Winnower Operations	0.17	Yes	N/A	N/A
600	Buhler Cocoa Bean Roaster	24.4	No	CbC	N/A

601	Winnower	0.68	Yes	N/A	N/A
602	Nib Grinders	1.36	No	PRES 129.112(c)(2)	N/A
603	Bean Transporter	0.0	Yes	N/A	N/A
604	Fines/Shell Conveying	0.0	Yes	N/A	N/A
MISC	NG-fired R&D Dryer	0.024	Yes	N/A	N/A
MISC	Natural Gas-Fired Space Heater (75,000 Btu/hr)	0.002	Yes	N/A	N/A
MISC	Natural Gas-Fired Space Heater (130,000 Btu/hr)	0.003	Yes	N/A	N/A
MISC	R&D Pre-Grind Mill	0.0	Yes	N/A	N/A
MISC	Crumb Pilot Plant Dust Collector	0.0	Yes	N/A	N/A
MISC	(3) Cooling Towers	0.0	Yes	N/A	N/A
MISC	No. 2 Fuel Oil Storage Tank (25,000 gallons)	0.03	Yes	N/A	N/A
MISC	Food Flavorings – Various Alcohol Based	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	Denatured Alcohol	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	Isopropyl Alcohol – 70%	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	Bulk Bean Unloading System – Internal Discharge	0.0	Yes	N/A	N/A
MISC	Fine/Shell Loading	0.0	Yes	N/A	N/A
MISC	Cocoa Bean Area Receiving Baghouse Exhaust #2 (No. 11) – Internal Discharge	0.0	Yes	N/A	N/A
MISC	Cocoa Bean Receiving, Cleaning, & Conveying Baghouse #1 Exhaust – Internal Discharge	0.0	Yes	N/A	N/A
MISC	Dark Chocolate Sugar Conveying Baghouse Exhaust – Internal Discharge	0.0	Yes	N/A	N/A
MISC	Cocoa Bean Receiving Area Baghouse #2 (No.	0.0	Yes	N/A	N/A

	11) – Internal Discharge				
MISC	Cocoa Bean Receiving, Cleaning, & Conveying Baghouse #1 – Internal Discharge	0.0	Yes	N/A	N/A
MISC	Dark Chocolate Conveying Baghouse	0.0	Yes	N/A	N/A
MISC	Lime Storage Silo – Waste Water Treatment Plant	0.0	Yes	N/A	N/A
MISC	Buhler Building NG-fired Emergency Generator	0.03	Yes	N/A	N/A
MISC	Winnowing Fines Collector (Silo Area)	0.0	Yes	N/A	N/A
MISC	Hull Bin Exhaust Fan	0.0	Yes	N/A	N/A
MISC	Alkalizer and NG-Fired Dryer	<2.7	No	PRES 129.112(d)	N/A
MISC	NG-Fired Warehouse Space Heater	<2.7	No	PRES 129.112(d)	N/A
MISC	R&D Pilot Plant Operations	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	R&D Micronizer	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	R&D Roaster	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	R&D Fryer Hood	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	Liquor Milling Areas (3)	<2.7	No	PRES 129.112(c)(2)	N/A
MISC	Liquor Storage	<2.7	No	PRES 129.112(c)(2)	N/A

ATTACHMENT B – EMISSIONS INVENTORY

CY2021 AIMS SUBMITTAL

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Region: HARRISBURG **County:** Lancaster **Municipality:** Elizabethtown Boro
SIC: 2064 - Manufacturing - Candy And Other Confectionery Products
NAICS: 311351 - Chocolate and Confectionery Manufacturing from Cacao Beans

Contact	Name	Address	Telephone
MAILA		295 S Brown St, Elizabethtown, PA - 17022-2127	717-367-0916
PRMT	A King	295 S Brown St, Elizabethtown, PA - 17022-2127	717-367-0955
REOFF	D Weaver	295 S Brown St, Elizabethtown, PA - 17022-2127	717-367-1500
FIRM	A King	295 S Brown St, Elizabethtown, PA - 17022-2127	717-367-1500
LOCAD		295 S Brown St, Elizabethtown, PA - 17022-2127	--
CORP	D Weaver	295 S Brown St, Elizabethtown, PA - 17022-2127	717-367-1500
INSP	A King	295 S Brown St, Elizabethtown, PA - 17022-2127	717-367-1500

FACILITY LOCATION INFORMATION

Map:	0-81.71	**Latitude:**	40 deg, 08 min, 45.90 sec N	**UTM Coordinates:**		**North:**	4445
Elevation(Ft):	440	**Longitude:**	-76 deg, 36 min, 27.86 sec W	**Zone:**	18	**East:**	363.05

FACILITY POLLUTANT SUMMARY
(SUM OF INDIVIDUAL AND MISCELLANEOUS SOURCES)
EMISSION ESTIMATES (0.0 TONS/YEAR)

Ammonia	0.3339
CO	8.8139
Carbon Dioxide	12,486.5322
Lead	0.0000
Methane	0.5956
NOX	11.9095
Nitrous Oxide	0.2263
PM-CON	0.6011
PM10	89.4247
PM2.5	89.4247
SOX	0.1390
VOC	61.2272
Arsenic	0.0000
Barium	0.0000
Benzene	0.0000
Butane	0.0000
Cadmium	0.0000
Chromium	0.0000
Copper	0.0000
Ethane	0.0000
Formaldehyde	0.0000
Hexane	0.0000
Manganese	0.0000
Mercury	0.0000
Molybdenum	0.0000
Naphthalene	0.0000
Nickel	0.0000
Pentane	0.0000
Polycyclic Organic Matter	0.0000
Propane	0.0000

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

FACILITY POLLUTANT SUMMARY
(SUM OF INDIVIDUAL AND MISCELLANEOUS SOURCES)
EMISSION ESTIMATES (0.0 TONS/YEAR)

Toluene	0.0000
Vanadium	0.0000
Zinc	0.0000

FUEL USAGE SUMMARY

Fuel Type	Total Use
#2 Oil	21.77 Th Gal
Natural Gas	203.25 MMCF

SUB FACILITIES INCLUDED

Type	SF	Name
FML	FM001	#2 Oil Storage Tank
FML	FM002	Natural Gas Pipeline
CU	031	Babcock & Wilcox Boiler
CU	032	Nebraska Boiler
PRO	220	Dry Milk Process System
PRO	230	Milk Crumb Processing System
PRO	240	Sugar Storage And Distribution System
PRO	401	Jetzone #1 Bean Cleaner/Separator
PRO	402	Jetzone #1 Bean Roaster And Cooler
PRO	403	Jetzone #1 Winnowing Operations
PRO	501	Jetzone #2 Cocoa Bean Cleaning
PRO	502	Jetzone #2 Cocoa Bean Roaster & Cooler
PRO	503	Jetzone #2 Winnower Operations
PRO	504	Jetzone #2 Pregrind Operations
PRO	600	Buhler Cocoa Bean Roaster
PRO	601	Winnower
PRO	602	Nib Grinders
PRO	603	Bean Transporter
PRO	604	Fines/Shell Conveying

Fuel Location: **FM001** **#2 Oil Storage Tank** **SF Type:** **FML**
Date Installed: **Fuel Stored:** #2 Oil **Capacity:**

Sources fed in 2021:
032 NEBRASKA BOILER
031 BABCOCK & WILCOX BOILER

2021 Fuel Tests:
Date Collected: 02/03/2021 **% Ash:** 0.00 **% Sulfur:** 0.0015 **BTU(Lb/Gal/CuFt):** 140000

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Fuel Location:	**FM002**	**Natural Gas Pipeline**		**SF Type:**	**FML**
Date Installed:		**Fuel Stored:**	Natural Gas	**Capacity:**	

Sources fed in 2021:

031	BABCOCK & WILCOX BOILER
032	NEBRASKA BOILER
402	JETZONE #1 BEAN ROASTER AND COOLER
502	JETZONE #2 COCOA BEAN ROASTER & COOLER

2021 Fuel Tests:

Date Collected:	01/01/2021	**% Ash:**	0.00	**% Sulfur:**	0.0000	**BTU(Lb/Gal/CuFt):**	1050

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **031 Babcock & Wilcox Boiler** **SF Type: CU**

Rated Input (MMBTU/HR): 91.4 Date Installed: 06/01/1971

Fuel: #2 Oil **Fuel Data Based on FML:** FM001

SCC: 10200501 - External Combustion Boilers;Industrial;Distillate Oil;Grades 1 And 2 Oil Burned

Monthly Throughputs in Th Gal				
SCHEDULE 1	JAN:	17.33	JUL:	0.00
Date Effective: 01/01/2021	FEB:	3.98	AUG:	0.00
Date End: 12/31/2021	MAR:	0.00	SEP:	0.00
Total Days: 8	APR:	0.00	OCT:	0.00
Total Hours: 180	MAY:	0.00	NOV:	0.00
Days Per Week: 0	JUN:	0.00	DEC:	0.21

Fuel: Natural Gas **Fuel Data Based on FML:** FM002

SCC: 10200602 - External Combustion Boilers;Industrial;Natural Gas;10-100 Million Btu/Hr Burned

Monthly Throughputs in MMCF				
SCHEDULE 1	JAN:	14.46	JUL:	5.16
Date Effective: 01/01/2021	FEB:	1.61	AUG:	0.15
Date End: 12/31/2021	MAR:	13.54	SEP:	0.00
Total Days: 162	APR:	4.84	OCT:	3.19
Total Hours: 3546	MAY:	7.27	NOV:	6.30
Days Per Week: 3	JUN:	13.89	DEC:	4.90

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **031 Babcock & Wilcox Boiler** **SF Type: CU**

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
* Ammonia	7664417	0.1291	AP-42 LATEST AVAILABLE	
* CO	630080	3.2168	AP-42 LATEST AVAILABLE	
* Carbon Dioxide	124389	4,758.5480	AP-42 LATEST AVAILABLE	
* Lead	7439921	0.0000	SEE COMMENT	
* Methane	74828	0.0872	AP-42 LATEST AVAILABLE	
* NOX	10102440	3.9807	AP-42 LATEST AVAILABLE	
* Nitrous Oxide	10024972	0.0856	AP-42 LATEST AVAILABLE	
PM-CON		0.2286	AP-42 LATEST AVAILABLE	
* PM10		0.3217	AP-42 LATEST AVAILABLE	
PM2.5		0.3217	AP-42 LATEST AVAILABLE	
* SOX	7446095	0.0990	AP-42 LATEST AVAILABLE	
* VOC		0.2093	AP-42 LATEST AVAILABLE	
* Arsenic	7440382	0.0000	SEE COMMENT	
* Barium	7440393	0.0000	SEE COMMENT	
* Benzene	71432	0.0000	SEE COMMENT	
* Butane	106978	0.0000	SEE COMMENT	
* Cadmium	7440439	0.0000	SEE COMMENT	
* Chromium	7440473	0.0000	SEE COMMENT	
* Copper	7440508	0.0000	SEE COMMENT	
* Ethane	74840	0.0000	SEE COMMENT	
* Formaldehyde	50000	0.0000	SEE COMMENT	
* Hexane	110543	0.0000	SEE COMMENT	
* Manganese	7439965	0.0000	SEE COMMENT	
* Mercury	7439976	0.0000	SEE COMMENT	
* Molybdenum	7439987	0.0000	SEE COMMENT	
* Naphthalene	91203	0.0000	SEE COMMENT	
* Nickel	7440020	0.0000	SEE COMMENT	
* Pentane	109660	0.0000	SEE COMMENT	
* Polycyclic Organic Matter		0.0000	SEE COMMENT	
* Propane	74986	0.0000	SEE COMMENT	
* Toluene	108883	0.0000	SEE COMMENT	
* Vanadium	7440622	0.0000	SEE COMMENT	
* Zinc	7440666	0.0000	SEE COMMENT	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **032 Nebraska Boiler** **SF Type: CU**

Rated Input (MMBTU/HR): 78.5 Date Installed: 03/01/1991

Fuel: #2 Oil **Fuel Data Based on FML:** FM001

SCC: 10200501 - External Combustion Boilers;Industrial;Distillate Oil;Grades 1 And 2 Oil Burned

Monthly Throughputs in Th Gal				
SCHEDULE 1	JAN:	0.00	JUL:	0.00
Date Effective: 01/01/2021	FEB:	0.00	AUG:	0.00
Date End: 12/31/2021	MAR:	0.00	SEP:	0.00
Total Days: 1	APR:	0.00	OCT:	0.00
Total Hours: 12	MAY:	0.00	NOV:	0.00
Days Per Week: 0	JUN:	0.00	DEC:	0.21

Fuel: Natural Gas **Fuel Data Based on FML:** FM002

SCC: 10200602 - External Combustion Boilers;Industrial;Natural Gas;10-100 Million Btu/Hr Burned

Monthly Throughputs in MMCF				
SCHEDULE 1	JAN:	1.43	JUL:	8.72
Date Effective: 01/01/2021	FEB:	11.91	AUG:	14.10
Date End: 12/31/2021	MAR:	13.37	SEP:	13.35
Total Days: 218	APR:	4.69	OCT:	11.43
Total Hours: 4831	MAY:	7.12	NOV:	9.21
Days Per Week: 4	JUN:	0.00	DEC:	9.48

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **032 Nebraska Boiler** **SF Type: CU**

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
* Cadmium	7440439	0.0000	SEE COMMENT	
* Chromium	7440473	0.0000	SEE COMMENT	
* Copper	7440508	0.0000	SEE COMMENT	
* Ethane	74840	0.0000	SEE COMMENT	
* Formaldehyde	50000	0.0000	SEE COMMENT	
* Hexane	110543	0.0000	SEE COMMENT	
* Manganese	7439965	0.0000	SEE COMMENT	
* Mercury	7439976	0.0000	SEE COMMENT	
* Molybdenum	7439987	0.0000	SEE COMMENT	
* Naphthalene	91203	0.0000	SEE COMMENT	
* Nickel	7440020	0.0000	SEE COMMENT	
* Pentane	109660	0.0000	SEE COMMENT	
* Polycyclic Organic Matter		0.0000	SEE COMMENT	
* Propane	74986	0.0000	SEE COMMENT	
* Toluene	108883	0.0000	SEE COMMENT	
* Vanadium	7440622	0.0000	SEE COMMENT	
* Zinc	7440666	0.0000	SEE COMMENT	
* Ammonia	7664417	0.1678	AP-42 LATEST AVAILABLE	
* CO	630080	4.4024	AP-42 LATEST AVAILABLE	
* Carbon Dioxide	124389	6,290.7015	AP-42 LATEST AVAILABLE	
* Lead	7439921	0.0000	SEE COMMENT	
* Methane	74828	0.1205	AP-42 LATEST AVAILABLE	
* NOX	10102440	5.2424	AP-42 LATEST AVAILABLE	
* Nitrous Oxide	10024972	0.1153	AP-42 LATEST AVAILABLE	
PM-CON		0.2988	AP-42 LATEST AVAILABLE	
* PM10		0.3986	AP-42 LATEST AVAILABLE	
PM2.5		0.3986	AP-42 LATEST AVAILABLE	
* SOX	7446095	0.0322	AP-42 LATEST AVAILABLE	
* VOC		0.2882	AP-42 LATEST AVAILABLE	
* Arsenic	7440382	0.0000	SEE COMMENT	
* Barium	7440393	0.0000	SEE COMMENT	
* Benzene	71432	0.0000	SEE COMMENT	
* Butane	106978	0.0000	SEE COMMENT	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **220 Dry Milk Process System** **SF Type:** **PRO**

Material: Dry Milk

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	895.35	JUL:	1,284.60
Date Effective: 01/01/2021	FEB:	642.15	AUG:	963.82
Date End: 12/31/2021	MAR:	971.56	SEP:	703.21
Total Days: 158	APR:	863.69	OCT:	830.88
Total Hours: 3060	MAY:	864.54	NOV:	660.23
Days Per Week: 3	JUN:	1,019.87	DEC:	558.97

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		0.3979	DEP EFFICIENCY OF CONTROL DEVICE	
PM2.5		0.3979	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **230 Milk Crumb Processing System** **SF Type:** **PRO**

Material: Milk Crumb

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,587.75	JUL:	2,992.85
Date Effective: 01/01/2021	FEB:	1,720.60	AUG:	2,723.75
Date End: 12/31/2021	MAR:	2,877.60	SEP:	2,193.45
Total Days: 215	APR:	2,571.90	OCT:	2,472.70
Total Hours: 4622	MAY:	2,681.40	NOV:	2,064.05
Days Per Week: 4	JUN:	2,800.55	DEC:	1,694.30

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		7.1364	DEP EFFICIENCY OF CONTROL DEVICE	
PM2.5		7.1364	DEP EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **240 Sugar Storage And Distribution System** **SF Type:** **PRO**

Material: Sugar

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	884.76	JUL:	1,312.82
Date Effective: 01/01/2021	FEB:	408.38	AUG:	1,198.78
Date End: 12/31/2021	MAR:	958.92	SEP:	812.86
Total Days: 285	APR:	568.98	OCT:	720.64
Total Hours: 3116	MAY:	829.98	NOV:	438.36
Days Per Week: 6	JUN:	936.68	DEC:	327.66

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		0.1546	DEP EFFICIENCY OF CONTROL DEVICE	
PM2.5		0.1546	DEP EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **401 Jetzone #1 Bean Cleaner/Separator** **SF Type:** **PRO**

Material: Cocoa Beans

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	1,127.90	JUL:	1,263.25
Date Effective: 01/01/2021	FEB:	1,191.06	AUG:	1,244.33
Date End: 12/31/2021	MAR:	1,175.05	SEP:	1,205.08
Total Days: 326	APR:	1,160.98	OCT:	1,230.18
Total Hours: 6946	MAY:	1,263.25	NOV:	1,205.08
Days Per Week: 6	JUN:	1,238.15	DEC:	1,230.18

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		3.7633	DEP EFFICIENCY OF CONTROL DEVICE	
PM2.5		3.7633	DEP EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **402 Jetzone #1 Bean Roaster And Cooler** **SF Type:** **PRO**

Material: Cocoa Beans
Fuel: **Fuel Data Based on FML:**
SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	1,127.90	JUL:	1,263.25
Date Effective: 01/01/2021	FEB:	1,191.06	AUG:	1,244.33
Date End: 12/31/2021	MAR:	1,175.05	SEP:	1,205.08
Total Days: 326	APR:	1,160.98	OCT:	1,230.18
Total Hours: 6739	MAY:	1,263.25	NOV:	1,205.08
Days Per Week: 6	JUN:	1,238.15	DEC:	1,230.18

Material:
Fuel: Natural Gas **Fuel Data Based on FML:** FM002
SCC: 39000698 - Industrial Processes;In-Process Fuel Use;Natural Gas;Process Use

Monthly Throughputs in MMCF				
SCHEDULE 1	JAN:	1.20	JUL:	1.33
Date Effective: 01/01/2021	FEB:	1.17	AUG:	1.27
Date End: 12/31/2021	MAR:	1.33	SEP:	1.34
Total Days: 326	APR:	0.78	OCT:	1.49
Total Hours: 6739	MAY:	1.18	NOV:	0.99
Days Per Week: 6	JUN:	1.26	DEC:	0.97

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0229	AP-42 LATEST AVAILABLE	
CO	630080	0.6010	AP-42 LATEST AVAILABLE	
* Carbon Dioxide	124389	858.6000	AP-42 LATEST AVAILABLE	
Lead	7439921	0.0000	SEE COMMENT	
* Methane	74828	0.0165	AP-42 LATEST AVAILABLE	
NOX	10102440	0.7155	AP-42 LATEST AVAILABLE	
* Nitrous Oxide	10024972	0.0157	AP-42 LATEST AVAILABLE	
PM-CON		0.0408	AP-42 LATEST AVAILABLE	
* PM10		7.2464	DEP EFFICIENCY OF CONTROL DEVICE	
PM2.5		7.2464	DEP EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0043	AP-42 LATEST AVAILABLE	
VOC		21.0477	AP-42 LATEST AVAILABLE	
Ethane	74840	0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **403 Jetzone #1 Winnowing Operations** **SF Type:** **PRO**

Material: Cocoa Beans

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	1,127.90	JUL:	1,263.25
Date Effective: 01/01/2021	FEB:	1,191.06	AUG:	1,244.33
Date End: 12/31/2021	MAR:	1,175.05	SEP:	1,205.08
Total Days: 326	APR:	1,160.98	OCT:	1,230.18
Total Hours: 7018	MAY:	1,263.25	NOV:	1,205.08
Days Per Week: 6	JUN:	1,238.15	DEC:	1,230.18

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		3.8366	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		3.8366	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0727	CO. EFFICIENCY OF CONTROL DEVICE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **501 Jetzone #2 Cocoa Bean Cleaning** **SF Type:** **PRO**

Material: Cocoa Beans

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,019.10	JUL:	2,346.42
Date Effective: 01/01/2021	FEB:	2,184.63	AUG:	2,361.86
Date End: 12/31/2021	MAR:	1,454.02	SEP:	2,287.44
Total Days: 343	APR:	2,359.73	OCT:	2,549.22
Total Hours: 7418	MAY:	2,552.05	NOV:	1,879.50
Days Per Week: 7	JUN:	2,368.95	DEC:	1,220.82

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		7.6953	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		7.6953	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **502 Jetzone #2 Cocoa Bean Roaster & Cooler** **SF Type:** **PRO**

Material: Cocoa Beans
Fuel: **Fuel Data Based on FML:**
SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,019.10	JUL:	2,346.42
Date Effective: 01/01/2021	FEB:	2,184.63	AUG:	2,361.86
Date End: 12/31/2021	MAR:	1,454.02	SEP:	2,287.44
Total Days: 326	APR:	2,359.73	OCT:	2,549.22
Total Hours: 6900	MAY:	2,552.05	NOV:	1,879.50
Days Per Week: 6	JUN:	2,368.95	DEC:	1,220.82

Material:
Fuel: Natural Gas **Fuel Data Based on FML:** FM002
SCC: 39000698 - Industrial Processes;In-Process Fuel Use;Natural Gas;Process Use

Monthly Throughputs in MMCF				
SCHEDULE 1	JAN:	0.08	JUL:	0.05
Date Effective: 01/01/2021	FEB:	0.04	AUG:	0.06
Date End: 12/31/2021	MAR:	0.00	SEP:	0.02
Total Days: 326	APR:	0.00	OCT:	0.00
Total Hours: 6900	MAY:	0.02	NOV:	0.00
Days Per Week: 6	JUN:	0.06	DEC:	0.00

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0005	AP-42 LATEST AVAILABLE	
CO	630080	0.0139	AP-42 LATEST AVAILABLE	
* Carbon Dioxide	124389	19.8276	AP-42 LATEST AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
* Methane	74828	0.0004	AP-42 LATEST AVAILABLE	
NOX	10102440	0.0165	AP-42 LATEST AVAILABLE	
* Nitrous Oxide	10024972	0.0004	AP-42 LATEST AVAILABLE	
PM-CON		0.0009	AP-42 LATEST AVAILABLE	
* PM10		13.7919	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		13.7919	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0001	AP-42 LATEST AVAILABLE	
VOC		22.6665	AP-42 LATEST AVAILABLE	
Ethane	74840	0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **503 Jetzone #2 Winnower Operations** **SF Type:** **PRO**

Material: Cocoa Beans

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,019.10	JUL:	2,346.42
Date Effective: 01/01/2021	FEB:	2,184.63	AUG:	2,361.86
Date End: 12/31/2021	MAR:	1,454.02	SEP:	2,287.44
Total Days: 326	APR:	2,359.73	OCT:	2,549.22
Total Hours: 7101	MAY:	2,552.05	NOV:	1,879.50
Days Per Week: 6	JUN:	2,368.95	DEC:	1,220.82

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	
PM2.5		10.3391	CO. EFFICIENCY OF CONTROL DEVICE	
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		10.3391	CO. EFFICIENCY OF CONTROL DEVICE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **504 Jetzone #2 Pregrind Operations** **SF Type:** **PRO**

Material: Cocoa Beans

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,019.10	JUL:	2,346.42
Date Effective: 01/01/2021	FEB:	2,184.63	AUG:	2,361.86
Date End: 12/31/2021	MAR:	1,454.02	SEP:	2,287.44
Total Days: 363	APR:	2,359.73	OCT:	2,549.22
Total Hours: 7118	MAY:	2,552.05	NOV:	1,879.50
Days Per Week: 7	JUN:	2,368.95	DEC:	1,220.82

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		2.6458	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		2.6458	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **600 Buhler Cocoa Bean Roaster** **SF Type:** **PRO**

Material: COCOA BEANS

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,210.41	JUL:	421.92
Date Effective: 01/01/2021	FEB:	1,668.78	AUG:	1,720.26
Date End: 12/31/2021	MAR:	1,995.45	SEP:	2,238.50
Total Days: 319	APR:	2,228.77	OCT:	2,309.91
Total Hours: 5803	MAY:	2,288.55	NOV:	2,006.10
Days Per Week: 6	JUN:	1,650.94	DEC:	1,395.10

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0136	AP-42 LATEST AVAILABLE	
CO	630080	0.3569	AP-42 LATEST AVAILABLE	
Carbon Dioxide	124389	509.8800	AP-42 LATEST AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0098	AP-42 LATEST AVAILABLE	
NOX	10102440	0.4249	AP-42 LATEST AVAILABLE	
Nitrous Oxide	10024972	0.0093	AP-42 LATEST AVAILABLE	
PM-CON		0.0242	AP-42 LATEST AVAILABLE	
* PM10		13.0643	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		13.0643	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0025	AP-42 LATEST AVAILABLE	
VOC		15.6966	AP-42 LATEST AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **601 Winnower** **SF Type:** **PRO**

Material: COCOA BEANS

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,210.41	JUL:	421.92
Date Effective: 01/01/2021	FEB:	1,668.78	AUG:	1,720.26
Date End: 12/31/2021	MAR:	1,995.45	SEP:	2,238.50
Total Days: 323	APR:	2,228.77	OCT:	2,309.91
Total Hours: 6457	MAY:	2,288.55	NOV:	2,006.10
Days Per Week: 6	JUN:	1,650.94	DEC:	1,395.10

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.1291	AP-42 LATEST AVAILABLE	
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		6.2856	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		6.2856	CO. EFFICIENCY OF CONTROL DEVICE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **602 Nib Grinders** **SF Type:** **PRO**

Material: COCOA BEANS

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,210.41	JUL:	421.92
Date Effective: 01/01/2021	FEB:	1,668.78	AUG:	1,720.26
Date End: 12/31/2021	MAR:	1,995.45	SEP:	2,238.50
Total Days: 323	APR:	2,228.77	OCT:	2,309.91
Total Hours: 6457	MAY:	2,288.55	NOV:	2,006.10
Days Per Week: 6	JUN:	1,650.94	DEC:	1,395.10

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		10.9028	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		10.9028	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		1.0331	AP-42 LATEST AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **603 Bean Transporter** **SF Type:** **PRO**

Material: COCOA BEANS

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,210.41	JUL:	421.92
Date Effective: 01/01/2021	FEB:	1,668.78	AUG:	1,720.26
Date End: 12/31/2021	MAR:	1,995.45	SEP:	2,238.50
Total Days: 324	APR:	2,228.77	OCT:	2,309.91
Total Hours: 6615	MAY:	2,288.55	NOV:	2,006.10
Days Per Week: 6	JUN:	1,650.94	DEC:	1,395.10

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		1.1130	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		1.1130	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Sub Facilty: **604 Fines/Shell Conveying** **SF Type:** **PRO**

Material: COCOA BEANS

Fuel: **Fuel Data Based on FML:**

SCC: 30201899 - Industrial Processes;Food And Agriculture;Candy Manufacturing;Other Not Classified

Monthly Throughputs in Tons				
SCHEDULE 1	JAN:	2,210.41	JUL:	421.92
Date Effective: 01/01/2021	FEB:	1,668.78	AUG:	1,720.26
Date End: 12/31/2021	MAR:	1,995.45	SEP:	2,238.50
Total Days: 324	APR:	2,228.77	OCT:	2,309.91
Total Hours: 6615	MAY:	2,288.55	NOV:	2,006.10
Days Per Week: 6	JUN:	1,650.94	DEC:	1,395.10

Actual Emission Estimates (Tons/Yr) For Emission Fees And Emission Statements:

Pollutant	CAS	Emission Amt (0.0 TPY)	Calculation Method	Use Factor
Ammonia	7664417	0.0000	NO FACTOR AVAILABLE	
CO	630080	0.0000	NO FACTOR AVAILABLE	
Carbon Dioxide	124389	0.0000	NO FACTOR AVAILABLE	
Lead	7439921	0.0000	NO FACTOR AVAILABLE	
Methane	74828	0.0000	NO FACTOR AVAILABLE	
NOX	10102440	0.0000	NO FACTOR AVAILABLE	
Nitrous Oxide	10024972	0.0000	NO FACTOR AVAILABLE	
PM-CON		0.0000	NO FACTOR AVAILABLE	
* PM10		0.3277	CO. EFFICIENCY OF CONTROL DEVICE	
PM2.5		0.3277	CO. EFFICIENCY OF CONTROL DEVICE	
SOX	7446095	0.0000	NO FACTOR AVAILABLE	
VOC		0.0000	NO FACTOR AVAILABLE	

*** SCC Factor Exists**

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

OTHER MISCELLANEOUS SUB FACILITY EMISSIONS (Criteria/ HAPs/ Non-Criteria)

SF (Optional Name)	Pollutant	CAS	Emission Amt (0.0 TPY)	Calc. Method
Generator 5	VOC		0.0018	AP-42 LATEST AVAILABLE
Fire Pump	Methane	74828	0.0153	AP-42 LATEST AVAILABLE
Generator 1	Methane	74828	0.0330	AP-42 LATEST AVAILABLE
Generator 2	Methane	74828	0.0747	AP-42 LATEST AVAILABLE
Generator 3	Methane	74828	0.1102	AP-42 LATEST AVAILABLE
Generator 4	Methane	74828	0.1090	AP-42 LATEST AVAILABLE
Generator 5	Methane	74828	0.0190	AP-42 LATEST AVAILABLE
Fire Pump	PM2.5		0.0006	AP-42 LATEST AVAILABLE
Generator 1	PM2.5		0.0003	AP-42 LATEST AVAILABLE
Generator 2	PM2.5		0.0006	AP-42 LATEST AVAILABLE
Generator 3	PM2.5		0.0009	AP-42 LATEST AVAILABLE
Generator 4	PM2.5		0.0011	AP-42 LATEST AVAILABLE
Generator 5	PM2.5		0.0002	AP-42 LATEST AVAILABLE
Fire Pump	Carbon Dioxide	124389	9.3133	AP-42 LATEST AVAILABLE
Generator 1	Carbon Dioxide	124389	2.9060	AP-42 LATEST AVAILABLE
Generator 2	Carbon Dioxide	124389	6.5700	AP-42 LATEST AVAILABLE
Generator 3	Carbon Dioxide	124389	9.6944	AP-42 LATEST AVAILABLE
Fire Pump	CO	630080	0.0539	AP-42 LATEST AVAILABLE
Generator 1	CO	630080	0.0084	AP-42 LATEST AVAILABLE
Generator 2	CO	630080	0.0189	AP-42 LATEST AVAILABLE
Generator 3	CO	630080	0.0279	AP-42 LATEST AVAILABLE
Generator 4	CO	630080	0.1090	AP-42 LATEST AVAILABLE
Generator 5	CO	630080	0.0048	AP-42 LATEST AVAILABLE
Fire Pump	NOX	10102440	0.2504	AP-42 LATEST AVAILABLE
Generator 1	NOX	10102440	0.1078	AP-42 LATEST AVAILABLE
Generator 2	NOX	10102440	0.2437	AP-42 LATEST AVAILABLE
Generator 3	NOX	10102440	0.3596	AP-42 LATEST AVAILABLE
Generator 4	NOX	10102440	0.5060	AP-42 LATEST AVAILABLE
Generator 5	NOX	10102440	0.0620	AP-42 LATEST AVAILABLE
Fire Pump	PM10		0.0006	AP-42 LATEST AVAILABLE
Generator 1	PM10		0.0003	AP-42 LATEST AVAILABLE
Generator 2	PM10		0.0006	AP-42 LATEST AVAILABLE
Generator 3	PM10		0.0009	AP-42 LATEST AVAILABLE
Generator 4	PM10		0.0011	AP-42 LATEST AVAILABLE
Generator 5	PM10		0.0002	AP-42 LATEST AVAILABLE
Fire Pump	SOX	7446095	0.0002	AP-42 LATEST AVAILABLE
Generator 3	SOX	7446095	0.0001	AP-42 LATEST AVAILABLE
Generator 4	SOX	7446095	0.0006	AP-42 LATEST AVAILABLE
Fire Pump	VOC		0.0204	AP-42 LATEST AVAILABLE
Generator 1	VOC		0.0031	AP-42 LATEST AVAILABLE
Generator 2	VOC		0.0070	AP-42 LATEST AVAILABLE
Generator 3	VOC		0.0104	AP-42 LATEST AVAILABLE
Generator 4	VOC		0.0413	AP-42 LATEST AVAILABLE
Generator 4	Carbon Dioxide	124389	18.8190	AP-42 LATEST AVAILABLE
Generator 5	Carbon Dioxide	124389	1.6724	AP-42 LATEST AVAILABLE

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

SF (Optional Name)	Pollutant	CAS	Emission Amt (0.0 TPY)	Calc. Method
Fire Pump	PM-CON		0.0019	AP-42 LATEST AVAILABLE
Generator 1	PM-CON		0.0003	AP-42 LATEST AVAILABLE
Generator 2	PM-CON		0.0006	AP-42 LATEST AVAILABLE
Generator 3	PM-CON		0.0009	AP-42 LATEST AVAILABLE
Generator 4	PM-CON		0.0039	AP-42 LATEST AVAILABLE
Generator 5	PM-CON		0.0002	AP-42 LATEST AVAILABLE

NOTE: Most pollutants need to be reported if greater than 0.5 TPY. The following pollutants need to be reported if greater than the amounts listed:

Polychlorobiphenols (PCB)	0.01 TPY
Lead (Pb)	0.01 TPY
Polycyclic Organic Mater (POM)	0.01 TPY
Dioxins (submit Lbs/Yr only)	0.02 TPY
Furans (submit Lbs/Yr only)	0.02 Lbs/Yr
Mercury (Hg):	
Coal fired electric generating units (EGU)	0.0001 TPY
Non-coal fired EGUs	0.0005 TPY
All other sub facilities	0.01 TPY

Input Form For:	2021	**Tax ID/Plant Code:**	20-8940055-1
MARS WRIGLEY CONFECTIONERY US LLC/ELIZABETHTOWN		**PF ID:**	2006

NOTES

From: Andrew King **Date:** 02/06/2022

Subject: HAP Emissions

Message:

The emissions of individual HAPs are less than 0.5 tons per year, therefore, not required to be reported.

ATTACHMENT(S) TO THIS REPORT

File Name	Document Type	Document Description	File Size
2021-02-24 Emission Factors for RY2021.xlsx	Emission Calculation Worksheet	Emission Factors for RY2021	27.01 KB

Combined file size of all attachments: 27.01 KB

PTE CALCULATIONS

TABLE B-1
VOC EMISSION SOURCES
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Source	Capacity	Units	VOC Emission Factor	Units	Annual Hours	VOC PTE, Ton/Yr
Source 031 – Babcock & Wilcox Boiler	3.96E+05	MMBtu/yr[1]	5.4E-03	lb/MMbtu[2]	8760	1.07
Source 032 - Nebraska Boiler	3.96E+05	MMBtu/yr[1]	5.4E-03	lb/MMbtu[2]	8760	1.07
Source 402 - Jetzone #1 Bean Roaster and Cooler	RACT 2 Emission limit					26.41
Source 502 – Jetzone #2 Cocoa Bean Roaster and Cooler	RACT 2 Emission limit					48.90
Source 504 – Jetzone #2 Pregrind Operations						
Source 600 – Buhler Cocoa Bean Roaster	RACT 2 Emission limit					24.40
Source 602- Nib Grinders	6,600	lb/hr	0.32	lb/hr	8500	1.36

[1] Permit Limit, Source Group 003 Permit Conition #001. PTE based on NG due to higher emission factor between NG and fuel oil.
[2] AP-42 Chapter 1.4, Table 1.4-2, Emission Factors for Critera Pollutants and Greenhouse Gases from Natural Gas Combustion. Assumes 1,020 btu/scf

TABLE B-2
EXEMPT SOURCES LESS THAN 1 TON VOC
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Source	Capacity	Units	VOC Emission Factor	Units	Annual Hours	VOC PTE, Ton/Yr
Source 103 – Diesel Fire Pump	255	hp	2.91E-04	lb/hp-hr[1]	500	0.019
Source 104 – (3) Emergency Generators	*0.41895*	*MMBtu/hr*[4]	*0.36*	*lb/MMBtu*[1]	*500*	*0.038*
	0.2793	*MMBtu/hr*[4]	*0.36*	*lb/MMBtu*[1]	*500*	*0.025*
	0.41895	*MMBtu/hr*[4]	*0.118*	*lb/MMBtu*[2]	*500*	*0.012*
	Source 104 Total					0.075
Source 105 – Y2K Emergency Generators	4.1895	MMBtu/hr[4]	0.36	lb/hp-hr[1]	500	0.377
Source 403 – Jetzone #1 Winnowing Operations	4,840	lb/hr	0.01	lb/ton	6912	0.084
Source 503 – Jetzone #2 Winnower Operations	7,920	lb/hr	0.01	lb/ton	8500	0.168
Source 601 – Winnower	7,999	lb/hr	0.04	lb/ton	8500	0.680
Misc - NG-fired R&D Dryer	1.0	MMBtu/hr	0.0054	lb/MMBtu[3]	8760	0.024
Misc - NG-fired Space Heater	0.075	MMBtu/hr	0.0054	lb/MMBtu[3]	8760	0.002
Misc - NG-fired Space Heater	0.13	MMBtu/hr	0.0054	lb/MMBtu[3]	8760	0.003
Misc. - No. 2 Fuel Oil Storage Tank (25,000 gallons)	See Table B-2					0.030
Misc. - Buhler Emergency Generator	0.931	MMBtu/hr[4]	0.118	lb/MMBtu[2]	500	0.027

[1] AP-42 Chapter 3.3, Table 3.3-1 Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines
[2] AP-42 Chapter 3.2, Table 3.2-2 Uncontrolled Emission Factors for 4-Stroke Lean-Burn Engines
[3] AP-42 Chapter 1.4, Table 1.4-2, Emission Factors for Critera Pollutants and Greenhouse Gases from Natural Gas Combustion. Based on 1,020 btu/scf.
[4] Based on Engine output in kW and 9,310 btu/kw

TABLE B-3
FUEL OIL AST POTENTIAL-TO-EMIT
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Tank No.	Boiler House	**Tank type**	Vertical fixed roof	**Date**	12/22/22
Material stored	Distilllate Fuel Oil No. 2	**Company**	Mars Wrigley, LLC	**Performed by**	JGW
City	Elizabethtown	**State**	PA		
Description	Outdoor storage tank				

INPUT DATA	**Symbol**		**Units**
Molecular Weight			
Molecular weight	Mv	130	Lb/lb-mole
Tank design data			
Shell height	Hs	30.00	
Diameter	D	12.00	ft
Liquid height	Hl	30.00	ft
Avg. Liquid height	Hl	15.00	ft
vapor space outage	Hvo	15.13	ft
Tank volume		25,381	gallons
Turnovers	N	418	
Net throughput	Q	10,599,600	gallons/yr
Tunover factor	KN	0.239	
Working loss product factor	Kp	1.00	
Meteorological data			
Daily ave. ambient temp.	TAA	54.75	°F
Daily max. ambient temp.	TAX	63.38	°F
Daily min. ambient temp.	TAN	46.11	°F
Daily ambient temp. range	DTA	17.28	°F
Tank paint solar absorptance (see adjacent tab	α	0.17	
Daily total insolation factor	I	1,236	Btu/ft2-day
Liquid bulk temperature	TB	54.77	°F
Daily vapor temp. range	DTv	18.32	°F
Daily ave. liquid surface temp.	TLA	56.42	°F
Daily max. liquid surface temp.	TLX	61.00	°F
Daily min. liquid surface temp.	TlN	51.84	°F
VP @ daily ave. liquid surf. temp.	PvA	0.37	mm Hg
VP @ daily max. liquid surf. temp.	PvX	0.50	mm Hg
VP @ daily min. liquid surf. temp.	PvN	0.27	mm Hg
Daily vapor pressure range	DPv	0.22	mm Hg
Breather vent pressure setting range	DPB	0.06	psia
Breather vent pressure setting range	DPB	3.10	mm Hg

CALCULATIONS	**Symbol**		**Units**
Breathing losses			
Tank vapor space volume	Vv	1,682.33	ft3
Vapor density	Wv	1.689E-04	lb/ft3
Vapor space expansion factc	KE	0.03168	
Vented vapor saturation factc	Ks	0.9944	ft2
Breathing losses	LB	3.27	lb/yr
Working losses	Lw	56.34	lb/yr
TOTAL LOSSES	LT	**59.61**	lb/yr

Table 1a
Tank Paint Solar Absorptance

Tank Paint	**Solar Absorptance**
white/white	0.17
Aluminum/Specular	0.39
gray/light	0.54
Aluminum/Diffuse	0.6
grey/medium	0.68

[1]Calculations performed on this spreadsheet are taken from the USEPA AP-42-Section 7.1 Organic Liquid Storage Tanks - January 1996. This spreadsheet is derived from materials provided by Jimmy Peress, PE, Tritech Consulting Engineers, 85-93 Chevy Chase Street, Jamaica, NY 11432 USA, Tel - 718-454-3920, Fax - 718-454-6330, e-mail - PeressJ@nyc.rr.com.

ATTACHMENT C – ADD-ON VOC CONTROL COSTS

TABLE C-1
JETZONE #1 ROASTER AND COOLER (SOURCE 402) REGENERATIVE THERMAL OXIDIZER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct Costs	Value	Comment/Cost Factors [1]
Purchased equipment costs		
Control device + auxiliary equipment	1,325,796	Adwest 12/8/22 Quote
Instrumentation	132,580	0.10A
Sales taxes	39,774	0.03A
Freight	66,290	0.05A
Purchased equipment costs (PEC)	1,564,439	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	125,155	0.08B
Handling and erection	219,021	0.14B
Electrical	62,578	0.04B
Piping	31,289	0.02B
Insulation for ductwork	15,644	0.01B
Painting	15,644	0.01B
Direct installation costs(DIC)	469,332	sum direct installation costs or (0.30B)
Site Preparation		as required, SP
Total Direct Cost (DC)	2,033,771	PEC+DIC+SP or (1.67B+SP)
Indirect costs [1]		
Engineering	156,444	0.10B
Construction and field expenses	78,222	0.05B
Contractor fees	156,444	0.10B
Startup	31,289	0.02B
Performance test	15,644	0.01B
Contingencies	156,444	0.10B
Total Indirect Cost (IC)	594,487	sum indirect costs or (0.35B)
Total Capital Investment	2,628,258	DC+IC or (1.61B+SP)
Retrofit Adjusted Capital Costs		
Retrofit Factor [2]	**$1,314,129**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$3,942,387**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors [1]
Direct Annual Costs		
Operating Labor		
Operator	28,080	0.5 hr/shift
Supervisor	4,212	0.15 Operator
Operating Materials		
Maintenance		
Labor	28,080	0.5 hr/shift
Materials	28,080	1.0 Labor
Utilities		
Electricity	37,822	
Supplemental fuel (natural gas)	112,406	
Total Direct Annual Costs (DC)	238,680	sum direct annual costs
Indirect Annual Costs		
Overhead	53,071	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	105,130	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	1,502,444	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	1,660,645	
Total Annual Cost	1,899,325	
Cost/Ton VOC Controlled	73,385	

Inputs	Value	Comments
Operating/maint. factor (hr/yr):	6,912	Mars
Operating labor rate ($/hr):	65.00	Mars
Maintenance labor rate ($/hr):	65.00	Mars
Operating/maint. labor factor (hr/sh):	0.50	OAQPS
Natural gas price ($/th cu ft)	9.68	Mars
Natural gas required (Mcf/hr)	1.68	Adwest 12/8/22 Quote
Electricity price ($/kwh):	0.096	Mars
Electricity required (kwh)	57	Adwest 12/8/22 Quote
Airflow (acfm)	17,500	Mars
Annual interest rate (fraction):	0.070	Bank Prime Rate 11/22
Control system life (years):	3	Expected Remaining Service Life
Capital recovery factor:	0.3811	Calculated
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. H2O)	18	Adwest 12/8/22 Quote
Capture efficiency	100.00%	Assumed
Control efficiency	98.00%	Adwest 12/8/22 Quote
VOC pre control (tons/yr)	26.41	Permit Limit
VOC captured (tons/yr)	26.41	Calculated
VOC controlled (tons/yr)	25.88	Calculated

Purchased Equipment Costs		
Control Device - RETOX 17.5RTO95	1,325,796	Adwest 12/8/22 Quote
Total	1,325,796	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

TABLE C-2
JETZONE #1 ROASTER AND COOLER (SOURCE 402) - ROASTER ONLY - REGENERATIVE THERMAL OXIDIZER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct Costs	Value	Comment/Cost Factors [1]
Purchased equipment costs		
Control device + auxiliary equipment	967,352	Adwest 12/9/21 Quote
Instrumentation	96,735	0.10A
Sales taxes	29,021	0.03A
Freight	48,368	0.05A
Purchased equipment costs (PEC)	1,141,475	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	91,318	0.08B
Handling and erection	159,807	0.14B
Electrical	45,659	0.04B
Piping	22,830	0.02B
Insulation for ductwork	11,415	0.01B
Painting	11,415	0.01B
Direct installation costs(DIC)	342,443	sum direct installation costs or (0.30B)
Site Preparation		as required, SP
Total Direct Cost (DC)	1,483,918	PEC+DIC+SP or (1.67B+SP)
Indirect costs [1]		
Engineering	114,148	0.10B
Construction and field expenses	57,074	0.05B
Contractor fees	114,148	0.10B
Startup	22,830	0.02B
Performance test	11,415	0.01B
Contingencies	114,148	0.10B
Total Indirect Cost (IC)	433,761	sum indirect costs or (0.35B)
Total Capital Investment	1,917,679	DC+IC or (1.61B+SP)
Retrofit Adjusted Capital Costs		
Retrofit Factor[2]	**$958,839**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$2,876,518**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors [1]
Direct Annual Costs		
Operating Labor		
Operator	28,080	0.5 hr/shift
Supervisor	4,212	0.15 Operator
Operating Materials		
Maintenance		
Labor	28,080	0.5 hr/shift
Materials	28,080	1.0 Labor
Utilities		
Electricity	17,252	
Supplemental fuel (natural gas)	24,087	
Total Direct Annual Costs (DC)	129,791	sum direct annual costs
Indirect Annual Costs		
Overhead	53,071	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	76,707	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	1,096,241	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	1,226,019	
Total Annual Cost	1,355,811	
Cost/Ton VOC Controlled	513,221	

Inputs	Value	Comments
Operating/maint. factor (hr/yr):	6,912	Mars
Operating labor rate ($/hr):	65.00	Mars
Maintenance labor rate ($/hr):	65.00	Mars
Operating/maint. labor factor (hr/sh):	0.50	OAQPS
Natural gas price ($/th cu ft)	9.68	Mars
Natural gas required (Mcf/hr)	0.36	Adwest 12/9/21 Quote
Electricity price ($/kwh):	0.096	Mars
Electricity required (kwh)	26	Adwest 12/9/21 Quote
Airflow (acfm)	7,000	Mars
Annual interest rate (fraction):	0.070	Bank Prime Rate 11/22
Control system life (years):	3	Expected Remaining Service Life
Capital recovery factor:	0.3811	Calculated
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. H2O)	19	Adwest 12/9/21 Quote
Capture efficiency	100.00%	Assumed
Control efficiency	98.00%	Adwest 12/9/21 Quote
VOC pre control (tons/yr)	2.70	Calculated based on 0.78 lb/hr based on 7/20 stack test
VOC captured (tons/yr)	2.70	Calculated
VOC controlled (tons/yr)	2.64	Calculated

Purchased Equipment Costs		
Control Device - RETOX 5.0RTO95	967,352	Adwest 12/9/21 Quote
Total	967,352	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

TABLE C-3
JETZONE #1 ROASTER AND COOLER (SOURCE 402) WET VENTURI SCRUBBER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct costs	Value	Comment/Cost Factors [1]
Purchased equipment costs		
Control device + auxiliary equipment	$107,000.00	A (Sly Quotation 6682-PH1, June 6, 2019)
Instrumentation	$10,700	0.1A
Sales taxes	$3,210	0.03A
Freight	$5,350	0.05A
Purchased equipment costs (PEC)	$126,260	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	$7,576	0.06B
Handling and erection	$50,504	0.4B
Electrical	$1,263	0.01B
Piping	$6,313	0.05B
Insulation for ductwork	$3,788	0.03B
Painting	$1,263	0.01B
Direct installation costs(DIC)	$70,706	sum direct installation costs or (0.67B)
Site Preparation		
Buildings		as required, Bldg.
Total Direct Cost (DC)	$196,966	PEC+DIC+SP+Bldg or (1.3B+SP+Bldg)
Indirect costs (installation)		
Engineering	$12,626	0.10B
Construction and field expenses	$12,626	0.10B
Contractor fees	$12,626	0.10B
Startup	$1,263	0.01B
Performance test	$1,263	0.01B
Contingencies	$3,788	0.03B
Total Indirect Cost (IC)	$44,191	sum indirect costs or (0.57B)
Total Capital Investment	**$241,157**	DC+IC or (2.24B+SP+Bldg)
Retrofit Adjusted Capital Costs		
Retrofit Factor[2]	**$120,578**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$361,735**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors [1]
Direct Annual Costs		
Operating Labor		
Operator	$28,080	OAQPS
Supervisor	$4,212	15% of Operator Labor
Operating Materials		
Maintenance		
Labor	$84,240	OAQPS
Materials	$84,240	100% of Maint. Labor
Utilities		
Fan Horsepower (hp)	75.00	Sly Quotation 6682-PH1, June 6, 2019
Electricity Cost (fan)	$37,111	OAQPS Formula
Pump Horespower (hp)	5.00	Sly Quotation 6682-PH1, June 6, 2019
Electricity Cost (pump)	$2,474	OAQPS Formula
Water Usage, gallons per minute (gpm)	90.00	Sly Quotation 6682-PH1, June 6, 2019
Water Cost	$24,261	Calculated, 10% makeup
Operating Materials	?	
Wastewater Disposal	?	
Total Direct Annual Costs (DC)	$264,618	sum direct annual costs
Indirect Annual Costs		
Overhead	$120,463	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	$9,646	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	$137,840	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	$267,949	
Total Annualized Scrubber Costs (TAC):	$532,567	Sum of Direct and Indirect Costs (DC + IC)
Cost/Ton VOC Controlled	$33,609	

Inputs	Value	Comments
Operating factor (hr/yr):	6,912	Based on 24 hr/day, 7 days/week, 52 weeks/year
Operating labor rate ($/hr):	65.00	RACT2 Application
Maintenance labor rate ($/hr):	65.00	RACT2 Application
Operating labor factor (hr/sh):	0.50	OAQPS Default Factor
Maintenance labor factor (hr/sh):	1.50	OAQPS Default Factor
Electricity price ($/kwh):	0.096	Mars
Water Price ($/Mgal)	6.5	PA State Average
Annual interest rate (fraction):	0.07	Bank Prime Rate 11/22
Control system life (years):	3	Expected Remaining Service Life
Capital recovery factor:	0.3811	Based on interest and equipment life above
Taxes, insurance, admin. factor:	0.04	Default
Capture efficiency	100.00%	Assumed
Control efficiency	60.00%	Assumed
VOC pre control (tons/yr)	26.41	Permit Limit
VOC captured (tons/yr)	26.41	Calculated
VOC controlled (tons/yr)	15.85	Calculated

Purchased Equipment Costs		
Control Device - Sly Venturi Scrubber	107,000	A (Sly Quotation 6682-PH1, June 6, 2019)
Total	107,000	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

TABLE C-4
JETZONE #1 ROASTER AND COOLER (SOURCE 402) - ROASTER ONLY - WET VENTURI SCRUBBER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct costs	Value	Comment/Cost Factors [1]
Purchased equipment costs		
Control device + auxiliary equipment	$87,000.00	A (Sly Quotation 6682-PH1, June 6, 2019)
Instrumentation	$8,700	0.1A
Sales taxes	$2,610	0.03A
Freight	$4,350	0.05A
Purchased equipment costs (PEC)	$102,660	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	$6,160	0.06B
Handling and erection	$41,064	0.4B
Electrical	$1,027	0.01B
Piping	$5,133	0.05B
Insulation for ductwork	$3,080	0.03B
Painting	$1,027	0.01B
Direct installation costs(DIC)	$57,490	sum direct installation costs or (0.67B)
Site Preparation		
Buildings		as required, Bldg.
Total Direct Cost (DC)	$160,150	PEC+DIC+SP+Bldg or (1.3B+SP+Bldg)
Indirect costs (installation)		
Engineering	$10,266	0.10B
Construction and field expenses	$10,266	0.10B
Contractor fees	$10,266	0.10B
Startup	$1,027	0.01B
Performance test	$1,027	0.01B
Contingencies	$3,080	0.03B
Total Indirect Cost (IC)	$35,931	sum indirect costs or (0.57B)
Total Capital Investment	**$196,081**	DC+IC or (2.24B+SP+Bldg)
Retrofit Adjusted Capital Costs		
Retrofit Factor[2]	**$98,040**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$294,121**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors [1]
Direct Annual Costs		
Operating Labor		
Operator	$28,080	OAQPS
Supervisor	$4,212	15% of Operator Labor
Operating Materials		
Maintenance		
Labor	$84,240	OAQPS
Materials	$84,240	100% of Maint. Labor
Utilities		
Fan Horsepower (hp)	40.00	Sly Quotation 6682-PH1, June 6, 2019
Electricity Cost (fan)	$19,792	OAQPS Formula
Pump Horsepower (hp)	5.00	Sly Quotation 6682-PH1, June 6, 2019
Electricity Cost (pump)	$2,474	OAQPS Formula
Water Usage, gallons per minute (gpm)	50.00	Sly Quotation 6682-PH1, June 6, 2019
Water Cost	$13,478	Calculated, 10% makeup
Operating Materials	?	
Wastewater Disposal	?	
Total Direct Annual Costs (DC)	$236,517	sum direct annual costs
Indirect Annual Costs		
Overhead	$120,463.20	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	$7,843	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	$112,075	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	$240,382	
Total Annualized Scrubber Costs (TAC):	$476,899	Sum of Direct and Indirect Costs (DC + IC)
Cost/Ton VOC Controlled	$294,854	

Inputs	Value	Comments
Operating factor (hr/yr):	6,912	Based on 24 hr/day, 7 days/week, 52 weeks/year
Operating labor rate ($/hr):	65.00	RACT2 Application
Maintenance labor rate ($/hr):	65.00	RACT2 Application
Operating labor factor (hr/sh):	0.50	OAQPS Default Factor
Maintenance labor factor (hr/sh):	1.50	OAQPS Default Factor
Electricity price ($/kwh):	0.096	Mars
Water Price ($/Mgal)	6.5	PA State Average
Annual interest rate (fraction):	0.07	Bank Prime Rate 11/22
Control system life (years):	3	Expected Remaining Service Life
Capital recovery factor:	0.3811	Based on interest and equipment life above
Taxes, insurance, admin. factor:	0.04	Default
Capture efficiency	100.00%	Assumed
Control efficiency	60.00%	Assumed
VOC pre control (tons/yr)	2.70	Calculated based on 0.78 lb/hr based on 7/20 stack test
VOC captured (tons/yr)	2.70	Calculated
VOC controlled (tons/yr)	1.62	Calculated

Purchased Equipment Costs		
Control Device - Sly Venturi Scrubber	87,000	A (Sly Quotation 6682-PH1, June 6, 2019)
Total	87,000	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

TABLE C-5
JETZONE #2 ROASTER AND COOLER (SOURCE 502) AND JETZONE #2 PREGRIND (SOURCE 504) REGENERATIVE THERMAL OXIDIZER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct Costs	Value	Comment/Cost Factors (1)
Purchased equipment costs		
Control device + auxiliary equipment	1,325,796	Adwest 12/8/22 Quote
Instrumentation	132,580	0.10A
Sales taxes	39,774	0.03A
Freight	66,290	0.05A
Purchased equipment costs (PEC)	1,564,439	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	125,155	0.08B
Handling and erection	219,021	0.14B
Electrical	62,578	0.04B
Piping	31,289	0.02B
Insulation for ductwork	15,644	0.01B
Painting	15,644	0.01B
Direct installation costs(DIC)	469,332	sum direct installation costs or (0.30B)
Site Preparation		as required, SP
Total Direct Cost (DC)	2,033,771	PEC+DIC+SP or (1.67B+SP)
Indirect costs (1)		
Engineering	156,444	0.10B
Construction and field expenses	78,222	0.05B
Contractor fees	156,444	0.10B
Startup	31,289	0.02B
Performance test	15,644	0.01B
Contingencies	156,444	0.10B
Total Indirect Cost (IC)	594,487	sum indirect costs or (0.35B)
Total Capital Investment	2,628,258	DC+IC or (1.61B+SP)
Retrofit Adjusted Capital Costs		
Retrofit Factor(2)	**$1,314,129**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$3,942,387**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors (1)
Direct Annual Costs		
Operating Labor		
Operator	34,531	0.5 hr/shift
Supervisor	5,180	0.15 Operator
Operating Materials		
Maintenance		
Labor	34,531	0.5 hr/shift
Materials	34,531	1.0 Labor
Utilities		
Electricity	74,746	
Supplemental fuel (natural gas)	207,757	
Total Direct Annual Costs (DC)	391,276	sum direct annual costs
Indirect Annual Costs		
Overhead	65,264	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	105,130	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	372,161	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	542,556	
Total Annual Cost	933,832	
Cost/Ton VOC Controlled	19,486	

Inputs	Value	Comments
Operating/maint. factor (hr/yr):	8,500	Mars
Operating labor rate ($/hr):	65.00	Mars
Maintenance labor rate ($/hr):	65.00	Mars
Operating/maint. labor factor (hr/sh):	0.50	OAQPS
Natural gas price ($/th cu ft)	9.68	Mars
Natural gas required (Mcf/hr)	2.53	Adwest 12/8/22 Quote
Electricity price ($/kwh):	0.096	Mars
Electricity required (kwh)	92	Adwest 12/8/22 Quote
Airflow (acfm)	27,000	Mars
Annual interest rate (fraction):	0.070	Bank Prime Rate 11/22
Control system life (years):	20	OAQPS Default
Capital recovery factor:	0.0944	Calculated
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. H2O)	18	Adwest 12/8/22 Quote
Capture efficiency	100.00%	Assumed
Control efficiency	98.00%	Adwest 12/8/22 Quote
VOC pre control (tons/yr)	48.90	Permit Limit
VOC captured (tons/yr)	48.90	Calculated
VOC controlled (tons/yr)	47.92	Calculated

Purchased Equipment Costs		
Control Device - RETOX 28.0RTO95	1,325,796	Adwest 12/8/22 Quote
Total	1,325,796	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

TABLE C-6
JETZONE #2 ROASTER AND COOLER (SOURCE 502) AND JETZONE #2 PREGRIND (SOURCE 504) - ROASTER ONLY - REGENERATIVE THERMAL OXIDIZER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct Costs	Value	Comment/Cost Factors [1]
Purchased equipment costs		
Control device + auxiliary equipment	967,352	Adwest 12/9/21 Quote
Instrumentation	96,735	0.10A
Sales taxes	29,021	0.03A
Freight	48,368	0.05A
Purchased equipment costs (PEC)	1,141,475	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	91,318	0.08B
Handling and erection	159,807	0.14B
Electrical	45,659	0.04B
Piping	22,830	0.02B
Insulation for ductwork	11,415	0.01B
Painting	11,415	0.01B
Direct installation costs(DIC)	342,443	sum direct installation costs or (0.30B)
Site Preparation		as required, SP
Total Direct Cost (DC)	1,483,918	PEC+DIC+SP or (1.67B+SP)
Indirect costs [1]		
Engineering	114,148	0.10B
Construction and field expenses	57,074	0.05B
Contractor fees	114,148	0.10B
Startup	22,830	0.02B
Performance test	11,415	0.01B
Contingencies	114,148	0.10B
Total Indirect Cost (IC)	433,761	sum indirect costs or (0.35B)
Total Capital Investment	1,917,679	DC+IC or (1.61B+SP)
Retrofit Adjusted Capital Costs		
Retrofit Factor[2]	**$958,839**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$2,876,518**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors [1]
Direct Annual Costs		
Operating Labor		
Operator	34,531	0.5 hr/shift
Supervisor	5,180	0.15 Operator
Operating Materials		
Maintenance		
Labor	34,531	0.5 hr/shift
Materials	34,531	1.0 Labor
Utilities		
Electricity	21,216	
Supplemental fuel (natural gas)	29,621	
Total Direct Annual Costs (DC)	159,610	sum direct annual costs
Indirect Annual Costs		
Overhead	65,264	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	76,707	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	271,543	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	413,514	
Total Annual Cost	573,125	
Cost/Ton VOC Controlled	45,116	

Inputs	Value	Comments
Operating/maint. factor (hr/yr):	8,500	Mars
Operating labor rate ($/hr):	65.00	Mars
Maintenance labor rate ($/hr):	65.00	Mars
Operating/maint. labor factor (hr/sh):	0.50	OAQPS
Natural gas price ($/th cu ft)	9.68	Mars
Natural gas required (Mcf/hr)	0.36	Adwest 12/9/21 Quote
Electricity price ($/kwh):	0.096	Mars
Electricity required (kwh)	26	Adwest 12/9/21 Quote
Airflow (acfm)	6,200	Mars
Annual interest rate (fraction):	0.070	Bank Prime Rate 11/22
Control system life (years):	20	OAQPS Default
Capital recovery factor:	0.0944	Calculated
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. H2O)	19	Adwest 12/9/21 Quote
Capture efficiency	100.00%	Assumed
Control efficiency	98.00%	Adwest 12/9/21 Quote
VOC pre control (tons/yr)	12.96	Calculated based on 3.05 lb/hr based on 7/20 stack test
VOC captured (tons/yr)	12.96	Calculated
VOC controlled (tons/yr)	12.70	Calculated

Purchased Equipment Costs		
Control Device - RETOX 5.0RTO95	967,352	Adwest 12/9/21 Quote
Total	967,352	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

TABLE C-7
BUHLER ROASTER (SOURCE 600) REGENERATIVE THERMAL OXIDIZER - CONTROL COSTS
MARS WRIGLEY US, LLC - ELIZABETHTOWN, PA

Direct Costs	Value	Comment/Cost Factors [1]
Purchased equipment costs		
Control device + auxiliary equipment	1,325,796	Adwest 12/8/22 Quote
Instrumentation	132,580	0.10A
Sales taxes	39,774	0.03A
Freight	66,290	0.05A
Purchased equipment costs (PEC)	1,564,439	B (sum purchased equipment costs or 1.18A)
Direct installation costs		
Foundations and supports	125,155	0.08B
Handling and erection	219,021	0.14B
Electrical	62,578	0.04B
Piping	31,289	0.02B
Insulation for ductwork	15,644	0.01B
Painting	15,644	0.01B
Direct installation costs(DIC)	469,332	sum direct installation costs or (0.30B)
Site Preparation		as required, SP
Total Direct Cost (DC)	2,033,771	PEC+DIC+SP or (1.67B+SP)
Indirect costs [1]		
Engineering	156,444	0.10B
Construction and field expenses	78,222	0.05B
Contractor fees	156,444	0.10B
Startup	31,289	0.02B
Performance test	15,644	0.01B
Contingencies	156,444	0.10B
Total Indirect Cost (IC)	594,487	sum indirect costs or (0.35B)
Total Capital Investment	2,628,258	DC+IC or (1.61B+SP)
Retrofit Adjusted Capital Costs		
Retrofit Factor[2]	**$1,314,129**	50% TCI
Adjusted Total Capital Investment (ATCI)	**$3,942,387**	TCI+Retrofit Factor

Annual Costs	Value	Comment/Cost Factors [1]
Direct Annual Costs		
Operating Labor		
Operator	34,531	0.5 hr/shift
Supervisor	5,180	0.15 Operator
Operating Materials		
Maintenance		
Labor	34,531	0.5 hr/shift
Materials	34,531	1.0 Labor
Utilities		
Electricity	74,746	
Supplemental fuel (natural gas)	207,757	
Total Direct Annual Costs (DC)	391,276	sum direct annual costs
Indirect Annual Costs		
Overhead	65,264	0.6 (labor./mat'l)
Taxes, Insurance, Administrative	105,130	4% factor per EPA OAQPS Cost Control Manual
Capital Recovery	372,161	OAQPS (TCI * CRF)
Total Indirect Annual Costs (IC)	542,556	
Total Annual Cost	933,832	
Cost/Ton VOC Controlled	39,053	

Inputs	Value	Comments
Operating/maint. factor (hr/yr):	8,500	Mars
Operating labor rate ($/hr):	65.00	Mars
Maintenance labor rate ($/hr):	65.00	Mars
Operating/maint. labor factor (hr/sh):	0.50	OAQPS
Natural gas price ($/th cu ft)	9.68	Mars
Natural gas required (Mcf/hr)	2.53	Adwest 12/8/22 Quote
Electricity price ($/kwh):	0.096	Mars
Electricity required (kwh)	92	Adwest 12/8/22 Quote
Airflow (acfm)	28,000	Mars
Annual interest rate (fraction):	0.070	Bank Prime Rate 11/22
Control system life (years):	20	OAQPS Default
Capital recovery factor:	0.0944	Calculated
Taxes, insurance, admin. factor:	0.04	Default
Pressure drop (in. H2O)	18	Adwest 12/8/22 Quote
Capture efficiency	100.00%	Assumed
Control efficiency	98.00%	Adwest 12/8/22 Quote
VOC pre control (tons/yr)	24.40	Permit Limit
VOC captured (tons/yr)	24.40	Calculated
VOC controlled (tons/yr)	23.91	Calculated

Purchased Equipment Costs		
Control Device - RETOX 28.0RTO95	1,325,796	Adwest 12/8/22 Quote
Total	1,325,796	

Notes:
(1) Installation and operating costs estimated using EPA OAQPS Cost Manual (EPA Air Pollution Control Cost Manual, Sixth Edition, EPA/452/B-02-001, Updated 9/22)
(2) Retrofit capital is estimated at 50% due to existing limitations with building configuration, structural design, availability of space, and complexity of the systems.

ATTACHMENT D – VENDOR BUDGETARY QUOTE FOR RTO SYSTEM

12/9/21 ADWEST RTO COSTS

CECO Adwest

12/9/21

Mars Wrigley Confectionery
295 Brown Street
Elizabethtown, PA 17022

Attention: Michael Murphy e-mail: Michael.Murphy@effem.com
Tel: (717) 380-0974

Reference: RETOX Dual Chamber RTO System-RETOX 5,000 Stainless RTO
Application: Cocoa Bean Roasting VOCs-Elizabethtown, PA
Our Reference: Proposal No. 21-0174-5

Dear Mr. Murphy,

We are pleased to submit our revised proposal covering the supply and installation supervision of one (1) CECO Adwest induced draft all 316 stainless steel RETOX 5.0RTO95 dual chamber RTO oxidizer system with 316 Stainless Steel puff capture module system for your VOC emission control project in Elizabethtown, PA. This pricing update reflects the current alloy steel and material costs since your February 2020 Engineering PO Release to CECO Adwest. Adwest is part of CECO Industrial Air and Fluid Solutions (www.cecoenviro.com), a global leader of air pollution control technology.

Our RETOX RTO systems provide lower capital and energy usage with higher operating efficiency compared to present oxidizer systems used for low VOC load processes. The RETOX RTO quoted in this proposal is designed to destroy 98% of volatile organic compounds (VOC's) and provide a nominal 95% primary heat recovery at full flow effectiveness which provides fuel free operation above inlet solvent loadings of approximately 3% of the L.E.L. with our **flameless NOx Free Natural Gas Injection (NGI)** operation. The CECO Adwest advanced NGI system provides more than a **30% reduction in fuel costs** compared to other oxidizers using burner/combustion air blower operation.

Each weather tight RETOX RTO system is shop-assembled on a compact skid which minimizes field assembly and installation costs and time. The system uses an energy saving induced draft fan design and utilizes a Maxon natural gas burner for rapid 80 minute cold start-up. An integral Allen Bradley CompactLogix PLC control system with Ethernet/telemetry capabilities provides automatic system operation and remote diagnostics.

The RETOX RTO Quoted is 316 alloy stainless steel except for the I beam RTO support skid, combustion air pipe and stack platform and ladder (painted safety Yellow)-all of these are carbon steel per the approved and signed off drawings by Mars. PRICING FROM OUR SUPPLIERTS IS GOOD FOR 15 DAYS FROM TODAYS DATE.

Since 1977, CECO Adwest's RETOX RTO technical and sales team has been involved in the successful design and installation of over 4,100 RTO and oxidizer VOC control systems. Our clients include Gavina Coffee, Eastman Chemicals, Chemours, MASCO, Goodyear,

CECO Adwest

Alcoa, ConAgra Foods, Kimberly Clark, Honda, Hexcel Composites, Sealed Air, BP Oil, Kraft Foods, Hitachi, Norwich Pharmaceuticals, Devon Gas, and Saint-Gobain.

In summary, our RETOX RTO systems provide a reliable, market proven, and low maintenance solution to VOC abatement including:

- **RTO Fuel Savings of more than 30% – With Natural Gas Injection (NGI) & 95% HX**
- **Flameless RETOX No Nitrogen Oxide (NOx) NGI Operation**
- **One (1) Fan (Process Fan) Operation –** Lower Operational Costs
- **Simple, Zero Leakage Poppet Valve Flow Control with/Five (5) Year Warranty**
    - **(Requires Annual Adwest PM Visit)**
- **Vertical Poppet Valve Shafts –** Do not warp like horizontal Shafts
- **Low Pressure Drop/Low Cost –** Turbulent Flow - random Ceramic HX Media
- **Rapid 80 Minute Cold Startup Capability** (15 Minute Warm Start)
- **Skid Mounted, Low Profile Design –** For Ground mount Installation by others
- **316 Stainless Alloy construction except RTO I beam, Combustion Air Pipe, and stack platform/ladder-all are carbon steel. Platform & ladder to be safety yellow.**
- **Proven Allen Bradley, Maxon, Siemens, and Honeywell Components**
- **24/7 RTO Technical Service Support –** With Lifetime Telemetry Diagnostics
- **Maxon Natural Gas RTO Burner-Maxon LE Low NOx Burner**
- **5 YEAR POPPET VALVE FLOW CONTROL WARRANTY!**
- **Monthly Secure Storage fees are broken out for Pittsburgh area CECO Storage**

If you have any questions or would like additional information, please feel free to call me at my Belmont, NY East Coast office 716-474-9462 or Andrew Nimrod in our Fullerton, CA office at # 714-350-9773 anytime! CECO Adwest looks forward to working with you on this project and we are ready to start RTO fabrication with PO Release!

Respectfully Submitted,
CECO ADWEST

Brian Cannon,
Vice President Marketing and Sales
bcannon@onececo.com
(716) 474-9462

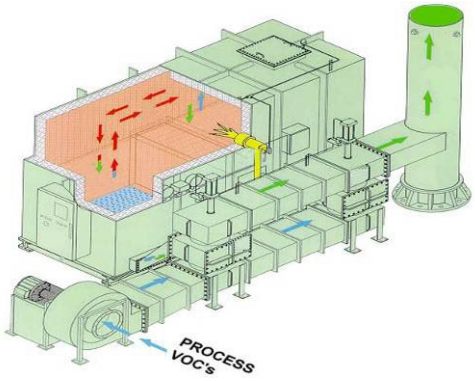
cc: Jeff Yerkes CECO Adwest 714-632-9801 jyerkes@OneCECO.com
cc: Andrew Nimrod CECO Adwest 714-632-9801 animrod@OneCECO.com
cc: Dennis Anderson-CECO Adwest Project manager danderson@onececo.com

CECO Adwest

CECO INDUSTRIAL SOLUTIONS

FULLERTON, CALIFORNIA

RETOX DUAL CHAMBER
REGENERATIVE THERMAL OXIDIZER SYSTEM (RTO)



PROPOSAL FOR

MARS WRIGLEY CONFECTIONERY
Elizabethtown, PA

(5,000 SCFM RETOX RTO-316 SS Alloy)

OUR REFERENCE: PROPOSAL NO. 21-0174-5

12/9/2021

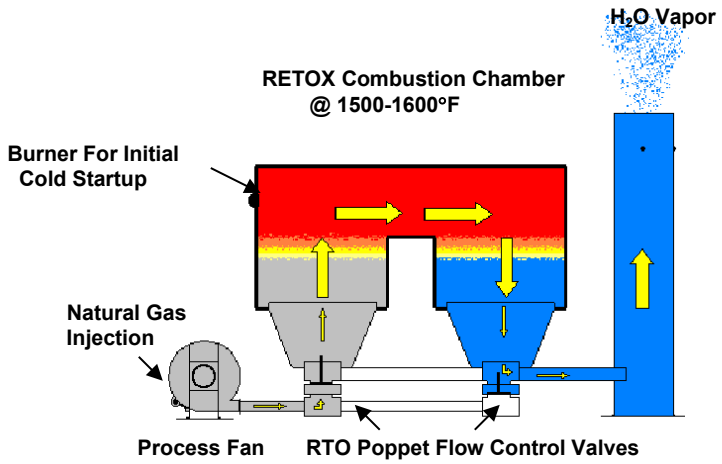
CALIFORNIA STATE CONTRACTORS
LICENSE NO. 1061685

680 Langsdorf Drive, Ste.102, Fullerton, CA 92831 TEL: (714) 632-9801- FAX: (714) 632-9812
www.CECOenviro.com/Adwest

RETOX RTO SYSTEM GENERAL DESCRIPTION

INTRODUCTION

CECO Adwest RETOX RTO Systems provides a proven and cost effective way for volatile organic compounds (VOC's) and solvent-laden gas to be converted into carbon dioxide and water vapor.



EQUIPMENT

The RETOX RTO system consists of a reinforced, insulated dual chamber filled with low pressure drop ceramic heat exchanger media. The process gas flow is automatically controlled by a zero leakage poppet valve mechanism which changes the direction of the gas flow at regular intervals via an integral programmable logic control (PLC) system. An external burner is used only for a rapid initial cold startup, typically 80 minutes. Only one RETOX fan is needed for normal RTO operation (i.e. No purge or Combustion air blowers).

PROCESS COMBUSTION

Due to the abundant oxygen content of the process gas, complete combustion readily occurs when the ignition point is reached in the RTO oxidizer (typically 1500-1600ºF). Process hydrocarbons are converted to harmless carbon dioxide and water vapor. With a sufficient concentration of VOCs in the incoming process gas, the exothermic of the solvents will be enough so that the destruction of VOC's will be self-sustaining with no auxiliary heat energy required from the fuel source.

HEAT RECOVERY

The high level of up to 95% heat recovery at full flow achieved is the result of regenerative heat transfer. The VOC laden process air enters a porous bed filled with high temperature, low pressure drop turbulent flow ceramic heat transfer media. The air is preheated by bed #1 to a maximum temperature, passes through a central combustion chamber where the hydrocarbons are oxidized to carbon dioxide and water vapor, and then exits a second bed where heat is transferred from the hot air back into the bed. To avoid an uneven temperature distribution in the RTO, the gas flow direction is changed automatically at regular intervals by the poppet valve flow

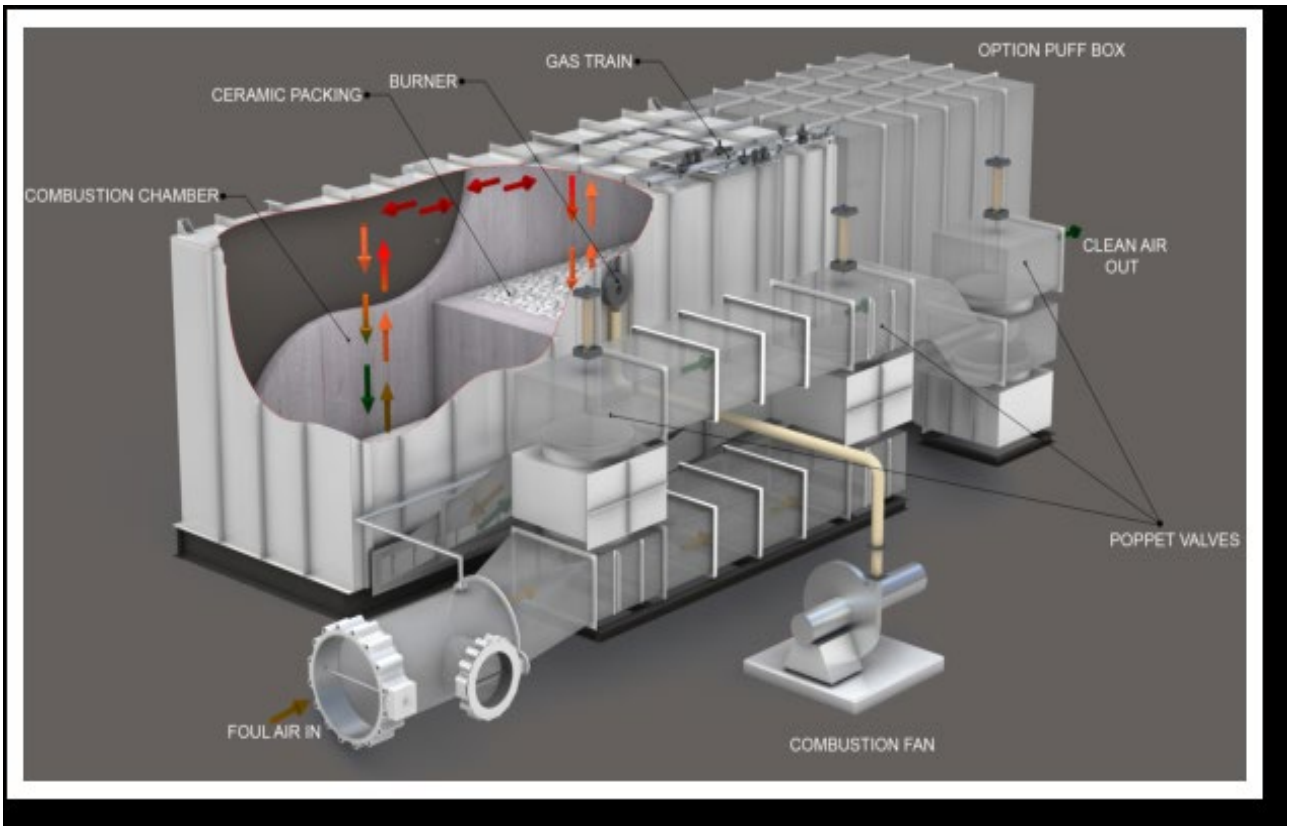
control mechanism to maintain even temperature profiles between the dual ceramic media chambers. Our turbulent flow media provides rapid RTO cold and warm startups vs. fragile block and monolith media that requires 3-6 hour startups.

CECO ADWEST CUSTOMER SERVICE

Adwest provides 24/7/365 responsive technical customer service for both our RETOX RTO systems, as well as competitive RTO oxidizer units. Call CECO Adwest's responsive customer service group at (714) 632-9801 to schedule your preventative maintenance visit today. CECO Adwest provides service and parts for all brands of RTO, RCO and thermal oxidizers, as well as RTO heat transfer media and catalyst rebuilds/replacement. In addition, CECO Adwest can relocate your existing RTO and oxidizer systems, should you have a to move and relocate your process.

Puff Capture System (316SS, Included)

The puff capture system is a module that is designed to treat a volume of untreated air that goes directly to atmosphere during the oxidizer valve switch. It consists of a large baffled chamber that stores the untreated volume and a poppet valve to control the flow direction. The poppet valve directs the exhaust flow either out through the main stack (the normal condition) or into the puff chamber during valve switching. The untreated air that is in the puff chamber is then recycled back into the inlet of the RTO oxidizer over the next flow cycle.



EQUIPMENT PRICING (US Dollars)-316 SS alloy RETOX 5,000 RTO & 70' Stack

Total price for the supply and installation of one (1) CECO Adwest RETOX 5.0RTO95 regenerative thermal oxidizer in 316SS and 70' 316 Stainless Steel exhaust stack as delineated in the attached engineering specification. (FOB, Elizabethtown, PA)

Description	Unit Price	Qty	Extended Price
Price Items A-1: RETOX 5.0RTO95 20" Dia. x 70' Stack w/316SS & Stack Platform, ladder in Carbon Steel/safety yellow	US$	1	US$ 884,350
Price Items A-2: Factory Installation Supervision (Excluding Startup and Training) -Includes Travel Costs, 1 tech onsite 3 days	US$	1	US$ 12,143
Price Items A-3: OE Factory Certified Start-Up & Training (1 tech, on site up to 7 days)	US$	1	US$ 16,400
Price Items A-4: Customer RTO QC final shop Inspection prior to shipment	US$	1	US$ 5,000
Price Items A-5: Five (5) Year Poppet Valve Flow Control Warranty (Requires ADWEST Annual PM Visit)	US$	1	US$ Included
Price Items A-6: Flameless NGI NOx free operation + energy savings	US$	1	US$ Included
Price Items A-7: OE Factory Pre-Wired / Tested	US$	1	US$ Included
Price Items A-8: RTO Freight **Estimate** w/Shrink Wrap, NTE	US$	1	US$ 49,459

Term of Sale:	**FOB, Elizabethtown, PA United States**	
Payment Terms: Per CECO & Mars Master Sales Agreement)	**35%** due with Mars Receipt of pro forma invoice	Due Upon Receipt of Invoice
	30% due upon receipt of major materials at CECO Adwest	Due NET30
	30% due upon delivery of all equipment to final destination or storage facility hereunder and Mars unit's receipt of all related technical and shipping documentation in accordance with Mars master agreement and applicable PO	Due NET30
	5% due upon successful SAT testing and Acceptance of the equipment by Mar Unit in accordance with section 9.4 (Equipment installation, commissioning and testing) and applicable PO; and after site acceptance of the equipment in accordance with SOQ and applicable PO.	Due NET30
Delivery:	**Fabrication** 18 - 20 weeks after release of fabrication PO **Shipping** 5 days upon completion of customer & CECO QC Inspection **Installation** 5 days assuming utilities and ducting are ready to be connected **Startup** 7 days including training, process must be ready to run	

* Delivery is dependent upon availability of buy-out items, i.e. burners, fans VFDs, etc.

NOTE: Because of the volatility and rising costs of Alloy and Stainless Steel prices, among other raw materials, this Proposal is good for 15 days after the above date.

Should Customer delay approvals of Drawings (Over 2 weeks from Submittals) or acceptance of Equipment or Start-up (2 weeks from Notification), any respective amounts still outstanding become immediately due, Customer will be Invoiced accordingly and expressly agrees to pay in full.

Material Escalation – Pricing may be adjusted at any time up until approval of drawings for fabrication in the event of significant material cost increase or if system layout is changed. Material cost increase will be based on comparison of prices as of proposal date and price at time of drawing approval. Any price increase will be discussed and agreed between parties.

CECO Environment Inc, its Subsidiaries and freight partners will not accept responsibility: financially or otherwise for delivery delays in shipping oversized items when caused by obtaining permits from governmental agencies.

PURCHASE ORDERS: To insure proper and timely processing, a purchase order resulting from this proposal should **reference this proposal number** and be issued to:
CECO Adwest, A Brand of CECO Industrial Solutions Company, 680 Langsdorf Dr., Ste.102, Fullerton CA 92831

SCHEDULE

Our shipment is subject to confirmation at time of approval of drawings by Customer. Adwest Technologies, Inc. will work with you to coordinate the RETOX shipment schedule to meet your VOC control compliance schedule to the best of our abilities. Actual freight costs (Pre-Pay & ADD) will be invoiced at time of delivery.

CONDITIONS OF SALE

Notwithstanding any other paragraph contained in this entire proposal, our Conditions of Sale, for the equipment shall be incorporated herein and shall be applicable. All quoted prices based on current costs are firm only if shipment is made within six-months from date of quotation.

CANCELLATION FEES

In cases of cancellation of any order after said order has been acknowledged, the following schedule applies:

AFTER PURCHASE ORDER BUT PRIOR TO DRAWINGS SUBMITTAL	25%
AFTER DRAWING SUBMITTAL	40%
AFTER DRAWING APPROVAL AND PRIOR TO RECEIPT OF BUYOUTS	50%
AFTER DRAWING APPROVAL AND RECEIPT OF BUYOUTS	75%
AFTER FABRICATION BEGINS	85%-95%
AT COMPLETION OF FABRICATION	100%

Customer expressly agrees these amounts will become due and will be paid forthwith.

CANCELLATION OF CONTRACT

In the event of termination by Buyer, if Seller, at the time of such termination, shall have in stock or on firm order any completed or uncompleted items or any raw, semi-processed or completed materials for use in fulfilling this Agreement, Buyer may require Seller to deliver all or part of the completed or uncompleted items or any raw, semi-processed or completed materials to Buyer. If such requirement is executed and value of materials exceeds the Cancellation Fees as above, Buyer will adjust reimbursement to Seller accordingly.

POLICY OF CONTINUING QUALITY INNOVATION

In the interest of maintaining state of the art quality in our equipment, CECO Industrial Solutions, Inc. reserves the right to revise these specifications and incorporate suggested changes to include the latest improvements in the equipment design vendor components and system hardware.

PROCEDURE AND INSURANCE REQUIREMENTS

Provisions must be made by Purchaser to ensure that condensation of the fumes and vapors does not occur on the ducting or heat transfer surfaces during the operation of this equipment. Should deposits of this nature take place, such that a potential of fire exists during running, upset or shutdown conditions, it will be necessary to install a fire extinguishing system to protect this equipment from damage. This system must be designed so that the extinguishing materials will not be allowed to enter the oxidizer, as damage to the equipment could result. These provisions are not included in this proposal.

The equipment selected will incorporate automatic features for protection and safety. However, while these features and their characteristics of operation afford a degree of safety, operation of the equipment is not to be considered free from all dangers and hazards inherent in the handling and firing of fuel. Proper operating techniques and maintenance procedures as specified in our manuals must be adhered to at all times.

NFPA 86 2011 Edition, Chapter 11 requires that the process exhaust be monitored for LEL (Lower Explosive Limit) if the LEL has the possibility to exceed 25%. CECO strongly recommends LEL monitoring and in fact, it is required for streams over 25% LEL. We have not included the cost for LEL monitoring in this proposal but would be happy to quote this as an option if desired.

Should the obtaining of FM approval require special equipment not covered in this specification (i.e. fire protection equipment, electrical interlocking of the oxidizer to the system), the cost of this equipment and obtaining of all permits or approvals required for installation and/or operation of this equipment is the responsibility of others.

ERECTION ASSISTANCE AND START-UP

Any contract resulting from this proposal will require start-up by an Adwest Service Technician to validate our warranty and guarantees. This will require a technical service representative to be present at the time of initial start-up and must give release of operation of the equipment in accordance with the Seller's operating and maintenance manual.

STARTUP AND TRAINING – Startup and Training Services are Included in the (A-3) Portion of this Proposal

- Startup and Training to Take Place During 1st Shift, Monday-Friday
- Overtime, Weekend, and Holiday Hours will be Billed at Additional Cost. Travel and Living Expenses are Included. A Minimum 2 Week Notice is Required Prior to the Scheduled Startup Date

SAFETY INSPECTIONS AND TESTING

RTO’s are dependable and will provide reliable service for many years. In fact, users often forget it’s part of their process as they operate with little attention for long periods. However this is only

possible with routine maintenance and the National Fire Protection Association states that "documented safety inspections and testing shall be performed at least annually". (NFPA 86 Standard for Thermal Oxidizers 2011 Edition Chapter 10). Adwest will be able to give you this service by supplemental agreement. Please contact our office for further details.

DESIGN CRITERIA

The design criteria is for your cocoa roaster VOC emissions as supplied by Mars Wrigley Confectionery

	RETOX 5.0RTO95
Process Volume, (SCFM)	5,000
Process Gas Inlet Temp., ºF	240-320
Solvent Loading #/Hr.	10.26
Solvent Composition	Formaldehyde, Acrolein, Ethanol, Methanol
Negative Pressure Upstream of oxidizer, ("w.c.)	- 2

Jobsite Location: Elizabethtown, PA

The solvent composition tabulated above has been assumed to have a solvent heat of combustion of 10,025 BTU/# net.

Because of their corrosive nature, compounds containing halogens or organic acids may not be suitable for application in the oxidizer. Also, if low boiling hydrocarbons, **particulates** or **silicones** are present in the process stream such that the potential for condensation or plugging in the duct or media exists, these conditions should be reviewed by CECO Adwest engineering.

NOTE: ***CECO Adwest highly recommends the upfront purchase of a specific Spare Parts package for your RETOX system which can decrease potential oxidizer down times from three days to three hours, or less. Contact Adwest for Spare Parts list and current price.***

PERFORMANCE GUARANTEE

1.A We make the following Performance Guarantee: If all of the Performance Conditions are satisfied (See Page 7 “Design Criteria”), then the Equipment will reduce the concentration of hydrocarbons measured at the discharge stack of the Equipment as compared to the concentration of hydrocarbons measured at the inlet of Equipment by an average of 99% or down to 25 ppm as C_1 in the stack. The Performance Conditions are defined in this specification under the heading of "Design Criteria". The Equipment must be operated within design limits of 1500ºF to 1600ºF oxidation temperature. 1500ºF should be specified for air quality permitting purposes.

1.B Nitrogen Oxides-We make the following NO_x Performance Guarantee: If all of the Performance Conditions are satisfied and the equipment is operated within design parameters as specified in the 'Design Criteria' section, the equipment will perform such that the total concentration of NO_x as measured (i.e. uncorrected to 3% of oxygen) at the discharge stack will not exceed 2 PPMv. This guarantee is predicated upon an inlet NO_x concentration of 0 PPMv and no nitrogenated hydrocarbons or compounds including ammonia in the process exhaust.

1.C We make the following Particulate Guarantee: The average particulate exiting the RTO will not exceed 0.02 grains/DSCF given:

a. The particulate mass emission entering the RTO does not exceed 60 lbs/hr
b. The average particle size is greater than 0.5 micron
c. The inorganic portion of the particulate does not exceed 30% of the total particulate on a weight basis
d. The RTO system is operating in normal mode, not bakeout mode

The determination of the emissions from the RTO will be determined by 3rd party testing in accordance with US EPA Test Methods 1, 2,4 5 and 202 and other methods as may be required by state or local agencies.

2. The only Performance Guarantee made is that which is expressly stated in Paragraph 1A, 1B, and 1C above. All other performance data contained in this Proposal or this Agreement or elsewhere are estimates or are for purposes of illustration only, and are not guaranteed.

3. The Performance Tests for determining whether the Performance Guarantee is satisfied shall be ineffective unless first reviewed and approved by us. We shall have the right and opportunity to witness the Performance Tests. In any event, the Performance Tests shall consist of simultaneous measurements of hydrocarbon VOC/HAPs loadings at the inlet and discharge stack, and methane, ethane or other natural gas injection hydrocarbon contribution shall be deducted from the measurements at the discharge stack. Performance Tests shall be at your expense, except as provided in Paragraph 4 below, and if the Performance Tests for any unit of Equipment are not completed before the expiration of the Test Limitation Period for that unit, which shall expire 12 months from date of shipment, then that unit of Equipment shall be deemed to have satisfied the Performance Guarantee, and we shall have no further obligation under this Performance Guarantee as to that unit.

4. If any unit of Equipment does not satisfy the Performance Guarantee as determined by the Performance Tests, then we shall, at our option, either: (a) repair, replace, or modify such unit of Equipment until it satisfies the Performance Guarantee.

5. ADWEST MAKES NO GUARANTEES ON ODOR REMOVAL WITHOUT SITE SPECIFIC PROCESS STREAM HYDROCARBON ANALYSIS AND COMPUTER MODELING.

SYSTEM ENERGY CALCULATION

These RTO Energy calculations are based on design process flow and solvent composition rates as provided by Mars Wrigley Confectionery

		RETOX 5.0RTO95	**IDLE MODE**
1.	Process Flow Rate, SCFM	5,000	1,250
2.	Oxidizer Inlet Temp, ºF	320	70
3.	Oxidizer Outlet Temp., ºF	388	129
4.	Oxidation Temperature, ºF	1,550	1,550
5.	VOC Composition Rate, #/Hr.	10	0
6.	Heating Value of VOCs, Btu/#	10,025	0
7.	Net Energy from VOCs, MMBTU/Hr	0.101	0.000
8.	Energy Required, MMBTU/Hr	0.364	0.174
9.	Energy Cost/Hr @ $ 4.50/MMBTU	$ 1.45	$ 0.70
10.	Fan Horsepower	32	1.7
11.	Fan Energy Usage, KW	26	1.4
12.	Fan Energy Cost/Hr. @ $.09/KWH	$ 2.05	$ 0.11
13.	Total Operating Costs, $/Hr	$ 3.51	$ 0.81

NOTES:

1. *The above tabulation is for comparison purposes only and does not include casing heat losses.*
2. *For Air Quality permitting purposes, use a combustion chamber temperature of greater than 1500ºF.*
3. *Maximum process flow turndown is 4:1 without outside makeup air.*
4. *The unit proposed will operate Fuel Free at 50 #/Hr @10,025 btu/lb.*

UTILITY REQUIREMENTS

Customer is to provide the following utilities for the oxidizer system.

1. Natural gas 1,445 SCFH @ 5 PSI minimum at natural gas piping connection on oxidizer (cold start-up/high fire condition)
2. Electricity at 460 volt 3 phase 60 HZ, 77 Full Load Amps to RTO control panel disconnect
3. Clean/dry compressed air 720 CFH @ 90 PSIG at air piping connection on oxidizer
4. Dedicated Ethernet line to RTO control panel for VPN Modem.

MAXIMUM PROCESS FAN CONDITIONS

RETOX 5.0RTO95

- 8,171 ACFM @ 320º F
- 19” w.c. total (- 2” w.c. at fan inlet)
- 32 BHP @320º F
- Arrangement # 1
- AirPro, Twin City or Equal Induced Draft Fan (Air Pro has 3 year warranty)
- WEG, Westinghouse, TECO or equal Premium Fan Motors

SCOPE OF SUPPLY

Type: One (1) Model RETOX 5.0RTO95 regenerative oxidizer system with a nominal 95 percent thermal efficiency.

Weight: 23,500 pounds excludes fan, motor, puff box and stack

Dimensions: 27'-8" long plus process fan
11'-8" wide
8'-3" high

EQUIPMENT INCLUDED

- Heat transfer media-Turbulent Flow, low pressure drop Random packings-95% HX
- Bed casing, 3/16” all welded forced draft carbon steel shell **316SS**
- Two 30” x 30” bed access doors **316SS**
- Inlet and outlet plenums **316SS**
- Casing insulation-Internal, shop installed, high density
- Low NOx nozzle mix natural gas burner with NFPA 86 natural gas pipe train and combustion air blower (3 H.P.)
- Natural gas injection system (NGI)-for Flameless NOx-Free Operation
- Two (2) process flow control valves with pneumatic operators **316SS**
- System controls including Allen Bradley programmable Compact Logix processor and PanelView 7 Plus (6”) Color Touch Screen with tamper protected data
- Rigid Conduit
- 24vdc components, where applicable
- UL or CUL stamped control panel
- Telemetry system with remote diagnostics capability
- Stainless Steel equipment tags
- High temperature paint-I beam skid
- One installation, operation, and maintenance instruction manual and one (1) CD Copy
- Induced Draft Process fan, motor and 50 HP Variable Frequency Drive
- Fan to oxidizer transition **316SS**
- Compressed air surge tank with controls
- Integral support skid-carbon steel-painted charcoal.
- Exhaust stack (ø20"x70') with EPA Test Ports **316SS** (Stack ladder & Test Platform are carbon steel with safety yellow paint)
- Make up air and blocking damper tee with controls **316SS**
- Puff Capture System **316SS**
- “HOT” signage strategically placed on the RTO

DESCRIPTION OF EQUIPMENT

Heat Transfer Media-95% Heat Transfer Recovery

Our RETOX RTO high temperature ceramic heat transfer media supplied will consist of turbulent flow silica/alumina saddle media, selected to provide the highest heat recovery and turbulence with the lowest pressure drops for this application. When shipping limits permit, (units below 10,000 SCFM) the heat transfer media will be factory installed to reduce hours for field installation of the unit.

Bed Casing Insulation

The bed casings are internally insulated with 6 inches of high density (10.6 Lbs. Density) of compressed ceramic fiber insulation (SuperWool or equal) rated at 2300ºF which is factory installed.

Bed Casing 3/16" Plate 316 SS

The bed casing design consists of all-welded construction, externally stiffened to withstand the pressure requirements of the induced draft fan and the lateral loads from the heat transfer surface making up the beds.

Inlet and Outlet Plenums 3/16" Plate 316 SS

The inlet and out plenums are designed to provide the most efficient flow distribution into and out of the porous bed and are constructed from externally stiffened carbon steel plates. The plenum walls do not require insulation for the LEL levels specified for this application.

Casing Access Openings 3/16” Plate 316 SS

The ceiling structure of the upper plenum is constructed such that access to the heat transfer media and burner is available to perform routine inspections.

Burner Assembly-Low NOx Maxon or Equal

The burner is a Kinedizer LE nozzle mix style by Maxon and is utilized only for unit start-up. An NFPA 86 designed natural gas piping train is also provided.

Natural Gas Injection System (NGI)-Flameless Operation

A natural gas injection system is utilized to allow the RETOX to be operated without the use of the main burner in Flameless NOx-Free Operation. This eliminates the need for combustion air and reduces the fuel consumption by more than 30%.

RTO Bake-Out (Included, As required)

The oxidizer control logic does include an off-line bake-out mode feature. This feature will allow the cold face of the heat exchanger bed media to be elevated to a temperature of 600ºF-700ºF for the purpose of volatilizing (i.e. baking-out) any residual condensed organic hydrocarbons.

Two (2) Process Flow Control Poppet Valves 316 SS

The oxidizer module contains two (2) vertical flow control poppet valves used to switch (regenerate) the direction of the process stream through the RTO oxidizer and the two (2) chambers of ceramic heat transfer media. The valves are operated by two pneumatic actuators requiring clean, dry compressed air at 720 CFH, -40°F and 90 psig. If the air is not dry, freeze protection may be required and is not included. These valves are guaranteed for five (5) years (Requires annual Adwest Service PM visit), and do not require a purge air fan. They can be worked on and adjusted without cooling down the RTO.

System Controls and Instrumentation

The RTO control panel (located on the oxidizer) is prewired, labeled, shop simulation tested, complete and ready for connections to plant power source. Control panel not to be mounted in direct sunlight. Based on RTO orientation customer shading maybe required. The panel will be designed to NEMA 3R standards and suitable for outdoor installation. The panel will contain the following:

Door mounted items

- Selection switches for mode of operation
- Allen Bradley PanelView 7 Plus Color 6" Touchscreen HMI with tamper protected data man-machine interface.
- Selection push buttons for process blower, burner/start/stop and maintenance reset.
- Fault push-button

Internal mounted

- Main incoming 460V fused disconnect, 3-phase
- Honeywell flame safeguard
- Honeywell burner management system
- Combustion air motor starter/disconnect
- Rockwell/Allen-Bradley CompactLogix™ (ethernet) processor having telemetry capabilities via VPN access
- Panel heater and air conditioner
- Control power transformer (120v)
- VPN Ethernet Modem
- Variable frequency drive

Other items include flow diversion valves with solenoids, hand valve, filter, and regulator, for the compressed air piping train. Also included is a low compressed air pressure switch, proof of air flow differential pressure switch, high temperature limit switch mounted in the exhaust, and miscellaneous thermocouples. Controls of the thermal oxidizer shall be based on Adwest's standard design, programming and P & ID philosophy.

The Allen Bradley PLC processor is supplied with a telemetry system which allows the Adwest service department to remotely monitor the system operation. A dedicated Ethernet line to the control panel is required to enable Adwest personnel to communicate and remotely make program changes if required during start-up or future trouble shooting.

Fan, Motor and Drive

The oxidizer is equipped with a heavy duty, induced draft Industrial Blower (Twin Cities or equal). The fan includes a drive motor and guards. The drive motor is suitable for use with a 460 volt, three-phase, 60 Hertz power supply.

Process Fan to Unit Duct 316SS

The process fan to unit duct is fabricated from 3/16" carbon steel. The duct is supplied with a predrilled flange for ease of connection. External insulation of process fan and fan to unit duct is by others if required.

Paint

All exposed carbon steel(if any) surfaces of the oxidizer will be coated with two (2) coats of our standard high temperature paint (black, brown, and gray). The stack will be manufactured from 316 stainless steel.

RETOX RTO ILME Multi-pole Rectangular Connectors NEMA 4

Adwest provides our RTO clients with the highest level of electrical and mechanical shop assembly to provide rapid RTO installation time. Our larger RETOX RTO's utilize an ILME Multi-pole Rectangular Connectors "cam lock" quick connection to provide easy and secure electrical connections in the field.

Installation, Operation and Maintenance Instruction Manuals

The CECO Adwest Technical Services Department will furnish one (1) hard copy and one (1) CD Copy of the operation and maintenance instruction manual.

INSTALLATION SUPERVISION SPECIFICATION

Applies Only If Installation Supervision Option Has Been Purchased (p. 3)

To Be Furnished by CECO Adwest

Factory trained personnel to ensure proper installation and eliminating any delays during commissioning.

1. Services of one (1) CECO Adwest field serviceman to perform initial equipment startup-One trip, one technician with travel expenses for 10 days MAX on site(3 days for installation supervision and 7 days for startup and training) -additional days at per diem rate plus actual travel expenses.

2. Erection management services to integrate activities of CECO Adwest for the successful and timely completion of the project.

3. All work is based on standard weekday labor and does not include premium or Holiday time utilized to expedite the installation.

4. Inspection of all equipment as it arrives on the jobsite with respect to shipping damage and completeness of shipments in accordance with the bill-of-lading.

5. Services of an CECO Adwest field serviceman to perform initial equipment startup.

6. Erection management services to integrate activities of CECO Adwest for the successful and timely completion of the project.

7. CECO Adwest start-up personnel to conduct classroom and equipment training sessions with customer operating personnel not to exceed one day.

8. Freight (RTO from Fabricator to Site & Media from Vendor to Site) to be billed at time of shipping (FOB, Elizabethtown, PA).

SCOPE OF SUPPLY BY OTHERS

The Following Work is Not Included Whether Installation Is Purchased or Not

1. Non-Union mechanical and electrical erection of one (1) CECO Adwest RETOX RTO thermal oxidizer system, ground-mounted at your Elizabethtown, PA plant including filling of heat exchanger media, induced draft oxidizer fan with motor, controls, stack, start-up, training, rigging, crane rental and installation of optional secondary air to liquid heat recovery system..

2. Electrical installation of main control panel at the oxidizer unit, thermocouples and actuators and NEMA 3R AC drive for process air blower.

3. Non-union labor, tools and material necessary to unload, position and install equipment supplied by CECO Adwest

4. Concrete foundations and/or steel support platforms. Stack mounting bolts, stack grouting and fan base concrete.

5. Non-union labor, equipment and material necessary to touch-up marked areas on equipment.

6. Free and unobstructed access to the work site, including maintained storage areas and roadways. Ground conditions shall be suitable for heavy equipment operation.

7. Power supply of 480 volt, three-phase and 120v, 60 cycle, single phase. Electrical connection of Main RTO Control panel to any remote CP 102 or 103 control panels.

8. Provisions for obtaining IEC, FM, CSA, TSSA, IRI, NFPA, PE, OSHA or other required approvals.

9. Facilities for erection supervision, equipment staging and storage.

10. Natural gas at 5 Psig and clean dry(-40F dew point rated) compressed air at 90 Psig. And gas main shut offs if required

11. All city, local, county, state, provincial, Federal EPA, MOE operator & air permits and associated costs and inspection fees.

12. UL and CUL approval of oxidizer if required. PE Stamps, inspections and approval by others

13. Sales Tax, duties, Customs clearance, Tariffs GST, inbound freight, personal, and corporate income taxes, etc. on project.

14. Air Board Compliance testing by third party stack testing Firms. CECO Adwest to approve RTO stack test protocols and methods and the be able to witness the stack test at our option.

15. Utilities brought to and terminated at the RTO, Fan and secondary Heat recovery connection points.

16. Process duct brought to RTO inlet flange and duct insulation if required.

17. All electrical power disconnects, grounding.

18. Gas fired ovens, roaster, dryers, etc. must have separate purge fans and atmospheric dampers to comply with NFPA codes.

19. Our steel supply is designed for our equipment loadings only. No external loads are to be applied.

20. Personnel protection, security fencing, lighting and convenience outlets.

21. All other items and services not specifically included by CECO Adwest scope of supply.

22. Additional prefiltration prior to RTO if required.

23. Process to secondary heat recovery liquid piping, expansion joints, pumps, isolation shut offs, drains, pumps, pump motors, liquid filters, heat transfer fluid, expansion tanks, isolation valves and freeze protection by others.

GENERAL TERMS AND CONDITIONS FOR THE SALE OF GOODS AND SERVICES

Applicability.

These terms and conditions of sale (these "**Terms**") are the only terms which govern the sale of the goods, including equipment, machinery, materials, consumables (collectively, "**Goods**") and services ("**Services**") by CECO Environmental Corp. and all of its affiliated companies (collectively, "**Seller**") to the buyer named on the signature line of these Terms ("**Buyer**"). Any provisions or conditions of Buyer's order which are in any way inconsistent with, or in addition to these Terms shall not be binding on Seller, and shall not be applicable, except with Seller's written acceptance.

The accompanying quotation (the "**Sales Confirmation**") and these Terms (collectively, this "**Agreement**") comprise the entire agreement between the parties, and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. These Terms prevail over any of Buyer's general terms and conditions of purchase regardless whether or when Buyer has submitted its purchase order or such terms. Fulfillment of Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend these Terms.

Notwithstanding anything to the contrary contained in this Agreement, Seller may, from time to time change the Services without the consent of Buyer provided that such changes do not materially affect the nature or scope of the Services, or the fees or any performance dates set forth in the Sales Confirmation.

Delivery of Goods and Performance of Services.

The Goods will be shipped within a reasonable time after the receipt of Buyer's purchase order. Seller shall not be liable for any delays, loss or damage in transit.

Unless otherwise agreed in writing by the parties, for shipments within the continental USA, Seller shall ship the Goods FCA (per Incoterms 2010) from Seller's factory to the designated delivery location (the "**Delivery Point**"). For international shipments, Seller shall ship the Goods Ex Works (per Incoterms 2010). The Goods shall be shipped using Seller's standard methods for packaging and shipping such Goods. Buyer shall take delivery of the Goods within ten (10) days of Seller's written notice that the Goods have been shipped to the Delivery Point. Buyer shall be responsible for all loading costs and provide equipment and labor reasonably suited for receipt of the Goods at the Delivery Point.

Seller may, in its sole discretion, without liability or penalty, make partial shipments of Goods to Buyer. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's purchase order.

If for any reason Buyer fails to accept delivery of any of the Goods on the date fixed pursuant to Seller's notice that the Goods have been delivered at the Delivery Point, or if Seller is unable to deliver the Goods at the Delivery Point on such date because Buyer has not provided appropriate instructions, documents, licenses or authorizations: (i) risk of loss to the Goods shall pass to Buyer; (ii) the Goods shall be deemed to have been delivered; and (iii) Seller, at its option, may store the Goods until Buyer picks them up, whereupon Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance).

Seller shall use commercially reasonable efforts to meet any performance dates to render the Services specified in the Sales Confirmation, and any such dates shall be estimates only.

With respect to the Services, Buyer shall (i) cooperate with Seller in all matters relating to the Services and provide such access to Buyer's premises, and such office accommodation and other facilities as may reasonably be requested by Seller, for the purposes of performing the Services; (ii) respond promptly to any Seller request to provide direction, information, approvals, authorizations or decisions that are reasonably necessary for Seller to perform Services in accordance with the requirements of this Agreement; (iii) provide such customer materials or information as Seller may reasonably request to carry out the Services in a timely manner and ensure that such customer materials or information are complete and accurate in all material respects; and (iv) obtain and maintain all necessary licenses and consents and comply with all applicable laws in relation to the Services before the date on which the Services are to start.

Any and all data books, instructions, operating manuals and specifications documents will be provided by Seller in an electronic format free of charge. Bound versions may be provided at Buyer's request, subject to additional charges.

Non-Delivery.

The quantity of any installment of Goods as recorded by Seller on dispatch from Seller's place of business is conclusive evidence of the quantity received by Buyer on delivery unless Buyer can provide conclusive evidence proving the contrary.

Seller shall not be liable for any non-delivery of Goods (even if caused by Seller's negligence) unless Buyer gives written notice to Seller of the non-delivery within ten (10) days of the date when the Goods would in the ordinary course of events have been received.

Any liability of Seller for non-delivery of the Goods shall be limited to replacing the Goods within a reasonable time or adjusting the invoice respecting such Goods to reflect the actual quantity delivered.

Title and Risk of Loss. Title and risk of loss passes to Buyer upon Seller's delivery to the Delivery Point unless otherwise specified. As collateral security for the payment of the purchase price of the Goods, Buyer hereby grants to Seller a lien on and security interest in and to all of the right, title and interest of Buyer in, to and under the Goods, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest under the Uniform Commercial Code.

Buyer's Acts or Omissions. If Seller's performance of its obligations under this Agreement is prevented or delayed by any act or omission of Buyer or its agents, subcontractors, consultants or employees, Seller shall not be deemed in breach of its obligations under this Agreement or otherwise liable for any costs, charges or losses sustained or incurred by Buyer, in each case, to the extent arising directly or indirectly from such prevention or delay.

Inspection and Rejection of Nonconforming Goods and Services.

Buyer shall inspect the Goods within ten (10) days of receipt ("**Inspection Period**"). Buyer will be deemed to have accepted the Goods unless it promptly notifies Seller in writing of any Nonconforming Goods during the Inspection Period and furnishes such written evidence or other documentation as reasonably required by Seller. "**Nonconforming Goods**" means only the following: (i) product shipped is different than identified in Buyer's purchase order; or (ii) product's label or packaging incorrectly identifies its contents.

If Buyer timely notifies Seller of any Nonconforming Goods, Seller shall, in its sole discretion, (i) replace such Nonconforming Goods with conforming Goods, or (ii) credit or refund the Price for such Nonconforming Goods, together with any reasonable shipping and handling expenses incurred by Buyer in connection therewith. Buyer shall ship, at its expense and risk of loss, any allegedly Nonconforming Goods to Seller's facility. If Seller determines that the Goods are Nonconforming Goods, and exercises its option to replace Nonconforming Goods, Seller shall, after receiving Buyer's shipment of

Nonconforming Goods, ship to Buyer, at Seller's expense and risk of loss, the replaced Goods to the Delivery Point, and shall reimburse Buyer for its return shipping costs.

If Buyer timely notifies Seller of material deficiencies in the performance of the Services, Seller shall undertake to reperform the Services within a reasonable time.

Buyer acknowledges and agrees that the remedies set forth in **Section 0 and 00** are Buyer's exclusive remedies for the delivery of Nonconforming Goods and deficient Services.

In no event shall Goods be considered Nonconforming for purposes hereof due to the Goods bearing a different, superseding or new part number or version number for the specified part number, provided that the Goods in question are substantially the same part as specified in Buyer's order

Changes. Changes to Buyer's order shall be handled as follows:

Each party may at any time propose changes in the specifications of the Goods or Services, delivery schedules or scope of supply under these Terms (a "**Change**"). Seller is not obligated to proceed with any Change until both parties agree upon such Change in a written Change Order describing the Change and the resulting changes in Price and other provisions, as the parties may mutually agree. A Change may also be caused by changes in Buyer's site-specific requirements or procedures, industry specifications, codes, standards or applicable laws or regulations.

Upon such Changes, the Price, delivery schedule and the other provisions of these Terms will be adjusted to reflect additional costs or obligations incurred by Seller resulting from such Changes; provided, however, no adjustments will be made on account of a general change to Seller's manufacturing or repair facilities resulting solely from a change in applicable laws or regulations applicable to such facilities. Unless otherwise agreed by the parties in a Change Order, pricing for Seller's additional work resulting from a Change shall be at Seller's then-current time and material rates.

Notwithstanding the foregoing provisions of this **Section 0**, it shall not be considered a Change for purposes hereof solely due to Seller's delivery of Goods bearing a different, superseding or new part number or version number for the specified part number, provided that the Goods in question are substantially the same part as specified in Buyer's order.

Price.

Buyer shall purchase the Goods and Services from Seller at the prices (the "**Prices**") set forth in Seller's quotation or bid. Prices may be increased by Seller before delivery of the Goods, due to Buyer's order modifications, changes to specifications, or delays caused by Buyer. In such event, these Terms shall be construed as if the increased prices were originally inserted herein, and Buyer shall be billed by Seller on the basis of such increased prices..

Buyer agrees to reimburse Seller for all reasonable travel and out-of-pocket expenses incurred by Seller in connection with the performance of the Services.

All Prices are exclusive of all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any Governmental Authority on any amounts payable by Buyer. Buyer shall be responsible for all such charges, costs and taxes; provided, that, Buyer shall not be responsible for any taxes imposed on, or with respect to, Seller's income, revenues, gross receipts, personnel or real or personal property or other assets.

Payment Terms.

Buyer shall pay all invoiced amounts due to Seller within thirty (30) days from the date of Seller's invoice. Unless otherwise provided in Seller's quotation, Buyer shall make all payments hereunder in US dollars.

Buyer shall pay interest on all late payments at the lesser of the rate of 1.5% per month or the highest rate permissible under applicable law, calculated daily and compounded monthly. Buyer shall reimburse Seller for all costs incurred in collecting any late payments, including, without limitation, reasonable attorneys' fees. In addition to all other remedies available under these Terms or at law (which Seller does not waive by the exercise of any rights hereunder), Seller shall be entitled to suspend the delivery of any Goods or performance of any Services if Buyer fails to pay any amounts when due hereunder and such failure continues for ten (10) days following written notice thereof.

Progress payments specified in the Sales Confirmation will apply if the total Prices for the Goods and Services purchased hereunder is equal to or greater than $250,000.00 USD.

Buyer shall not withhold payment of any amounts due and payable by reason of any set-off of any claim or dispute with Seller, whether relating to Seller's breach, bankruptcy or otherwise.

Suspensions and Cancellations.

No cancellations of an order or any portion of an order by Buyer will be effective unless accepted by Seller in writing. Accepted cancellations will be subject to a charge to cover all costs and expenses incurred by Seller through the date of cancellation, plus reasonable cancellation costs and a reasonable profit margin on the completed work. Cancellation of orders for Goods made to order and not part of Seller's regular stock will not be accepted after fabrication has commenced.

In the event Buyer suspends Seller's performance of work, Buyer shall reimburse Seller for all costs incurred by Seller as a result of the suspension, including, without limitation, all borrowing and opportunity costs. In the event a suspension exceeds 180 days in duration, in addition to being entitled to full reimbursement of costs, Seller shall have the unqualified right to cancel the unfinished portion of the order without liability.

Neither party shall be liable to the other for a delay to the extent caused by such a force majeure event, but only if the party affected provides prompt written notice to the counterparty of the occurrence of the force majeure event. For the avoidance of doubt, "force majeure event" shall include any pandemic, epidemic or disease recognized by the World Health Organization, including COVID-19.

Limited Warranty.

Subject to the other provisions of this Section 0, Seller warrants to Buyer that for a period of the lesser of eighteen (18) months from the date of readiness for shipment of the Goods, or twelve (12) months after the Goods are successfully commissioned ("**Goods Warranty Period**"), that such Goods will materially conform to the specifications set forth in Buyer's order and will be free from material defects in material and workmanship. The warranty for Services shall expire one (1) year after performance of the service, except that the warranty for software-related Services shall expire ninety (90) days after the performance thereof ("**Services Warranty Period**"). Seller shall have no liability for defects that arise after the warranty period has expired. These Warranty Periods may not be extended without Seller's express written agreement.

Seller warrants to Buyer that it shall perform the Services using personnel of required skill, experience and qualifications and in a professional and workmanlike manner in accordance with generally recognized industry standards for similar services and shall devote adequate resources to meet its obligations under this Agreement.

Any performance guarantee of Seller relating to the Goods with regard to compliance with any governmental specifications, including, without limitation, particulate levels or pollution controls, are specifically limited to the time of commissioning or start-up of the Goods in question. It is the Buyer's responsibility to properly maintain the Goods, monitor system performance and take corrective actions.

EXCEPT FOR THE WARRANTIES SET FORTH IN SECTIONS 0 AND 0, SELLER MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE GOODS OR SERVICES, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; OR (c) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY, WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.

Products manufactured by a third party other than Seller's agents and subcontractors ("Third Party Product") may constitute, contain, be contained in, incorporated into, attached to or packaged together with, the Goods. Third Party Products are not covered by the warranty in Section 0. For the avoidance of doubt, **SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO ANY THIRD PARTY PRODUCT, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** To the extent that Seller is entitled to assign any warranty of a third-party manufacturer, Seller will assign such warranties to Buyer.

Seller shall not be liable for a breach of the warranties set forth in **Section 0** and **Section 0** unless: (i) Buyer gives written notice of the defective Goods or Services, as the case may be, reasonably described, to Seller within ten (10) days of the time when Buyer discovers or ought to have discovered the defect; (ii) if applicable, Seller is given a reasonable opportunity after receiving the notice of breach of the warranty set forth in **Section 0** to examine such Goods and Buyer (if requested to do so by Seller) returns such Goods to Seller's place of business at Buyer's cost for the examination to take place there; and (iii) Seller reasonably verifies Buyer's claim that the Goods or Services are defective. If Seller determines the Goods are defective, Seller shall reimburse Buyer's costs of shipping the Goods to Seller for examination.

Seller shall not be liable for a breach of the warranty set forth in **Section 0** and **Section 0** if: (i) Buyer makes any further use of such Goods after giving such notice; (ii) the defect arises because Buyer failed to follow Seller's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods; or (iii) Buyer alters or repairs such Goods without the prior written consent of Seller.

Seller's warranties set forth in **Section 00** and **Section 00** are further conditioned on: (a) the proper storage, installation, operation and maintenance of the Goods and conformance with the proper operation instruction manuals provided by Seller or its suppliers or subcontractors; (b) Buyer keeping proper records of operation and maintenance during the applicable Warranty Period and providing Seller access to those records; and (c) modification or repair of the Goods only as authorized by Seller in writing. Seller does not warrant products or any repaired or replacement parts against normal wear and tear or damage caused by misuse, accident or use against the advice of Seller. Any modification or repair of Goods not authorized by Seller shall render the warranty null and void.

Electrical components, excluding motors, are warranted only to the extent warranted by the original manufacturer. To the extent that Seller is entitled to pass through a warranty of the original equipment manufacturer of the electrical goods sold, Seller will pass through such warranties to Buyer. Seller uses commercially reasonable efforts to utilize materials that resist rust, but the warranty on metal and stainless steel components DOES NOT COVER RUST, OXIDATION, FADING or other BLEMISHES unless it also results in a loss of structural integrity or a failure of these components.

Subject to **Section 0** and **Section 0** above, with respect to any such Goods during the Warranty Period, Seller shall, in its sole discretion, either: (i) repair or replace such Goods (or the defective part) or (ii) credit or refund the price of such Goods at the pro rata contract rate provided that, if Seller so requests, Buyer shall, at Seller's expense, return such Goods to Seller. **ALL COSTS OF ACCESSING, DISMANTLING, DECONTAMINATION, AND REINSTALLATION OF GOODS, COST OF FREIGHT AND DREYAGE, AND THE TIME AND EXPENSES OF SELLER'S PERSONNEL FOR SITE TRAVEL AND DIAGNOSIS ONSITE UNDER THIS WARRANTY SHALL BE BORNE BY BUYER.**

Subject to **Section 0** and **Section 0** above, with respect to any Services subject to a claim under the warranty set forth in **Section 0**, Seller shall, in its sole discretion, (i) repair or re-perform the applicable Services or (ii) credit or refund the price of such Services at the pro rata contract rate.

THE REMEDIES SET FORTH IN SECTION 0 AND SECTION 0 SHALL BE THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTIES SET FORTH IN SECTION 0 AND SECTION 0.

Intellectual Property Rights.

Buyer acknowledges and agrees that: (i) any and all Seller's intellectual property rights are the sole and exclusive property of Seller or its licensors; (ii) Buyer shall not acquire any ownership interest in any of Seller's intellectual property rights under this Agreement; (iii) any goodwill derived from the use by Buyer of Seller's intellectual property rights inures to the benefit of Seller or its licensors, as the case may be; (iv) if Buyer acquires any intellectual property rights, rights in or relating to any Goods (including any rights in any trademarks, derivative works or patent improvements relating thereto) by operation of law, or otherwise, such rights are deemed and are hereby irrevocably assigned to Seller or its licensors, as the case may be, without further action by either of the parties; and (v) Buyer shall use Seller's intellectual property rights solely for purposes of using the Goods under this Agreement and only in accordance with this Agreement and the instructions of Seller.

Buyer shall not: (i) take any action that interferes with any of Seller's rights in or to Seller's intellectual property rights, including Seller's ownership or exercise thereof; (ii) challenge any right, title or interest of Seller in or to Seller's intellectual property rights; (iii) make any claim or take any action adverse to Seller's ownership of Seller's intellectual property rights; (iv) register or apply for registrations, anywhere in the world, for Seller's trademarks or any other trademark that is similar to Seller's trademarks or that incorporates Seller's trademarks; (v) use any mark, anywhere that is confusingly similar to Seller's trademarks; (vi) engage in any action that tends to disparage, dilute the value of, or reflect negatively on the Goods or any Seller's trademarks; (vii) misappropriate any of Seller's trademarks for use as a domain name without prior written consent from Seller; or (viii) alter, obscure or remove any Seller's trademarks, or trademark or copyright notices or any other proprietary rights notices placed on the Goods, marketing materials or other materials that Seller may provide.

Seller's Intellectual Property Indemnification.

Subject to the terms and conditions of this Agreement, including **Section 0** and **Section 0**, Seller shall indemnify, defend and hold harmless Buyer from and against all losses awarded against Buyer in a final non-appealable judgment arising out of any claim of a third party alleging that any of the Goods or Buyer receipt or use thereof infringes any intellectual property right of a third party.

If the Goods, or any part of the Goods, becomes, or in Seller's opinion is likely to become, subject to a claim of a third party that qualifies for intellectual property indemnification coverage under this **Section 0**, Seller shall, at its sole option and expense, notify Buyer in writing to cease using all or a part of the Goods, in which case Buyer shall immediately cease all such use of such Goods on receipt of Seller's notice.

Notwithstanding anything to the contrary in this Agreement, Seller is not obligated to indemnify or defend Buyer against any claim (direct or indirect) under **Section 0** if such claim or corresponding losses arise out of or result from, in whole or in part, (i) Buyer's marketing, advertising, promotion or sale or any product containing the Goods; (ii) use of the Goods in combination with any products, materials or equipment supplied to Buyer by a person other than Seller or its authorized representatives, if the infringement would have been avoided by the use of the Goods not so combined; (iii) any modifications or changes made to the Goods by or on behalf of any person other than Seller or its representatives, if the infringement would have been avoided without such modification or change; or (iv) Buyer's failure to use any updated or corrected version of the Goods; or (v) Seller's adherence to Buyer's specifications.

THIS SECTION 0 SETS FORTH THE ENTIRE LIABILITY AND OBLIGATION OF SELLER AND THE SOLE AND EXCLUSIVE REMEDY FOR BUYER FOR ANY LOSSES COVERED BY SECTION 0.

Limitation of Liability.

IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY FOR ANY LOSS OF USE, REVENUE OR PROFIT OR LOSS OF DATA OR DIMINUTION IN VALUE, OR FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, REGARDLESS OF WHETHER SUCH DAMAGES WERE FORESEEABLE AND WHETHER OR NOT SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.

IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO SELLER FOR THE GOODS AND SERVICES SOLD HEREUNDER. THE LIMITATION OF LIABILITY PROVISIONS SET FORTH IN THIS SECTION 0 SHALL APPLY EVEN IF BUYER'S REMEDIES UNDER THIS AGREEMENT FAIL OF THEIR ESSENTIAL PURPOSE.

The limitation of liability set forth in **Section 0** shall not apply to (i) liability resulting from Seller's gross negligence or willful misconduct or (ii) death or bodily injury to the extent resulting from Seller's negligent acts or omissions.

Compliance with Law.

Generally. Buyer shall comply with all applicable laws, regulations and ordinances. Buyer shall maintain in effect all the licenses, permissions, authorizations, consents and permits that it needs to carry out its obligations under this Agreement. Buyer shall comply with all export and import laws of all countries involved in the sale of the Goods under this Agreement or any resale of the Goods by Buyer. Buyer assumes all responsibility for shipments of Goods requiring any government import clearance. Seller may terminate this Agreement if any governmental authority imposes antidumping or countervailing duties or any other penalties on Goods.

OFAC Representation and Warranty. Buyer is in compliance with the International Emergency Economic Powers Act (50 U.S.C. § 1701) and all other Laws administered by OFAC or any other Governmental Authority imposing economic sanctions and trade embargoes ("**Economic Sanctions Laws**") against countries ("**Embargoed Countries**") and persons designated in such Laws (collectively, "**Embargoed Targets**"). Buyer is not an Embargoed Target or otherwise subject to any Economic Sanctions Law.

OFAC Covenant. Without limiting the generality of **Section 0**, Buyer shall comply with all Economic Sanctions Laws. Without limiting the generality of the foregoing, Buyer shall not: (i) directly or indirectly export, re-export, transship or otherwise deliver the Goods or any portion of the Goods to an Embargoed Country or an Embargoed Target; or (ii) broker, finance or otherwise facilitate any transaction in violation of any Economic Sanctions Law.

Export Regulation (EAR and ITAR) Covenant. Buyer acknowledges that the Goods, including any software, documentation and any related technical data included with, or contained in, such Goods, and any products utilizing any such Goods, software, documentation or technical data (collectively, "**Regulated Goods**") may be subject to US export control Laws and regulations, including the Export Administration Regulations promulgated under the Export Administration Act of 1979, and the International Traffic in Arms Regulations administered by the US Department of State. Without limiting the generality of **Section 0**, Buyer shall not, and shall not permit any third parties to, directly or indirectly, export, re-export or release any Regulated Goods to any jurisdiction or country to which, or any party to whom, the export, re-export or release of any Regulated Goods is prohibited by applicable federal or foreign law. Buyer shall be responsible for any breach of this Section by its, and its successors' and permitted assigns', parent, affiliates, employees, officers, directors, partners, members, shareholders, customers, agents, distributors, resellers or vendors that are not Buyer.

Foreign Corrupt Practices Act Representation and Warranty. Buyer is in compliance with the Foreign Corrupt Practices Act of 1977, as amended ("**FCPA**") and the UK Bribery Act of 2010 ("**Bribery Act**"). Neither Buyer nor any of its representatives has: (i) used any corporate funds for any unlawful contribution, gift, entertainment or other unlawful expense relating to political activity or to influence official action; (ii) made any direct or indirect unlawful payment to any foreign or domestic government official or employee from corporate funds; (iii) made any bribe, rebate, payoff, influence payment, kickback or other unlawful payment; or (iv) failed to disclose fully any contribution or payment made by Buyer (or made by any Person acting on its behalf of which Buyer is aware) that violates the FCPA or the Bribery Act.

Anti-Bribery Covenant. Without limiting the generality **of Section 0**, Buyer shall, and shall cause its representatives to, comply with the FCPA and the Bribery Act, including maintaining and complying with all policies and procedures to ensure compliance with these Acts.

Termination. In addition to any remedies that may be provided under these Terms, Seller may terminate this Agreement with immediate effect upon written notice to Buyer, if Buyer: (a) fails to pay any amount when due under this Agreement and such failure continues for ten (10) days after Buyer's receipt of written notice of nonpayment; (b) has not otherwise performed or complied with any of these Terms, in whole or in part; or (c) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

Waiver. No waiver by Seller of any of the provisions of this Agreement is effective unless explicitly set forth in writing and signed by Seller. No failure to exercise, or delay in exercising, any right, remedy, power or privilege arising from this Agreement operates, or may be construed, as a waiver thereof. No single or partial exercise of any right, remedy, power or privilege hereunder precludes any other or further exercise thereof or the exercise of any other right, remedy, power or privilege.

Confidential Information. All non-public, confidential or proprietary information of Seller, including but not limited to, specifications, samples, patterns, designs, plans, drawings, documents, data, business operations, customer lists, pricing, discounts or rebates, disclosed by Seller to Buyer, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential" in connection with this Agreement is confidential, solely for the use of performing this Agreement and may not be disclosed or copied unless authorized in advance by Seller in writing. Upon Seller's request, Buyer shall promptly return all documents and other materials received from Seller. Seller shall be entitled to injunctive relief for any violation of this Section. This Section does not apply to information that is: (a) in the public domain; (b) known to Buyer at the time of disclosure; or (c) rightfully obtained by Buyer on a non-confidential basis from a third party.

Force Majeure. Seller shall not be liable or responsible to Buyer, nor be deemed to have defaulted or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement when and to the extent such failure or delay is caused by or results from acts or circumstances beyond the reasonable control of Seller including, without limitation, acts of God, flood, fire, earthquake, explosion, governmental actions, war, invasion or hostilities (whether war is declared or not), terrorist threats or acts, riot, or other civil unrest, national emergency, revolution, insurrection, epidemic, lockouts, strikes or other labor disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials, materials or telecommunication breakdown or power outage.

Assignment. Buyer shall not assign any of its rights or delegate any of its obligations under this Agreement without the prior written consent of Seller. Any purported assignment or delegation in violation of this Section is null and void. No assignment or delegation relieves Buyer of any of its obligations under this Agreement.

Relationship of the Parties. The relationship between the parties is that of independent contractors. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture or other form of joint enterprise, employment or fiduciary relationship between the parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

No Third-Party Beneficiaries. This Agreement is for the sole benefit of the parties hereto and their respective successors and permitted assigns and nothing herein, express or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of these Terms.

Governing Law. All matters arising out of or relating to this Agreement are governed by and construed in accordance with the internal laws of the State or nation where Seller has its principal place of business, without giving effect to any choice or conflict of law provision or rule that would cause the application of the laws of any jurisdiction other than those of such State. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to the transactions contemplated by these Terms and Conditions.

Submission to Jurisdiction. Any legal suit, action or proceeding arising out of or relating to this Agreement shall be instituted in the courts of the State or nation where Seller has its principal place of business, and each party irrevocably submits to the exclusive jurisdiction of such courts in any such suit, action or proceeding.

Notices. All notices, requests, consents, claims, demands, waivers and other communications hereunder (each, a "**Notice**") shall be in writing and addressed to the parties at the addresses set forth on the face of the Sales Confirmation or to such other address that may be designated by the receiving party in writing. All Notices shall be delivered by personal delivery, nationally recognized overnight courier (with all fees pre-paid), facsimile (with confirmation of transmission) or certified or registered mail (in each case, return receipt requested, postage prepaid). Except as otherwise provided in this Agreement, a Notice is effective only (a) upon receipt of the receiving party, and (b) if the party giving the Notice has complied with the requirements of this Section.

Severability. If any term or provision of this Agreement is invalid, illegal or unenforceable in any jurisdiction, such invalidity, illegality or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

Survival. Provisions of these Terms which by their nature should apply beyond their terms will remain in force after any termination or expiration of this Order including, but not limited to, the following provisions: Insurance, Compliance with Laws, Confidential Information, Governing Law, Submission to Jurisdiction and Survival.

Amendment and Modification. These Terms may only be amended or modified in a written document stating specifically that it amends these Terms and is signed by an authorized representative of each party. Only the VP&GM of the Business or the General Counsel of CECO are authorized to approve.

12/8/22 ADWEST RTO COSTS

CECO Adwest

12/08/2022

LIBERTY ENVIRONMENTAL, INC
505 Penn Street, Suite 400
Reading, PA
19601

Attention: Gavin L. Biebuyck e-mail: gbiebuyck@libertyenviro.com
Tel: (610) 375-9301 x2008

Reference: RETOX Dual Chamber RTO System
Application: Cocoa Roaster
Our Reference: Proposal No. 22-0277-1

Dear Gavin L. Biebuyck,

We are pleased to submit our proposal covering the supply and installation of one (1) CECO Adwest RETOX 28.0RTO95 dual chamber RTO oxidizer system for your VOC emission control project for Mars Wrigley in Elizabethtown, PA. CECO Adwest is part of CECO Industrial Air and Fluid Solutions (www.cecoenviro.com), a global leader of air pollution control technology.

Our RETOX RTO systems provide lower capital and energy usage with higher operating efficiency compared to present oxidizer systems used for low VOC load processes. The RETOX RTO quoted in this proposal is designed to destroy 98% of volatile organic compounds (VOC's) and provide a nominal 95% primary heat recovery at full flow effectiveness which provides fuel free operation above inlet solvent loadings of approximately 3% of the L.E.L. with our **flameless NOx Free Natural Gas Injection (NGI)** operation. The CECO Adwest advanced NGI system provides more than a **30% reduction in fuel costs** compared to other oxidizers using burner/combustion air blower operation.

Each weather tight RETOX RTO system is shop-assembled on a compact skid which minimizes field assembly and installation costs and time. The system uses an energy saving induced draft fan design and utilizes a Maxon or equivalent natural gas burner for rapid 80 minutes cold start-up. An integral Allen Bradley CompactLogix PLC control system with Ethernet/telemetry capabilities provides automatic system operation and remote diagnostics. Also, there are no expensive catalyst, carbon bed additives or structured block media to replace and maintain.

CECO Adwest

Since 1977, CECO Adwest's RETOX RTO technical and sales team has been involved in the successful design and installation of over 4,100 RTO and oxidizer VOC control systems. Our clients include Eastman Chemicals, S. A. Recycling, Sonoco, Chemours, Honda, Johnson Controls, CSP Plastics, Fuji Seal, Adhesives Research, Navistar, Continental Tire, Altria, Mitsubishi, IBM, General Dynamics, MASCO, Goodyear, Alcoa, Georgia Pacific, Kimberly Clark, Honda, Hexcel Composites, Sealed Air, BP Oil, Mondelez, Hitachi, Norwich Pharmaceuticals, Devon Gas, and Saint-Gobain.

In summary, our RETOX RTO systems provide a reliable, market proven, and low maintenance solution to VOC abatement including:

- **RTO Fuel Savings of more than 30% – With Natural Gas Injection (NGI) & 97% HX**
- **Flameless RETOX No Nitrogen Oxide (NOx) NGI Operation**
- **One (1) Fan (Process Fan) Operation –** Lower Operational Costs
- **Simple, Zero Leakage Poppet Valve Flow Control with/Five (5) Year Warranty**
    - **(Requires Annual Adwest PM Visit)**
- **Vertical Poppet Valve Shafts –** Do not warp like horizontal Shafts
- **Low Pressure Drop/Low Cost –** Turbulent Flow - random Ceramic HX Media
- **Rapid 80 Minute Cold RTO Burner Startup Capability** (15 Minute Warm Start)
- **Skid Mounted, Low Profile Design –** For Ground, Roof or Indoor Installation
- **Operate Up To 25% LEL Inlet Solvent Loadings** with optional Hot Gas Bypass
- **Proven Allen Bradley, Maxon, Siemens, and Honeywell Components**
- **RTO Technical Service Support –** With Telemetry Diagnostics
- **Maxon or equivalent Natural Gas RTO Burner**
- **5 YEAR POPPET VALVE FLOW CONTROL WARRANTY!**

If you have any questions or would like additional information, please feel free to call me at the number below or Abbas Nadalizadeh in our Fullerton, CA office at # 513-872-9734 anytime! CECO Adwest looks forward to working with you on this project!

Very truly yours,

CECO ADWEST

Brian Cannon,
Vice President Marketing and Sales
bcannon@onececo.com
(716) 474-9462

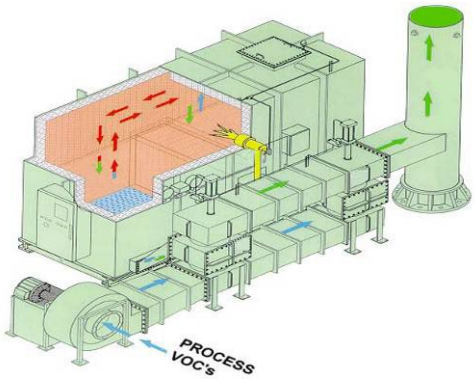
cc: Jeff Yerkes CECO Adwest 714-632-9801 jyerkes@OneCECO.com
cc: Andrew Nimrod CECO Adwest 714-632-9801 animrod@OneCECO.com

CECO Adwest

CECO INDUSTRIAL SOLUTIONS

FULLERTON, CALIFORNIA

RETOX DUAL CHAMBER
REGENERATIVE THERMAL OXIDIZER SYSTEM (RTO)



PROPOSAL FOR

LIBERTY ENVIRONMENTAL, INC

(28,000 SCFM)

OUR REFERENCE: PROPOSAL NO. 22-0277-1

12/08/2022

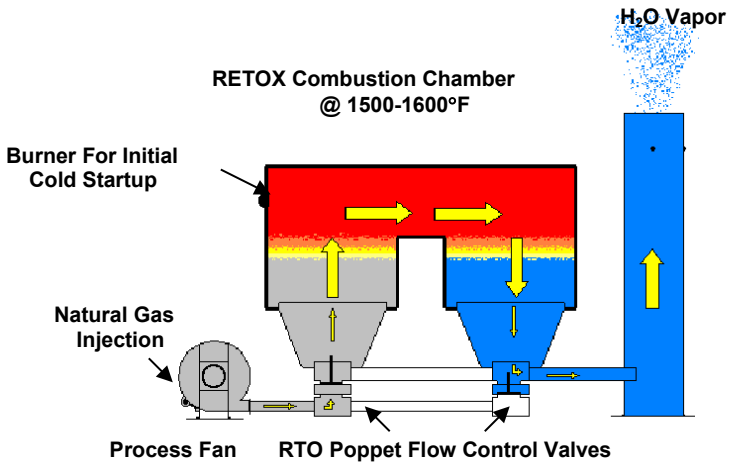
CALIFORNIA STATE CONTRACTORS
LICENSE NO. 1061685

680 Langsdorf Drive, Ste.102, Fullerton, CA 92831 TEL: (714) 632-9801- FAX: (714) 632-9812
www.CECOenviro.com/Adwest

RETOX RTO SYSTEM GENERAL DESCRIPTION

INTRODUCTION

CECO Adwest RETOX RTO Systems provides a proven and cost-effective way for volatile organic compounds (VOC's) and solvent-laden gas to be converted into carbon dioxide and water vapor.



EQUIPMENT

The RETOX RTO system consists of a reinforced, insulated dual chamber filled with low pressure drop ceramic heat exchanger media. The process gas flow is automatically controlled by a zero-leakage poppet valve mechanism which changes the direction of the gas flow at regular intervals via an integral programmable logic control (PLC) system. An external burner is used only for a rapid initial cold startup, typically 80 minutes. Only one RETOX fan is needed for normal RTO operation (i.e. No purge or Combustion air blowers).

PROCESS COMBUSTION

Due to the abundant oxygen content of the process gas, complete combustion readily occurs when the ignition point is reached in the RTO oxidizer (typically 1500-1600ºF). Process hydrocarbons are converted to harmless carbon dioxide and water vapor. With a sufficient concentration of VOCs in the incoming process gas, the exothermic of the solvents will be enough so that the destruction of VOC's will be self-sustaining with no auxiliary heat energy required from the fuel source.

HEAT RECOVERY

The high level of up to 95% heat recovery at full flow achieved is the result of regenerative heat transfer. The VOC laden process air enters a porous bed filled with high temperature, low pressure drop turbulent flow ceramic heat transfer media. The air is preheated by bed #1 to a maximum temperature, passes through a central combustion chamber where the hydrocarbons are oxidized to carbon dioxide and water vapor, and then exits a second bed where heat is transferred from the hot air back into the bed. To avoid an uneven temperature distribution in the RTO, the gas flow direction is changed automatically at regular intervals by the poppet valve flow

control mechanism to maintain even temperature profiles between the dual ceramic media chambers. Our turbulent flow media provides rapid RTO cold and warm startups vs. fragile block and monolith media that requires 3-6 hour startups.

CECO ADWEST CUSTOMER SERVICE

CECO Adwest provides 24/7/365 responsive technical customer service for both our RETOX RTO systems, as well as competitive RTO oxidizer units. Call CECO Adwest's responsive customer service group at (714) 632-9801 to schedule your preventative maintenance visit today. CECO Adwest provides service and parts for all brands of RTO, RCO and thermal oxidizers, as well as RTO heat transfer media and catalyst rebuilds/replacement. In addition, CECO Adwest can relocate your existing RTO and oxidizer systems, should you have a to move and relocate your process.

EQUIPMENT PRICING (US Dollars)

Total price for the supply and installation of one (1) CECO Adwest RETOX 28.0RTO95 regenerative thermal oxidizer as delineated in the attached engineering specification. (Ex-Works), USD

Description	Unit Price	Qty	Extended Price
Price Items A-1: RETOX 28.0RTO95	US$	1	US$ 1,237,579
Price Items A-2: RTO Installation (Excluding Startup and Training) on client supplied concrete pad. (See Installation and Scope of supply by others for additional details)	US$	1	US$ 62,692
Price Items A-3: OE Factory Certified Start-Up & Operator Training (1 Technician, Up to 7 days on site, includes travel expenses)	US$	1	US$ 25,525
Price Items A-4: Five (5) Year Poppet Valve Flow Control Warranty (Requires ADWEST Annual PM Visit)	US$	1	US$ Included
Price Items A-5: Flameless NGI NOx (free operation + energy savings)	US$	1	US$ Included
Price Items A-6: OE Factory Pre-Wired / Tested	US$	1	US$ Included
TOTAL BASE OFFER:			**US$ 1,325,796**

Term of Sale:	**Ex- Works (EXW) United States – Pre-Pay and Add**	
Payment Terms:	40% due with Purchase Order 30% due on submittal of drawings 20% due on notification prior to shipment 10% due at completion of RTO startup (not to exceed 60 days from shipment)	Due Upon Receipt of Invoice Due NET30 Due NET30 Due NET 30
RTO Shipment:	**3D Drawings** 3 - 4 weeks after approval of Purchase Order and deposit **Fabrication** 18 - 20 weeks after release of fabrication drawings*	

* Delivery is dependent upon availability of buy-out items, i.e. burners, fans VFDs, etc.

NOTE: Because of the volatility and rising costs of Alloy and Stainless Steel prices, among other raw materials, this Proposal is good for 15 days after the above date.

NOTE ON TAX EXEMPT CERTIFICATES: CECO is required by State Law to Invoice Sales Tax unless a TAX EXEMPT FORM/CERTIFICATE is provided to us at the time of Purchase Order. Please provide your Tax Exempt Certificates with the purchase order.

Should Customer delay approvals of Drawings (Over 2 weeks from Submittals) or acceptance of Equipment or Start-up (2 weeks from Notification), any respective amounts still outstanding become immediately due, Customer will be Invoiced accordingly and expressly agrees to pay in full.

Material Escalation – Pricing may be adjusted at any time up until approval of drawings for fabrication in the event of significant material cost increase or if system layout is changed. Material cost increase will be based on comparison of prices as of proposal date and price at time of drawing approval. Any price increase will be discussed and agreed between parties.
CECO Environment Inc, its Subsidiaries and freight partners will not accept responsibility: financially or otherwise for delivery delays in shipping oversized items when caused by obtaining permits from governmental agencies.

PURCHASE ORDERS: To insure proper and timely processing, a purchase order resulting from this proposal should **reference this proposal number** and be issued to:
CECO Adwest, A Brand of CECO Industrial Solutions Company, 680 Langsdorf Dr., Ste.102, Fullerton CA 92831

SCHEDULE

Our shipment is subject to confirmation at time of approval of drawings by Customer. Adwest Technologies, Inc. will work with you to coordinate the RETOX shipment schedule to meet your VOC control compliance schedule to the best of our abilities. Actual freight costs (Pre-Pay & ADD) will be invoiced at time of delivery.

CONDITIONS OF SALE

Notwithstanding any other paragraph contained in this entire proposal, our Conditions of Sale, for the equipment shall be incorporated herein and shall be applicable. All quoted prices based on current costs are firm only if shipment is made within six-months from date of quotation.

CANCELLATION FEES

In cases of cancellation of any order after said order has been acknowledged, the following schedule applies:

AFTER PURCHASE ORDER BUT PRIOR TO DRAWINGS SUBMITTAL	25%
AFTER DRAWING SUBMITTAL	40%
AFTER DRAWING APPROVAL AND PRIOR TO RECEIPT OF BUYOUTS	50%
AFTER DRAWING APPROVAL AND RECEIPT OF BUYOUTS	75%
AFTER FABRICATION BEGINS	85%-95%
AT COMPLETION OF FABRICATION	100%

Customer expressly agrees these amounts will become due and will be paid forthwith.

CANCELLATION OF CONTRACT

In the event of termination by Buyer, if Seller, at the time of such termination, shall have in stock or on firm order any completed or uncompleted items or any raw, semi-processed or completed materials for use in fulfilling this Agreement, Buyer may require Seller to deliver all or part of the completed or uncompleted items or any raw, semi-processed or completed materials to Buyer. If such requirement is executed and value of materials exceeds the Cancellation Fees as above, Buyer will adjust reimbursement to Seller accordingly.

POLICY OF CONTINUING QUALITY INNOVATION

In the interest of maintaining state of the art quality in our equipment, CECO Industrial Solutions, Inc. reserves the right to revise these specifications and incorporate suggested changes to include the latest improvements in the equipment design and vendor components and system hardware.

PROCEDURE AND INSURANCE REQUIREMENTS

Provisions must be made by Purchaser to ensure that condensation of the fumes and vapors does not occur on the ducting or heat transfer surfaces during the operation of this equipment. Should deposits of this nature take place, such that a potential of fire exists during running, upset or shutdown conditions, it will be necessary to install a fire extinguishing system to protect this equipment from damage. This system must be designed so that the extinguishing materials will not be allowed to enter the oxidizer, as damage to the equipment could result. These provisions are not included in this proposal.

The equipment selected will incorporate automatic features for protection and safety. However, while these features and their characteristics of operation afford a degree of safety, operation of the equipment is not to be considered free from all dangers and hazards inherent in the handling and firing of fuel. Proper operating techniques and maintenance procedures as specified in our manuals must be adhered to at all times.

NFPA 86 2011 Edition, Chapter 11 requires that the process exhaust be monitored for LEL (Lower Explosive Limit) if the LEL has the possibility to exceed 25%. CECO strongly recommends LEL monitoring and in fact, it is required for streams over 25% LEL. We have not included the cost for LEL monitoring in this proposal but would be happy to quote this as an option if desired.

Should the obtaining of FM approval require special equipment not covered in this specification (i.e. fire protection equipment, electrical interlocking of the oxidizer to the system), the cost of this equipment and obtaining of all permits or approvals required for installation and/or operation of this equipment is the responsibility of others.

ERECTION ASSISTANCE AND START-UP

Any contract resulting from this proposal will require start-up by an Adwest Service Technician to validate our warranty and guarantees. This will require a technical service representative to be present at the time of initial start-up and must give release of operation of the equipment in accordance with the Seller's operating and maintenance manual.

STARTUP AND TRAINING

Startup and Training services are included in the (A-2) portion of this proposal. The following services, equipment and expenses are included:

- Experienced and qualified labor, equipment, travel and living expenses to commission the VOC abatement system offered herein. Our pricing allows for up to seven (7) ten-hour days on-site for a single technician for both start-up of the equipment and operator and maintenance training
- Startup and training offered herein is based on working a single shift on contiguous days starting on a week day
- Additional overtime, weekend, and holiday hours will be billed at the rates in effect at time the services are provided. These additional charges ***have not*** been included in the pricing identified herein
- Three (3) week notice is required prior to the requested start date. During busy times of the year (July/December), additional notice may be required to secure your dates. In the

event that services are scheduled and then cancelled or postponed one week, or less, prior to the scheduled start date, a fee of $5,200 will be assessed
- We require an endorsed and dated Pre-Start-up checklist a minimum of five (5) business days prior to having the technician(s) travel to your site

SAFETY INSPECTIONS AND TESTING

RTO's are dependable and will provide reliable service for many years. In fact, users often forget it's part of their process as they operate with little attention for long periods. However this is only possible with routine maintenance and the National Fire Protection Association states that "documented safety inspections and testing shall be performed at least annually". (NFPA 86 Standard for Thermal Oxidizers 2011 Edition Chapter 10). Adwest will be able to give you this service by supplemental agreement. Please contact our office for further details.

DESIGN CRITERIA

The design criteria is for your VOC emissions as supplied by Mars Wrigley

	RETOX 28.0RTO95
Process Volume, (SCFM)	28,000
Process Gas Inlet Temp., ºF	140
Solvent Loading #/Hr.	8
Solvent Composition	Formaldehyde, Acrolein, Ethanol, Methanol -2
Negative Pressure Upstream of oxidizer, ("w.c.)	- 2

Jobsite Location: Elizabethtown, PA

The solvent composition tabulated above has been assumed to have a solvent heat of combustion of 10,025 BTU/# net.

Because of their corrosive nature, compounds containing halogens or organic acids may not be suitable for application in the oxidizer. Also, if low boiling hydrocarbons, **particulates** or **silicones** are present in the process stream such that the potential for condensation or plugging in the duct or media exists, these conditions should be reviewed by CECO Adwest engineering.

NOTE: ***CECO Adwest highly recommends the upfront purchase of a specific Spare Parts package for your RETOX system which can decrease potential oxidizer down times from three days to three hours, or less. Contact Adwest for Spare Parts list and current price.***

PERFORMANCE GUARANTEE

1. We make the following Performance Guarantee: If all of the Performance Conditions are satisfied (See Page 7 “Design Criteria”), then the Equipment will reduce the concentration of hydrocarbons measured at the discharge stack of the Equipment as compared to the concentration of hydrocarbons measured at the inlet of Equipment by an average of 98% or down to 25 ppm as C_1 in the stack. The Performance Conditions are defined in this specification under the heading of "Design Criteria". The Equipment must be operated within design limits of 1500ºF to 1600ºF oxidation temperature. 1500ºF should be specified for air quality permitting purposes.

2. The only Performance Guarantee made is that which is expressly stated in Paragraph 1 above. All other performance data contained in this Proposal or this Agreement or elsewhere are estimates or are for purposes of illustration only, and are not guaranteed.

3. The Performance Tests for determining whether the Performance Guarantee is satisfied shall be ineffective unless first reviewed and approved by us. We shall have the right and opportunity to witness the Performance Tests. In any event, the Performance Tests shall consist of simultaneous measurements of hydrocarbon solvent loadings at the inlet and discharge stack, and methane, ethane or other natural gas injection hydrocarbon contribution shall be deducted from the measurements at the discharge stack. Performance Tests shall be at your expense, except as provided in Paragraph 4 below, and if the Performance Tests for any unit of Equipment are not completed before the expiration of the Test Limitation Period for that unit, which shall expire 12 months from date of shipment, then that unit of Equipment shall be deemed to have satisfied the Performance Guarantee, and we shall have no further obligation under this Performance Guarantee as to that unit.

4. If any unit of Equipment does not satisfy the Performance Guarantee as determined by the Performance Tests, then we shall, at our option, either: (a) repair, replace, or modify such unit of Equipment until it satisfies the Performance Guarantee.

5. ADWEST MAKES NO GUARANTEES ON ODOR REMOVAL WITHOUT SITE SPECIFIC PROCESS STREAM HYDROCARBON ANALYSIS AND COMPUTER MODELING.

SYSTEM ENERGY CALCULATION

These RTO Energy calculations are based on design process flow and solvent composition rates as provided by Mars Wrigley.

		RETOX 28.0RTO95	RETOX 17.5RTO95	IDLE MODE
1.	Process Flow Rate, SCFM	28,000	17,500	7,000
2.	Oxidizer Inlet Temp, ºF	140	140	70
3.	Oxidizer Outlet Temp., ºF	218	218	129
4.	Oxidation Temperature, ºF	1,550	1,550	1,550
5.	VOC Composition Rate, #/Hr.	8	6	0
6.	Heating Value of VOCs, Btu/#	10,025	10,025	0
7.	Net Energy from VOCs, MMBTU/Hr	0.079	0.059	0.000
8.	Energy Required, MMBTU/Hr	2.575	1.712	0.743
9.	Energy Cost/Hr @ $ 4.50/MMBTU	$10.30	$6.85	$ 2.97
10.	Fan Horsepower	113.2	71	9.5
11.	Fan Energy Usage, KW	91.6	57	7.7
12.	Fan Energy Cost/Hr. @ $.09/KWH	$ 7.33	$4.58	$ 0.62
13.	Total Operating Costs, $/Hr	$17.63	$11.43	$ 3.59

NOTES:

1. *The above tabulation is for comparison purposes only and does not include casing heat losses.*
2. *For Air Quality permitting purposes, use a combustion chamber temperature of greater than 1500ºF.*
3. *Maximum process flow turndown is 4:1 without outside makeup air.*
4. *The unit proposed will operate Fuel Free at 272 #/Hr @10,025 btu/lb and greater inlet VOC loadings.*

UTILITY REQUIREMENTS

Customer is to provide the following utilities for the oxidizer system.

1. Natural gas 7,225 SCFH @ 5 PSI minimum at natural gas piping connection on oxidizer (cold start-up/high fire condition)
2. Electricity at 460 volt 3 phase 60 HZ, 263.75 Full Load Amps to RTO control panel disconnect
3. Clean/dry compressed (-40F dew point rated) air 720 CFH @ 90 PSIG at air piping connection on oxidizer
4. Dedicated Ethernet line to RTO control panel for VPN Modem

MAXIMUM PROCESS FAN CONDITIONS

RETOX 28.0RTO95

- 31,698 ACFM @ 140º F
- 18” w.c. total (- 2” w.c. at fan inlet)
- 113.2 BHP @140º F
- Arrangement # 8
- AirPro, Twin City or Equal Induced Draft Fan
- WEG, Westinghouse, TECO or equal Premium Fan Motors

Note: Please advise CECO Adwest if fan, controls and RTO are to be installed in a classified duty/hazardous duty area. This will require upgraded Class 1, Division 2 controls and system design at additional cost.

SCOPE OF SUPPLY

Type: One (1) Model RETOX 28.0RTO95 regenerative oxidizer system with a nominal 95 percent thermal efficiency.

Weight: 108,200 pounds excludes fan, motor, and stack

Dimensions: 35'-8" long plus process fan
22'-6" wide
12'-2" high

EQUIPMENT INCLUDED

- Heat transfer media-Turbulent Flow, low pressure drop Random packings-95% HX
- Bed casing, 3/16” all welded induced draft **304SS** shell
- Two 30” x 30” bed access doors **304SS**
- Inlet and outlet plenums **304SS**
- Casing insulation – Internal shop installed high density SuperWool or equal ceramic fiber
- Nozzle mix natural gas burner with NFPA 86 natural gas pipe train and combustion air blower (10 H.P.)
- Natural gas injection system (NGI)-for Flameless NOx-Free Operation
- Two (2) process flow control valves **304SS** with pneumatic operators
- System controls including Allen Bradley programmable Compact Logix processor and PanelView 7 Plus (6”) Color Touch Screen with tamper protected data
- UL or CUL stamped control panel
- Telemetry system with remote diagnostics capability
- High temperature paint
- One installation, operation, and maintenance instruction manual and one (1) CD Copy
- Process fan w/ **304SS airstream**, motor and 150 HP Variable Frequency Drive
- Fan to oxidizer transition **304SS**
- Compressed air surge tank with controls
- Integral support skid
- Exhaust stack (ø42" x 50') in **304SS** with EPA Test Ports
- Make up air and blocking damper tee (ø46"x28") **304SS** with controls

DESCRIPTION OF EQUIPMENT

Heat Transfer Media-95% Heat Transfer Recovery

Our RETOX RTO high temperature ceramic heat transfer media supplied will consist of turbulent flow silica/alumina saddle media, selected to provide the highest heat recovery and turbulence with the lowest pressure drops for this application. When shipping limits permit, (units below 10,000 SCFM) the heat transfer media will be factory installed to reduce hours for field installation of the unit.

Bed Casing Insulation

The bed casings are internally insulated with 6 inches of high density (10.6 Lbs. Density) of compressed ceramic fiber insulation (SuperWool or equal) rated at 2300ºF which is factory installed.

Bed Casing 3/16" Plate 304SS

The bed casing design consists of all-welded construction, externally stiffened to withstand the pressure requirements of the induced draft fan and the lateral loads from the heat transfer surface making up the beds.

Inlet and Outlet Plenums 3/16" Plate 304SS

The inlet and out plenums are designed to provide the most efficient flow distribution into and out of the porous bed and are constructed from externally stiffened carbon steel plates. The plenum walls do not require insulation for the LEL levels specified for this application.

Casing Access Openings 3/16” Plate 304SS

The ceiling structure of the upper plenum is constructed such that access to the heat transfer media and burner is available to perform routine inspections.

RTO Burner Assembly

The RTO burner is a Kinemax nozzle mix style by Maxon or equivalent and is utilized only for unit cold and warm start-ups. An NFPA 86 designed natural gas piping train is also provided.

Natural Gas Injection System (NGI)-Flameless Operation

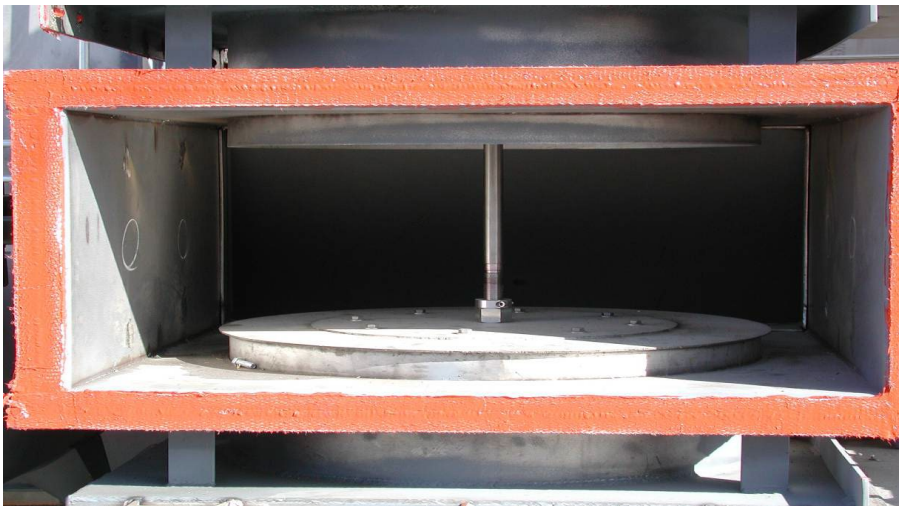
A natural gas injection system is utilized to allow the RETOX to be operated without the use of the main burner in Flameless NOx-Free Operation. This eliminates the need for combustion air and reduces the fuel consumption by more than 30%.

RTO Offline Bake-Out (Included, As required)

The RTO oxidizer control logic does include an off-line RTO bake-out mode feature. This feature will allow the cold face of the heat exchanger bed media to be elevated to a temperature of 600ºF-700ºF for the purpose of volatilizing (i.e. baking-out) any residual condensed organic hydrocarbons.

Two (2) Process Flow Control Poppet Valves 304SS

The oxidizer module contains two (2) vertical flow control poppet valves used to switch (regenerate) the direction of the process stream through the RTO oxidizer and the two (2) chambers of ceramic heat transfer media. The valves are operated by two pneumatic actuators requiring clean, dry compressed air at 720 CFH, -40°F and 90 psig. If the air is not dry, freeze protection may be required and is not included. These valves are guaranteed for five (5) years (Requires annual Adwest Service PM visit), and do not require a purge air fan. They can be worked on and adjusted without cooling down the RTO.



System Controls and Instrumentation

The control panel (located on the oxidizer) is prewired, labeled, shop simulation tested, complete and ready for connections to plant power source. Control panel not to be mounted in direct sunlight. Based on RTO orientation customer shading maybe required. The panel will be designed to NEMA 3R standards and suitable for outdoor installation. The panel will contain the following:

Door mounted items

- Selection switches for mode of operation
- Allen Bradley PanelView 7 Plus Color 6" Touchscreen HMI with tamper protected data man-machine interface.
- Selection push buttons for process blower, burner/start/stop and maintenance reset.
- Fault push-button

Internal mounted

- Main incoming 460V fused disconnect, 3-phase
- Honeywell flame safeguard
- Honeywell burner management system
- Combustion air motor starter/disconnect
- Rockwell/Allen-Bradley CompactLogix™ (ethernet) processor having telemetry capabilities via VPN access
- Panel heater and air conditioner
- Control power transformer (120v)
- VPN Ethernet Modem
- Variable frequency drive

Other items include flow diversion valves with solenoids, hand valve, filter, and regulator, for the compressed air piping train. Also included is a low compressed air pressure switch, proof of air flow differential pressure switch, high temperature limit switch mounted in the exhaust, and miscellaneous thermocouples. Controls of the thermal oxidizer shall be based on Adwest's standard design, programming and P & ID philosophy.

The Allen Bradley PLC processor is supplied with a telemetry system which allows the Adwest service department to remotely monitor the system operation. A dedicated Ethernet line to the control panel is required to enable Adwest personnel to communicate and remotely make program changes if required during start-up or future trouble shooting.

Fan, Motor and Drive

The oxidizer is equipped with a heavy duty, induced draft Industrial Blower (AirPro or equal). The fan includes 304 stainless steel air stream parts, a drive motor and guards. The drive motor is suitable for use with a 460 volt, three-phase, 60 Hertz power supply. RTO and combustion fan vibration isolation systems, sensors, switches and expansion joints not included unless required per provided process conditions or at customer's request.

Process Fan to Unit Duct 304SS

The process fan to unit duct is fabricated from 3/16" 304 stainless steel. The duct is supplied with a predrilled flange for ease of connection. External insulation of process fan and fan to unit duct is by others if required.

Exhaust Stack 304SS

A freestanding 304 stainless steel exhaust stack is designed per STS-1 with consideration of local seismic and wind conditions. Two (2) 3" test ports are provided in accordance with EPA guidelines. Access ladder and platform can be included upon request.

Paint

All exposed surfaces of the oxidizer and stack will be coated with two (2) coats of our high temperature silicone alkyd resin DTM paint (black, brown, and gray).

RETOX RTO ILME Multi-pole Rectangular Connectors NEMA 4

Adwest provides our RTO clients with the highest level of electrical and mechanical shop assembly to provide rapid RTO installation time. Our larger RETOX RTO's utilize an ILME Multi-pole Rectangular Connectors "cam lock" quick connection to provide easy and secure electrical connections in the field.

Installation, Operation and Maintenance Instruction Manuals

The CECO Adwest Technical Services Department will furnish one (1) hard copy and one (1) CD Copy of the operation and maintenance instruction manual.

INSTALLATION SPECIFICATION

Applies Only If Installation Option Has Been Purchased

To Be Furnished By CECO Adwest

1. Merit shop mechanical and electrical erection of one (1) CECO Adwest RETOX RTO thermal oxidizer system, ground-mounted at your facility including filling of heat exchanger media, induced draft oxidizer fan with motor, controls, stack, start-up, training, rigging, crane rental, and Adwest Project engineering.

2. Electrical installation of main control panel at the oxidizer unit, thermocouples and actuators and NEMA 3R AC drive for process air blower. (Note: Electrical and power wiring, conduit of all remote panels or Main Control panels not shop mounted on the RTO are by others. All surge protection is not included and is by others.

3. All electrical power at motor disconnects as required.

4. Services of an CECO Adwest field serviceman to perform initial equipment startup.

5. Erection management services to integrate activities of Adwest for the successful and timely completion of the project.

6. Merit shop labor, tools and material necessary to unload, position and install equipment supplied by CECO Adwest.

7. All work is based on standard weekday labor and does not include premium or Holiday time utilized to expedite the installation.

8. Inspection of all equipment as it arrives on the jobsite with respect to shipping damage and completeness of shipments in accordance with the bill-of-lading.

9. Merit shop labor, equipment and material necessary to touch-up marked areas on equipment.

SCOPE OF SUPPLY BY OTHERS

The Following Work is Not Included Whether Installation Is Purchased Or Not

1. Level Concrete foundations and/or steel support platforms per CECO Adwest Foot loadings. Stack mounting bolts, stack grouting, stack electrical grounding and fan base concrete.

2. Free, secure and unobstructed access to the work site, including maintained secured storage areas and roadways. Ground conditions shall be suitable for heavy equipment

operation and installation. Must be free of debris, ice, snow, etc. NOTE: Crane must have access to within 5' of the foundation or larger crane may be needed at additional cost to customer.

3. Power supply of 460 volt, 60 cycle, three phase. Electrical connection of Main RTO Control panel to any remote CP 102 or 103 control panels.

4. Provisions for obtaining FM, CSA, TSSA, IRI, NFPA, MOE, PE, OSHA or other required approvals, permits and inspections.

5. Facilities for erection supervision, equipment staging, storage and dumpster bins for any site cleanup by our crew.

6. Natural gas at 5 Psig and clean dry compressed air at 90 Psig.

7. All city, local, county, state, provincial, Federal EPA, MOE operator permits, inspections and associated costs and inspection fees.

8. UL and CUL approval of oxidizer if required. PE Stamps, Inspections and approval by others

9. Sales Tax, duties, GST, personal, and corporate income taxes, etc. on project. NOTE: Customer to provide Tax Exempt Certificates to CECO Adwest at time of purchase order.

10. Air Board Compliance testing by third party stack testing Firms. CECO Adwest to approve RTO stack test protocols and methods and the be able to witness the stack test at our option.

11. Utilities brought to and terminated at the RTO connection points.

12. Process duct brought to RTO inlet flange and duct insulation if required.

13. All electrical power, natural gas and compressed air utility disconnects, surge protection and meters if required. NOTE: Please advise if RTO is to be installed in a Hazardous Duty or Classified Duty location so we can quote an option for Class 1, Div 2 upgrades.

14. Gas fired ovens, dryers, etc. must have separate purge fans and atmospheric dampers to comply with NFPA codes.

15. Process interlocks/interconnecting wiring between the RTO and the production/process equipment is the responsibility of the Buyer.

16. In the event the VFD controlling the RTO process fan is not mounted on the RTO, the electrical wiring and electrical installation/conduit of the VFD from the CP101 and other panels and to the fan motor is the responsibility of the Buyer.

17. Our steel supply is designed for our equipment loadings only. No external loads are to be applied.

18. Personnel protection, security fencing, lighting and convenience outlets.

19. Freight (billed at actual cost to client plus 10% handling). Shrink wrap can also be provided at additional cost if required and is not included.

20. All other items and services not specifically included by Adwest scope of supply.

21. Pre-filtration of an particulates prior to entering the proposed RETOX RTO. CECO Adwest can provide a pre-filtration system if required at additional cost.

CECO Adwest Rate Sheet

2022 FIELD SERVICE RATES (US)

The Purchaser shall issue a purchase order to CECO Adwest for the services to be performed. On receipt of a purchase order, a service technician shall be assigned to carry out the order. Payment is due upon presentation of invoice.

The Purchaser shall pay CECO Adwest for the time, expenses, and materials required by each service technician to accomplish the work ordered by the Purchaser. Charges are made according to the schedule of charges below.

CHARGES	PER DAY	PER HOUR
Weekday (up to 8 hrs)	$1,548.00	$193.50
Overtime (>8 hrs, up to 12 hrs)	-	$290.25
Weekend (up to 8 hrs)	$2,322.00	$290.25
Overtime (>8 hrs, up to 12 hrs)	-	$387.00
Holidays	-	$580.50
Travel (weekday)	$1,500.00	-

The above rates apply to non-emergency services scheduled three (3) business days or more in advance. Emergency service response with less than three (3) business days' notice will be subject to a premium of 25%.

Material used to perform the work ordered by the Purchaser, or left with him at his order, is charged for at the current CECO Adwest sell price.

The minimum period of time charged for travel time or field service is four (4) hours. Service time starts when the service technician leaves his/her home base and it ends upon his/her return home. Travel time will be invoiced as follows:

- 1-4 hrs = 4 hr minimum charge
- 4-8 hrs = 8 hr minimum charge

In addition to the above, Living Expenses (per diem) and Travel Expenses (car rental, lodging, and/or airfare) will be charged. If it is necessary to travel by company or personal car, the rate is $0.85 per mile.

The daily service charge is for all or part of the first eight (8) hours of service during normal working hours (8:00 AM through 5:00 PM, with one hour for lunch). Travel time is included in figuring the hours worked in any one day.

CECO Adwest shall not be liable to purchaser, for any consequential, incidental, or special damages of any nature, including but not limited to loss of profits, loss of use or loss by reason of plant shutdown, in the execution of this service.

Waiting time during which the CECO Adwest service technician is ready, willing, and able to work shall be regarded as having been actually worked by him, even though his services are not in fact used if such idle time results from Purchaser's cause, request, or requirement.

ALL RATES AND PRICES SUBJECT TO CHANGE WITHOUT NOTICE

GENERAL TERMS AND CONDITIONS FOR THE SALE OF GOODS AND SERVICES

Applicability.

These terms and conditions of sale (these "**Terms**") are the only terms which govern the sale of the goods, including equipment, machinery, materials, consumables (collectively, "**Goods**") and services ("**Services**") by CECO Environmental Corp. and all of its affiliated companies (collectively, "**Seller**") to the buyer named on the signature line of these Terms ("**Buyer**"). Any provisions or conditions of Buyer's order which are in any way inconsistent with, or in addition to these Terms shall not be binding on Seller, and shall not be applicable, except with Seller's written acceptance.

The accompanying quotation (the "**Sales Confirmation**") and these Terms (collectively, this "**Agreement**") comprise the entire agreement between the parties, and supersede all prior or contemporaneous understandings, agreements, negotiations, representations and warranties, and communications, both written and oral. These Terms prevail over any of Buyer's general terms and conditions of purchase regardless whether or when Buyer has submitted its purchase order or such terms. Fulfillment of Buyer's order does not constitute acceptance of any of Buyer's terms and conditions and does not serve to modify or amend these Terms.

Notwithstanding anything to the contrary contained in this Agreement, Seller may, from time to time change the Services without the consent of Buyer provided that such changes do not materially affect the nature or scope of the Services, or the fees or any performance dates set forth in the Sales Confirmation.

Delivery of Goods and Performance of Services.

The Goods will be shipped within a reasonable time after the receipt of Buyer's purchase order. Seller shall not be liable for any delays, loss or damage in transit.

Unless otherwise agreed in writing by the parties, for shipments within the continental USA, Seller shall ship the Goods FCA (per Incoterms 2010) from Seller's factory to the designated delivery location (the "**Delivery Point**"). For international shipments, Seller shall ship the Goods Ex Works (per Incoterms 2010). The Goods shall be shipped using Seller's standard methods for packaging and shipping such Goods. Buyer shall take delivery of the Goods within ten (10) days of Seller's written notice that the Goods have been shipped to the Delivery Point. Buyer shall be responsible for all loading costs and provide equipment and labor reasonably suited for receipt of the Goods at the Delivery Point.

Seller may, in its sole discretion, without liability or penalty, make partial shipments of Goods to Buyer. Each shipment will constitute a separate sale, and Buyer shall pay for the units shipped whether such shipment is in whole or partial fulfillment of Buyer's purchase order.

If for any reason Buyer fails to accept delivery of any of the Goods on the date fixed pursuant to Seller's notice that the Goods have been delivered at the Delivery Point, or if Seller is unable to deliver the Goods at the Delivery Point on such date because Buyer has not provided appropriate instructions, documents, licenses or authorizations: (i) risk of loss to the Goods shall pass to Buyer; (ii) the Goods shall be deemed to have been delivered; and (iii) Seller, at its option, may store the Goods until Buyer picks them up, whereupon Buyer shall be liable for all related costs and expenses (including, without limitation, storage and insurance).

Seller shall use commercially reasonable efforts to meet any performance dates to render the Services specified in the Sales Confirmation, and any such dates shall be estimates only.

With respect to the Services, Buyer shall (i) cooperate with Seller in all matters relating to the Services and provide such access to Buyer's premises, and such office accommodation and other facilities as may reasonably be requested by Seller, for the purposes of performing the Services; (ii) respond promptly to any Seller request to provide direction, information, approvals, authorizations or decisions that are reasonably necessary for Seller to perform Services in accordance with the requirements of this Agreement; (iii) provide such customer materials or information as Seller may reasonably request to carry out the Services in a timely manner and ensure that such customer materials or information are complete and accurate in all material respects; and (iv) obtain and maintain all necessary licenses and consents and comply with all applicable laws in relation to the Services before the date on which the Services are to start.

Any and all data books, instructions, operating manuals and specifications documents will be provided by Seller in an electronic format free of charge. Bound versions may be provided at Buyer's request, subject to additional charges.

Non-Delivery.

The quantity of any installment of Goods as recorded by Seller on dispatch from Seller's place of business is conclusive evidence of the quantity received by Buyer on delivery unless Buyer can provide conclusive evidence proving the contrary.

Seller shall not be liable for any non-delivery of Goods (even if caused by Seller's negligence) unless Buyer gives written notice to Seller of the non-delivery within ten (10) days of the date when the Goods would in the ordinary course of events have been received.

Any liability of Seller for non-delivery of the Goods shall be limited to replacing the Goods within a reasonable time or adjusting the invoice respecting such Goods to reflect the actual quantity delivered.

Title and Risk of Loss. Title and risk of loss passes to Buyer upon Seller's delivery to the Delivery Point unless otherwise specified. As collateral security for the payment of the purchase price of the Goods, Buyer hereby grants to Seller a lien on and security interest in and to all of the right, title and interest of Buyer in, to and under the Goods, wherever located, and whether now existing or hereafter arising or acquired from time to time, and in all accessions thereto and replacements or modifications thereof, as well as all proceeds (including insurance proceeds) of the foregoing. The security interest granted under this provision constitutes a purchase money security interest under the Uniform Commercial Code.

Buyer's Acts or Omissions. If Seller's performance of its obligations under this Agreement is prevented or delayed by any act or omission of Buyer or its agents, subcontractors, consultants or employees, Seller shall not be deemed in breach of its obligations under this Agreement or otherwise liable for any costs, charges or losses sustained or incurred by Buyer, in each case, to the extent arising directly or indirectly from such prevention or delay.

Inspection and Rejection of Nonconforming Goods and Services.

Buyer shall inspect the Goods within ten (10) days of receipt ("**Inspection Period**"). Buyer will be deemed to have accepted the Goods unless it promptly notifies Seller in writing of any Nonconforming Goods during the Inspection Period and furnishes such written evidence or other documentation as reasonably required by Seller. "**Nonconforming Goods**" means only the following: (i) product shipped is different than identified in Buyer's purchase order; or (ii) product's label or packaging incorrectly identifies its contents.

If Buyer timely notifies Seller of any Nonconforming Goods, Seller shall, in its sole discretion, (i) replace such Nonconforming Goods with conforming Goods, or (ii) credit or refund the Price for such Nonconforming Goods, together with any reasonable shipping and handling expenses incurred by Buyer in connection therewith. Buyer shall ship, at its expense and risk of loss, any allegedly Nonconforming Goods to Seller's facility. If Seller determines that the Goods are Nonconforming Goods, and exercises its option to replace Nonconforming Goods, Seller shall, after receiving Buyer's shipment of Nonconforming Goods, ship to Buyer, at Seller's expense and risk of loss, the replaced Goods to the Delivery Point, and shall reimburse Buyer for its return shipping costs.

If Buyer timely notifies Seller of material deficiencies in the performance of the Services, Seller shall undertake to reperform the Services within a reasonable time.

Buyer acknowledges and agrees that the remedies set forth in **Section 0 and 00** are Buyer's exclusive remedies for the delivery of Nonconforming Goods and deficient Services.

In no event shall Goods be considered Nonconforming for purposes hereof due to the Goods bearing a different, superseding or new part number or version number for the specified part number, provided that the Goods in question are substantially the same part as specified in Buyer's order

Changes. Changes to Buyer's order shall be handled as follows:

Each party may at any time propose changes in the specifications of the Goods or Services, delivery schedules or scope of supply under these Terms (a "**Change**"). Seller is not obligated to proceed with any Change until both parties agree upon such Change in a written Change Order describing the Change and the resulting changes in Price and other provisions, as the parties may mutually agree. A Change may also be caused by changes in Buyer's site-specific requirements or procedures, industry specifications, codes, standards or applicable laws or regulations.

Upon such Changes, the Price, delivery schedule and the other provisions of these Terms will be adjusted to reflect additional costs or obligations incurred by Seller resulting from such Changes; provided, however, no adjustments will be made on account of a general change to Seller's manufacturing or repair facilities resulting solely from a change in applicable laws or regulations applicable to such facilities. Unless otherwise agreed by the parties in a Change Order, pricing for Seller's additional work resulting from a Change shall be at Seller's then-current time and material rates.

Notwithstanding the foregoing provisions of this **Section 0**, it shall not be considered a Change for purposes hereof solely due to Seller's delivery of Goods bearing a different, superseding or new part number or version number for the specified part number, provided that the Goods in question are substantially the same part as specified in Buyer's order.

Price.

Buyer shall purchase the Goods and Services from Seller at the prices (the "**Prices**") set forth in Seller's quotation or bid. Prices may be increased by Seller before delivery of the Goods, due to Buyer's order modifications, changes to specifications, or delays caused by Buyer. In such event, these Terms shall be construed as if the increased prices were originally inserted herein, and Buyer shall be billed by Seller on the basis of such increased prices..

Buyer agrees to reimburse Seller for all reasonable travel and out-of-pocket expenses incurred by Seller in connection with the performance of the Services.

All Prices are exclusive of all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any Governmental Authority on any amounts payable by Buyer. Buyer shall be responsible for all such charges, costs and taxes; provided, that, Buyer shall not be responsible for any taxes imposed on, or with respect to, Seller's income, revenues, gross receipts, personnel or real or personal property or other assets.

Payment Terms.

Buyer shall pay all invoiced amounts due to Seller within thirty (30) days from the date of Seller's invoice. Unless otherwise provided in Seller's quotation, Buyer shall make all payments hereunder in US dollars.

Buyer shall pay interest on all late payments at the lesser of the rate of 1.5% per month or the highest rate permissible under applicable law, calculated daily and compounded monthly. Buyer shall reimburse Seller for all costs incurred in collecting any late payments, including, without limitation, reasonable attorneys' fees. In addition to all other remedies available under these Terms or at law (which Seller does not waive by the exercise of any rights hereunder), Seller shall be entitled to suspend the delivery of any Goods or performance of any Services if Buyer fails to pay any amounts when due hereunder and such failure continues for ten (10) days following written notice thereof.

Progress payments specified in the Sales Confirmation will apply if the total Prices for the Goods and Services purchased hereunder is equal to or greater than $250,000.00 USD.

Buyer shall not withhold payment of any amounts due and payable by reason of any set-off of any claim or dispute with Seller, whether relating to Seller's breach, bankruptcy or otherwise.

Suspensions and Cancellations.

No cancellations of an order or any portion of an order by Buyer will be effective unless accepted by Seller in writing. Accepted cancellations will be subject to a charge to cover all costs and expenses incurred by Seller through the date of cancellation, plus reasonable cancellation costs and a reasonable profit margin on the completed work. Cancellation of orders for Goods made to order and not part of Seller's regular stock will not be accepted after fabrication has commenced.

In the event Buyer suspends Seller's performance of work, Buyer shall reimburse Seller for all costs incurred by Seller as a result of the suspension, including, without limitation, all borrowing and opportunity costs. In the event a suspension exceeds 180 days in duration, in addition to being entitled to full reimbursement of costs, Seller shall have the unqualified right to cancel the unfinished portion of the order without liability.

Neither party shall be liable to the other for a delay to the extent caused by such a force majeure event, but only if the party affected provides prompt written notice to the counterparty of the occurrence of the force majeure event. For the avoidance of doubt, "force majeure event" shall include any pandemic, epidemic or disease recognized by the World Health Organization, including COVID-19.

Limited Warranty.

Subject to the other provisions of this Section 0, Seller warrants to Buyer that for a period of the lesser of eighteen (18) months from the date of readiness for shipment of the Goods, or twelve (12) months after the Goods are successfully commissioned ("**Goods Warranty Period**"), that such Goods will materially conform to the specifications set forth in Buyer's order and will be free from material defects in material and workmanship. The warranty for Services shall expire one (1) year after performance of the service, except that the warranty for software-related Services shall expire ninety (90) days after the performance thereof ("**Services Warranty Period**"). Seller shall have no liability for defects that arise after the warranty period has expired. These Warranty Periods may not be extended without Seller's express written agreement.

Seller warrants to Buyer that it shall perform the Services using personnel of required skill, experience and qualifications and in a professional and workmanlike manner in accordance with generally recognized industry standards for similar services and shall devote adequate resources to meet its obligations under this Agreement.

Any performance guarantee of Seller relating to the Goods with regard to compliance with any governmental specifications, including, without limitation, particulate levels or pollution controls, are specifically limited to the time of commissioning or start-up of the Goods in question. It is the Buyer's responsibility to properly maintain the Goods, monitor system performance and take corrective actions.

EXCEPT FOR THE WARRANTIES SET FORTH IN SECTIONS 0 AND 0, SELLER MAKES NO WARRANTY WHATSOEVER WITH RESPECT TO THE GOODS OR SERVICES, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; OR (c) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY, WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.

Products manufactured by a third party other than Seller's agents and subcontractors ("Third Party Product") may constitute, contain, be contained in, incorporated into, attached to or packaged together with, the Goods. Third Party Products are not covered by the warranty in Section 0. For the avoidance of doubt, **SELLER MAKES NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO ANY THIRD PARTY PRODUCT, INCLUDING ANY (a) WARRANTY OF MERCHANTABILITY; (b) WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE; (c) WARRANTY OF TITLE; OR (d) WARRANTY AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OF A THIRD PARTY; WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE.** To the extent that Seller is entitled to assign any warranty of a third-party manufacturer, Seller will assign such warranties to Buyer.

Seller shall not be liable for a breach of the warranties set forth in **Section 0** and **Section 0** unless: (i) Buyer gives written notice of the defective Goods or Services, as the case may be, reasonably described, to Seller within ten (10) days of the time when Buyer discovers or ought to have discovered the defect; (ii) if applicable, Seller is given a reasonable opportunity after receiving the notice of breach of the warranty set forth in **Section 0** to examine such Goods and Buyer (if requested to do so by Seller) returns such Goods to Seller's place of business at Buyer's cost for the examination to take place there; and (iii) Seller reasonably verifies Buyer's claim that the Goods or Services are defective. If Seller determines the Goods are defective, Seller shall reimburse Buyer's costs of shipping the Goods to Seller for examination.

Seller shall not be liable for a breach of the warranty set forth in **Section 0** and **Section 0** if: (i) Buyer makes any further use of such Goods after giving such notice; (ii) the defect arises because Buyer failed to follow Seller's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods; or (iii) Buyer alters or repairs such Goods without the prior written consent of Seller.

Seller's warranties set forth in **Section 00** and **Section 00** are further conditioned on: (a) the proper storage, installation, operation and maintenance of the Goods and conformance with the proper operation instruction manuals provided by Seller or its suppliers or subcontractors; (b) Buyer keeping proper records of operation and maintenance during the applicable Warranty Period and providing Seller access to those records; and (c) modification or repair of the Goods only as authorized by Seller in writing. Seller does not warrant products or any repaired or replacement parts against normal wear and tear or damage caused by misuse, accident or use against the advice of Seller. Any modification or repair of Goods not authorized by Seller shall render the warranty null and void.

Electrical components, excluding motors, are warranted only to the extent warranted by the original manufacturer. To the extent that Seller is entitled to pass through a warranty of the original equipment manufacturer of the electrical goods sold, Seller will pass through such warranties to Buyer. Seller uses commercially reasonable efforts to utilize materials that resist rust, but the warranty on metal and stainless steel components DOES NOT COVER RUST, OXIDATION, FADING or other BLEMISHES unless it also results in a loss of structural integrity or a failure of these components.

Subject to **Section 0** and **Section 0** above, with respect to any such Goods during the Warranty Period, Seller shall, in its sole discretion, either: (i) repair or replace such Goods (or the defective part) or (ii) credit or refund the price of such Goods at the pro rata contract rate provided that, if Seller so requests, Buyer shall, at Seller's expense, return such Goods to Seller. **ALL COSTS OF ACCESSING, DISMANTLING, DECONTAMINATION, AND REINSTALLATION OF GOODS, COST OF FREIGHT AND DREYAGE, AND THE TIME AND EXPENSES OF SELLER'S PERSONNEL FOR SITE TRAVEL AND DIAGNOSIS ONSITE UNDER THIS WARRANTY SHALL BE BORNE BY BUYER.**

Subject to **Section 0** and **Section 0** above, with respect to any Services subject to a claim under the warranty set forth in **Section 0**, Seller shall, in its sole discretion, (i) repair or re-perform the applicable Services or (ii) credit or refund the price of such Services at the pro rata contract rate.

THE REMEDIES SET FORTH IN SECTION 0 AND SECTION 0 SHALL BE THE BUYER'S SOLE AND EXCLUSIVE REMEDY AND SELLER'S ENTIRE LIABILITY FOR ANY BREACH OF THE LIMITED WARRANTIES SET FORTH IN SECTION 0 AND SECTION 0.

Intellectual Property Rights.

Buyer acknowledges and agrees that: (i) any and all Seller's intellectual property rights are the sole and exclusive property of Seller or its licensors; (ii) Buyer shall not acquire any ownership interest in any of Seller's intellectual property rights under this Agreement; (iii) any goodwill derived from the use by Buyer of Seller's intellectual property rights inures to the benefit of Seller or its licensors, as the case may be; (iv) if Buyer acquires any intellectual property rights, rights in or relating to any Goods (including any rights in any trademarks, derivative works or patent improvements relating thereto) by operation of law, or otherwise, such rights are deemed and are hereby irrevocably assigned to Seller or its licensors, as the case may be, without further action by either of the parties; and (v) Buyer shall use Seller's intellectual property rights solely for purposes of using the Goods under this Agreement and only in accordance with this Agreement and the instructions of Seller.

Buyer shall not: (i) take any action that interferes with any of Seller's rights in or to Seller's intellectual property rights, including Seller's ownership or exercise thereof; (ii) challenge any right, title or interest of Seller in or to Seller's intellectual property rights; (iii) make any claim or take any action adverse to Seller's ownership of Seller's intellectual property rights; (iv) register or apply for registrations, anywhere in the world, for Seller's trademarks or any other trademark that is similar to Seller's trademarks or that incorporates Seller's trademarks; (v) use any mark, anywhere that is confusingly similar to Seller's trademarks; (vi) engage in any action that tends to disparage, dilute the value of, or reflect negatively on the Goods or any Seller's trademarks; (vii) misappropriate any of Seller's trademarks for use as a domain name without prior written consent from Seller; or (viii) alter, obscure or remove any Seller's trademarks, or trademark or copyright notices or any other proprietary rights notices placed on the Goods, marketing materials or other materials that Seller may provide.

Seller's Intellectual Property Indemnification.

Subject to the terms and conditions of this Agreement, including **Section 0** and **Section 0**, Seller shall indemnify, defend and hold harmless Buyer from and against all losses awarded against Buyer in a final non-appealable judgment arising out of any claim of a third party alleging that any of the Goods or Buyer receipt or use thereof infringes any intellectual property right of a third party.

If the Goods, or any part of the Goods, becomes, or in Seller's opinion is likely to become, subject to a claim of a third party that qualifies for intellectual property indemnification coverage under this **Section 0**, Seller shall, at its sole option and expense, notify Buyer in writing to cease using all or a part of the Goods, in which case Buyer shall immediately cease all such use of such Goods on receipt of Seller's notice.

Notwithstanding anything to the contrary in this Agreement, Seller is not obligated to indemnify or defend Buyer against any claim (direct or indirect) under **Section 0** if such claim or corresponding losses arise out of or result from, in whole or in part, (i) Buyer's marketing, advertising, promotion or sale or any product containing the Goods; (ii) use of the Goods in combination with any products, materials or equipment supplied to Buyer by a person other than Seller or its authorized representatives, if the infringement would have been avoided by the use of the Goods not so combined; (iii) any modifications or changes made to the Goods by or on behalf of any person other than Seller or its representatives, if the infringement would have been avoided without such modification or change; or (iv) Buyer's failure to use any updated or corrected version of the Goods; or (v) Seller's adherence to Buyer's specifications.

THIS SECTION 0 SETS FORTH THE ENTIRE LIABILITY AND OBLIGATION OF SELLER AND THE SOLE AND EXCLUSIVE REMEDY FOR BUYER FOR ANY LOSSES COVERED BY SECTION 0.

Limitation of Liability.

IN NO EVENT SHALL SELLER BE LIABLE TO BUYER OR ANY THIRD PARTY FOR ANY LOSS OF USE, REVENUE OR PROFIT OR LOSS OF DATA OR DIMINUTION IN VALUE, OR FOR ANY CONSEQUENTIAL, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR PUNITIVE DAMAGES WHETHER ARISING OUT OF BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, REGARDLESS OF WHETHER SUCH DAMAGES WERE FORESEEABLE AND WHETHER OR NOT SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, AND NOTWITHSTANDING THE FAILURE OF ANY AGREED OR OTHER REMEDY OF ITS ESSENTIAL PURPOSE.

IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED THE TOTAL OF THE AMOUNTS PAID TO SELLER FOR THE GOODS AND SERVICES SOLD HEREUNDER. THE LIMITATION OF LIABILITY PROVISIONS SET FORTH IN THIS SECTION 0 SHALL APPLY EVEN IF BUYER'S REMEDIES UNDER THIS AGREEMENT FAIL OF THEIR ESSENTIAL PURPOSE.

The limitation of liability set forth in **Section 0** shall not apply to (i) liability resulting from Seller's gross negligence or willful misconduct or (ii) death or bodily injury to the extent resulting from Seller's negligent acts or omissions.

Compliance with Law.

Generally. Buyer shall comply with all applicable laws, regulations and ordinances. Buyer shall maintain in effect all the licenses, permissions, authorizations, consents and permits that it needs to carry out its obligations under this Agreement. Buyer shall comply with all export and import laws of all countries involved in the sale of the Goods under this Agreement or any resale of the Goods by Buyer. Buyer assumes all responsibility for shipments of Goods requiring any government import clearance. Seller may terminate this Agreement if any governmental authority imposes antidumping or countervailing duties or any other penalties on Goods.

OFAC Representation and Warranty. Buyer is in compliance with the International Emergency Economic Powers Act (50 U.S.C. § 1701) and all other Laws administered by OFAC or any other Governmental Authority imposing economic sanctions and trade embargoes ("**Economic Sanctions Laws**") against countries ("**Embargoed Countries**") and persons designated in such Laws (collectively, "**Embargoed Targets**"). Buyer is not an Embargoed Target or otherwise subject to any Economic Sanctions Law.

OFAC Covenant. Without limiting the generality of **Section 0**, Buyer shall comply with all Economic Sanctions Laws. Without limiting the generality of the foregoing, Buyer shall not: (i) directly or indirectly export, re-export, transship or otherwise deliver the Goods or any portion of the Goods to an Embargoed Country or an Embargoed Target; or (ii) broker, finance or otherwise facilitate any transaction in violation of any Economic Sanctions Law.

Export Regulation (EAR and ITAR) Covenant. Buyer acknowledges that the Goods, including any software, documentation and any related technical data included with, or contained in, such Goods, and any products utilizing any such Goods, software, documentation or technical data (collectively, "**Regulated Goods**") may be subject to US export control Laws and regulations, including the Export Administration Regulations promulgated under the Export Administration Act of 1979, and the International Traffic in Arms Regulations administered by the US Department of State. Without limiting the

generality of **Section 0**, Buyer shall not, and shall not permit any third parties to, directly or indirectly, export, re-export or release any Regulated Goods to any jurisdiction or country to which, or any party to whom, the export, re-export or release of any Regulated Goods is prohibited by applicable federal or foreign law. Buyer shall be responsible for any breach of this Section by its, and its successors' and permitted assigns', parent, affiliates, employees, officers, directors, partners, members, shareholders, customers, agents, distributors, resellers or vendors that are not Buyer.

Foreign Corrupt Practices Act Representation and Warranty. Buyer is in compliance with the Foreign Corrupt Practices Act of 1977, as amended ("**FCPA**") and the UK Bribery Act of 2010 ("**Bribery Act**"). Neither Buyer nor any of its representatives has: (i) used any corporate funds for any unlawful contribution, gift, entertainment or other unlawful expense relating to political activity or to influence official action; (ii) made any direct or indirect unlawful payment to any foreign or domestic government official or employee from corporate funds; (iii) made any bribe, rebate, payoff, influence payment, kickback or other unlawful payment; or (iv) failed to disclose fully any contribution or payment made by Buyer (or made by any Person acting on its behalf of which Buyer is aware) that violates the FCPA or the Bribery Act.

Anti-Bribery Covenant. Without limiting the generality **of Section 0**, Buyer shall, and shall cause its representatives to, comply with the FCPA and the Bribery Act, including maintaining and complying with all policies and procedures to ensure compliance with these Acts.

Termination. In addition to any remedies that may be provided under these Terms, Seller may terminate this Agreement with immediate effect upon written notice to Buyer, if Buyer: (a) fails to pay any amount when due under this Agreement and such failure continues for ten (10) days after Buyer's receipt of written notice of nonpayment; (b) has not otherwise performed or complied with any of these Terms, in whole or in part; or (c) becomes insolvent, files a petition for bankruptcy or commences or has commenced against it proceedings relating to bankruptcy, receivership, reorganization or assignment for the benefit of creditors.

Waiver. No waiver by Seller of any of the provisions of this Agreement is effective unless explicitly set forth in writing and signed by Seller. No failure to exercise, or delay in exercising, any right, remedy, power or privilege arising from this Agreement operates, or may be construed, as a waiver thereof. No single or partial exercise of any right, remedy, power or privilege hereunder precludes any other or further exercise thereof or the exercise of any other right, remedy, power or privilege.

Confidential Information. All non-public, confidential or proprietary information of Seller, including but not limited to, specifications, samples, patterns, designs, plans, drawings, documents, data, business operations, customer lists, pricing, discounts or rebates, disclosed by Seller to Buyer, whether disclosed orally or disclosed or accessed in written, electronic or other form or media, and whether or not marked, designated or otherwise identified as "confidential" in connection with this Agreement is confidential, solely for the use of performing this Agreement and may not be disclosed or copied unless authorized in advance by Seller in writing. Upon Seller's request, Buyer shall promptly return all documents and other materials received from Seller. Seller shall be entitled to injunctive relief for any violation of this Section. This Section does not apply to information that is: (a) in the public domain; (b) known to Buyer at the time of disclosure; or (c) rightfully obtained by Buyer on a non-confidential basis from a third party.

Force Majeure. Seller shall not be liable or responsible to Buyer, nor be deemed to have defaulted or breached this Agreement, for any failure or delay in fulfilling or performing any term of this Agreement when and to the extent such failure or delay is caused by or results from acts or circumstances beyond the reasonable control of Seller including, without limitation, acts of God, flood, fire, earthquake, explosion, governmental actions, war, invasion or hostilities (whether war is declared or not), terrorist threats or acts, riot, or other civil unrest, national emergency, revolution, insurrection, epidemic, lockouts, strikes or other labor disputes (whether or not relating to either party's workforce), or restraints or delays affecting carriers or inability or delay in obtaining supplies of adequate or suitable materials, materials or telecommunication breakdown or power outage.

Assignment. Buyer shall not assign any of its rights or delegate any of its obligations under this Agreement without the prior written consent of Seller. Any purported assignment or delegation in violation of this Section is null and void. No assignment or delegation relieves Buyer of any of its obligations under this Agreement.

Relationship of the Parties. The relationship between the parties is that of independent contractors. Nothing contained in this Agreement shall be construed as creating any agency, partnership, joint venture or other form of joint enterprise, employment or fiduciary relationship between the parties, and neither party shall have authority to contract for or bind the other party in any manner whatsoever.

No Third-Party Beneficiaries. This Agreement is for the sole benefit of the parties hereto and their respective successors and permitted assigns and nothing herein, express or implied, is intended to or shall confer upon any other person or entity any legal or equitable right, benefit or remedy of any nature whatsoever under or by reason of these Terms.

Governing Law. All matters arising out of or relating to this Agreement are governed by and construed in accordance with the internal laws of the State or nation where Seller has its principal place of business, without giving effect to any choice or conflict of law provision or rule that would cause the application of the laws of any jurisdiction other than those of such State. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to the transactions contemplated by these Terms and Conditions.

Submission to Jurisdiction. Any legal suit, action or proceeding arising out of or relating to this Agreement shall be instituted in the courts of the State or nation where Seller has its principal place of business, and each party irrevocably submits to the exclusive jurisdiction of such courts in any such suit, action or proceeding.

Notices. All notices, requests, consents, claims, demands, waivers and other communications hereunder (each, a "**Notice**") shall be in writing and addressed to the parties at the addresses set forth on the face of the Sales Confirmation or to such other address that may be designated by the receiving party in writing. All Notices shall be delivered by personal delivery, nationally recognized overnight courier (with all fees pre-paid), facsimile (with confirmation of transmission) or certified or registered mail (in each case, return receipt requested, postage prepaid). Except as otherwise provided in this Agreement, a Notice is effective only (a) upon receipt of the receiving party, and (b) if the party giving the Notice has complied with the requirements of this Section.

Severability. If any term or provision of this Agreement is invalid, illegal or unenforceable in any jurisdiction, such invalidity, illegality or unenforceability shall not affect any other term or provision of this Agreement or invalidate or render unenforceable such term or provision in any other jurisdiction.

Survival. Provisions of these Terms which by their nature should apply beyond their terms will remain in force after any termination or expiration of this Order including, but not limited to, the following provisions: Insurance, Compliance with Laws, Confidential Information, Governing Law, Submission to Jurisdiction and Survival.

Amendment and Modification. These Terms may only be amended or modified in a written document stating specifically that it amends these Terms and is signed by an authorized representative of each party. Only the VP&GM of the Business or the General Counsel of CECO are authorized to approve.

6/6/19 SLY WET VENTURI SCRUBBER COSTS

	Quotation Number	Project Manager	FOB
	6682-PH1	Dwayne Sanders 440-274-0143	Shipping Point
	Expiration	**Sales Representative**	**Terms**
	30 days	Ed McAdoo 610-831-0505	30/30/40
8300 Dow Circle, Suite 600, Strongsville, OH 44136 www.slyinc.com			

June 6, 2019

Ms. Katherine E. Cirone, P.E.
Compliance Specialist
LIBERTY ENVIRONMENTAL, INC.
315 W. James Street, Suite 205
Lancaster, PA 17603
O: 717.517.5023 | C: 908.930.1455
kcirone@libertyenviro.com

Subject: Sly quotation 6682-PH1, No. 3 & 5 Venturi Scrubbers for Cocoa Bean Roaster emissions
Mars Wrigley Confectionery, Roaster Replacement, Elizabethtown, PA

Dear Katie,

Thank you for your interest in Sly products. We are pleased to present our proposal in accordance with the attached terms and conditions.

DESIGN CONDITIONS AND PRICING:

Application:	Cocoa Bean Roaster	Cocoa Bean Roaster
Scenario:	A: Roaster & Mill	B: Roaster, Mill, and Cooler
Inlet Gas Flow Rate:	5200 acfm	9800 acfm
Inlet Temperature:	225 Deg F	140 Deg F
Inlet Relative Humidity:	8% vol	8% vol
Inlet Static Pressure:	-10" WC	-10" WC
Contaminants:	Particulate & VOCs	Particulate & VOCs
Inlet Loading:	2.81 lb/hr PM; 10.22 lb/hr VOC	3.63 lb/hr PM; 14.22 lb/hr VOC
Particle Size Distribution:	See last page	See last page
Scrubbing Solution:	50 gpm recirculated water	90 gpm recirculated water
Required Efficiency:	80 – 90%	80 – 90%
Outlet Gas Flow Rate:	4578 acfm	9418 acfm
Outlet Temperature:	119 Deg F	110 Deg F
Water Evaporation:	0.95 gpm	0.57 gpm
Design Rating:	+/- 30" WC	+/- 30" WC
Location:	Elizabethtown, PA	Elizabethtown, PA
Venturi Model No.:	**3**	**5**
Pump Motor HP:	**5 HP**	**5 HP**
Recirculation Tank Volume:	**290 gallons**	**550 gallons**
Exhaust Fan BHP/Motor HP:	**30 BHP / 40 HP**	**62 BHP / 75 HP**
Scrubber and Supports	**$43,220**	**$55,820**
Pump and Tank:	**$18,100**	**$23,250**
Instrumentation:	**$5,780**	**$5,780**
Exhaust Fan:	**$20,230**	**$27,120**

Sly recommends the following equipment selection:

- Venturi Scrubber and Cyclonic Separator with general dimensions as shown on the accompanying data sheet.

- The pressure drop through the scrubber is adjustable, but is recommended to be 12" WC. The actual required pressure drop will be determined by the particle size distribution and the required efficiency/outlet requirement.

- Based on the design conditions, we recommend the use of recirculated water at 3 psig (nominal distributor pressure).

- A continuous blowdown of the scrubbing solution is required and estimated TBD gpm.

- Makeup water requirement is estimated TBD gpm.

MATERIALS OF CONSTRUCTION:

Venturi Shell:	11 gauge 304L stainless steel
Separator Shell:	11 gauge 304L stainless steel
Tank:	11 gauge 304L stainless steel
Flanges:	3/16” 304L stainless steel
Fittings/Piping:	304 SS
Hardware:	316 SS
Gaskets:	Black neoprene

The Venturi and Cyclonic Separator will be constructed with the following accessories:

- Vertical flanged square process air inlet.
- Two water recirculation inlet connections below process air inlet.
- Manually adjustable Venturi throat damper to control pressure drop through the scrubber.
- 90 degree flooded elbow at bottom of Venturi section to minimize abrasion.
- Threaded couplings with plugs for drain.
- Separator has 30 degree sloped bottom with flanged connection for drain
- Horizontal flanged square gas outlet located near top of separator.
- Bolted access doors in the Venturi and cyclonic separator.
- Manually adjustable "spin" damper at the separator inlet.
- 1 set of support lugs on both Venturi and separator.
- Support structure to straddle recirculation tank.

RECIRCULATION SYSTEM COMPONENTS:

- Horizontal, end-suction centrifugal, close coupled pump of 316SS with mechanical seal, and TEFC motor for 3/60/460 VAC. The pump is rated for 70 feet total head.

- Closed top tank of 11 gauge 304L stainless steel with overflow weir, internal strainer and 45 degree sloped end for easy cleanout. Tank to be equipped with threaded connection for pump suction, drain, overflow, level control, and vent line.

SYSTEM INSTRUMENTATION: (controls by others)

- (1) Differential pressure gauge with Impolene tubing and fittings for scrubber pressure drop.
- (1) Magnetic flowmeter to monitor liquid flow to Venturi.
- (1) Magnetic flowmeter to monitor liquid flow to blowdown.
- (3) Pressure gauges to monitor each Venturi water inlets and the pump discharge.
- (1) Makeup water float valve, brass.

EXHAUST FAN:

- Exhaust Fan, Series IRO, Arrangement No. 1 belt drive, radial blade paddle wheel, Class 50D, 304LSS gas contact materials. Fan rated at 24" WC static pressure (-10" WC upstream of Scrubber, 12" WC Venturi dP, 2" WC duct losses). Estimated sound at 5' from acoustic center 93 dBA.

  Accessories include:
  - Shaft and bearing guard
  - Flanged inlet and outlet
  - V-Belt drive with guard
  - Drain & plug
  - Manual outlet damper
  - Clean out door
  - Unitary base
  - TEFC premium efficiency motor for 3/60/230/460 VAC

PAINT:

- Support legs and support structure of carbon steel construction and are to be treated with SSPC-SP-3 preparation and one prime coat of Mobile Silicone Alkyd to 1-2 mils DFT and one finish coat of Mobile Acrylic Enamel to 1-2 mils min DFT. Color: OSHA Blue.

FINISHING:

- Welding is per Sly standard procedures including continuous full penetration welds on the exterior.
- Weld spatter is removed but no further weld finishing is performed.
- All 304L stainless steel sheets are 2B mill finish on internal product contact side.
- External 304L surfaces are grit blasted to matte finish.

The following items are not included as part of the proposal and are to be provided by others:

- Piping, valves and fittings
- Freight
- Unloading and storage of equipment
- Foundations and anchors
- Installation labor
- Field engineering services
- Testing
- Access ladders and platforms
- Ductwork (external to system)
- Stack
- Field plumbing
- Field wiring
- Motor starters
- Control panel

For Indoor Installations with Combustible Particulate Solids or Explosion Hazards

In accordance with NFPA-654 (2013 Edition), all wet scrubbing equipment installed indoors where an explosion hazard exists must include an interlock to shut down the system in the event the water supply through the scrubber ceases or becomes inadequate to effectively scrub the particulate from the gas stream. This is to prevent the formation of a combustible dust cloud within the scrubber vessel. Refer to NFPA-654 2013 Edition, sections 7.13.1.1.1 & 7.13.1.1.2 for complete details and guidelines. OSHA regulates facilities regarding combustible dusts and the end user is ultimately responsible for the safety of the installation.

VALIDITY:

The prices contained herein are valid for a period of 30 days, after which we reserve the right to review our quote.

ORDERS:

Purchase orders should be addressed to Sly Incorporated, 8300 Dow Circle, Suite 600, Strongsville, Ohio 44136. Written purchase orders must be received and accepted by Sly before engineering commences.

TERMS:

30% with order, NET 10 days.
30% with submittal of engineering approvals (NET 30 or before shipment, whichever occurs first).
40% NET 30 DAYS. Prices are firm for acceptance in 30 days and shipment as noted below. An order placed on any or all the above equipment/services is subject to attached "Terms and Conditions". Any additional terms or conditions contained in Buyers Request for Quote or Purchase Order shall be deemed of no consequence to the contract and shall not be binding upon Seller unless agreed to in writing by the Seller. Acknowledgment of Buyer's Purchase Order by Seller will not constitute acceptance of Buyer's Terms and Conditions regardless of statements to the contrary. Terms are subject to credit approval at time of order.

FREIGHT:

If the cost of freight to deliver your equipment from our production facility is not included above, we will provide you with "pre-pay and add" service at an additional charge of 15% of the actual freight invoice. This cost will appear on your invoice as "Logistic Fee" along with the actual cost of the transportation. Transportation fees will be invoiced separately from the equipment.

SHIPMENT:

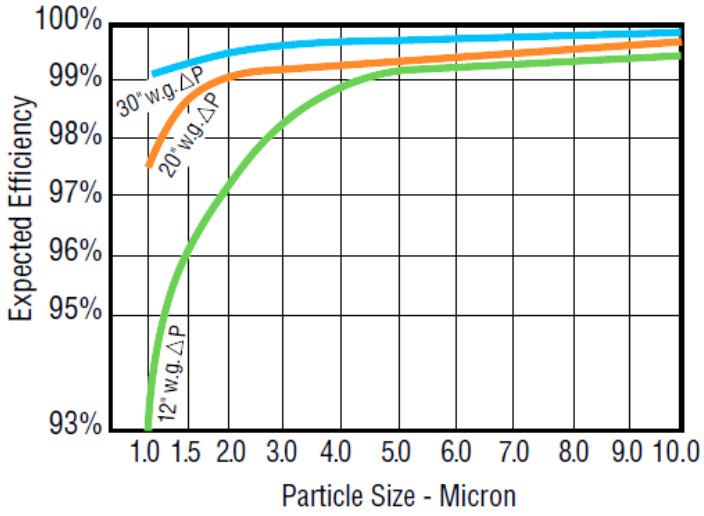
8 to 10 weeks after receipt of approval drawings.
4 to 5 weeks after date of order acknowledgment and scheduling. Drawings will be provided in AutoCAD and PDF format. If an alternate format is required please advise immediately to avoid additional charges and/or delays.

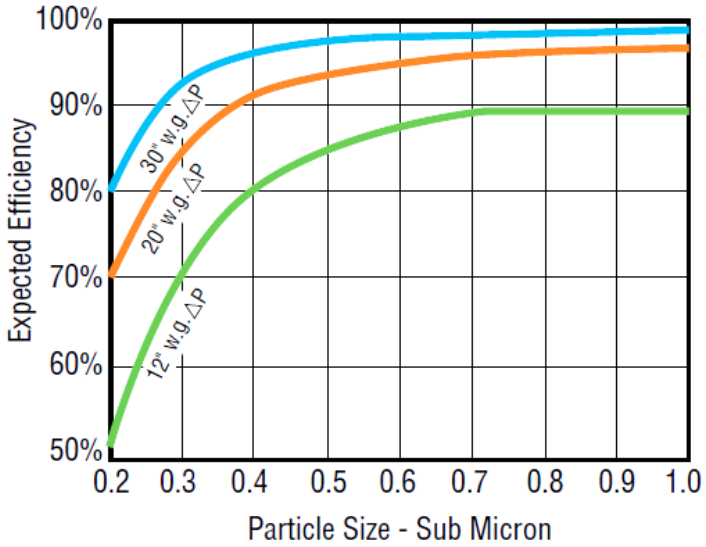
NOTE: ABOVE SUBJECT TO VERIFICATION AT TIME OF ORDER.

PERFORMANCE:

Statements of performance expectations for the proposed scrubber system are offered for information purposes only and do not express or imply any guarantees of performance to buyer or specific remedies by Seller. Any guarantees of performance expressed in this quotation will be limited to the stated terms of that guarantee. In all cases, the customer will bear the sole responsibility to verify scrubber design criteria and system performance.

Sly Venturi Scrubber Efficiencies





SLY VENTURI EFFICIENCY

Zone 2, Test 2 Particle Size Distribution

LOWER SIZE MICRONS	UPPER SIZE MICRONS	AVERAGE SIZE MICRONS	% BY WEIGHT	**12" D.P. EFF.**	20" D.P EFF.	30" D.P. EFF.
1.00	1.50	1.25	12.3000	11.4390	11.9925	12.1770
1.50	2.00	1.75	7.9000	7.5445	7.7815	7.8447
2.00	2.50	2.25	5.0000	4.8500	4.9500	4.9750
2.50	5.00	3.75	16.4000	16.1376	16.2852	16.3377
5.00	10.00	7.50	20.1000	19.9794	20.0196	20.0678
10.00	20.00	15.00	20.9000	20.8687	20.8791	20.8791
20.00	30.00	25.00	12.3000	12.2877	12.2877	12.2877
30.00	40.00	35.00	4.2000	4.1958	4.1958	4.1958
40.00	50.00	45.00	1.1000	1.0989	1.0989	1.0989
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
0.00	0.00	0.00	0.0000	0.0000	0.0000	0.0000
		REMOVAL	**100.20**	**98.4016**	**99.4903**	**99.8637**